

**September 28 to 30, 2023**



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ON TECHNOLOGY, ENGINEERING:  
PROCESSES AND PRODUCTS

ONLINE CONFERENCE

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# IV ICTEPP

IV International Conference on Technology,  
Engineering: Processes and Products

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# IV INTERNATIONAL CONFERENCE ON TECHNOLOGY, ENGINEERING: PROCESSES AND PRODUCTS

September 28 to 30, 2023

ONLINE CONFERENCE

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 **3ciencias** - [info@3ciencias.com](mailto:info@3ciencias.com)

## PRESENTATION

From **3Ciencias**, we are thrilled to introduce the latest edition of the **IV International Conference on Technology, Engineering: Processes and Products**. This conference was initiated with the primary objective of fostering the dissemination and exploration of cutting-edge scientific discoveries across various disciplines within the realms of Technology and Engineering.

Scheduled to unfold from **September 28 to 30, 2023**, this event is all set to break boundaries and overcome the traditional constraints of time and place. By adopting a **virtual** format, we are eliminating geographical and temporal barriers, making it accessible to professionals worldwide, be they experts, educators, researchers, or anyone with an interest in these fields.

The conference promises a diverse array of engaging content, including abstracts, presentations, and videos featuring keynote speakers who are at the forefront of their respective domains. These presentations will be readily available to anyone keen on gaining insights into the latest developments in Technology and Engineering.

Furthermore, the culmination of this event will result in the creation of the **Book of Proceedings**, a compendium that encapsulates the collective knowledge shared during the conference. Published with an **ISBN**, this book will serve as a valuable resource for scholars and enthusiasts alike. To ensure its reach and impact, it will undergo a process of indexation in various esteemed conference proceedings databases. Notably, it will be submitted for inclusion in the **Conference Proceedings Citation Index of Clarivate** and **EI Compendex**, thus cementing its place in the annals of esteemed scientific literature.

In this ever-evolving age of technology and engineering, the **IV International Conference on Technology, Engineering: Processes and Products** is poised to be a significant platform for fostering collaboration, sharing innovative research, and contributing to the advancement of these vital fields. We invite you to be a part of this extraordinary journey and join us in exploring the frontiers of knowledge and innovation.

The **main lines** of research will be the following:

- **The application of big data and artificial intelligence technology in social sciences.**
- **The application of big data in economic and financial management.**
- **Application of Data Model and machine learning technology.**
- **Big data, neural network algorithms and their applications.**
- **Applications of artificial intelligence in engineering.**

WELCOME TO

# IV ICTEPP

IV International Conference on Technology,  
Engineering: Processes and Products

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# AIMS & SCOPE

## PUBLISHING GOAL

**3Ciencias**, through **3C Conferences**, wants to transmit innovative projects and ideas to society. This objective is achieved through the publication of **original scientific articles**. **3C Conferences** is a group that organizes **social-scientific conferences**, where original works are disseminated, written in English.

The **main lines** of research for **IV ICTEPP** are the following:

- The application of big data and artificial intelligence technology in social sciences.
- The application of big data in economic and financial management.
- Application of Data Model and machine learning technology.
- Big data, neural network algorithms and their applications.
- Applications of artificial intelligence in engineering.

## SUBMISSION GUIDELINES

**3Ciencias** is an arbitrated journal that uses the **double-blind peer** review system, where external experts in the field on which a paper deals evaluate it, always maintaining the anonymity of both the authors and of the reviewers. The citations follows the standards of publication of the APA for indexing in the main international databases. The **maximun number of pages** is 15 per article. **Recommended** 6-8 pages.

## OUR TARGET

- Research staff.
- PhD students and Professors.
- Companies that develop research and want to publish some of their works.

## ETHICAL RESPONSIBILITIES

Previously published material is not accepted (they must be **unpublished works**). The list of signing authors must include only and exclusively those who have contributed intellectually (authorship). **Items that do not strictly comply with the standards are not accepted.**

# PLENARY SPEAKERS



## **PRAVEEN AGARWAL**

**Vice Principal | Chief Coordinator-International Relations,  
Anand-ICE**

Dr. P. Agarwal was born in Jaipur (India) on August 18, 1979. After completing his schooling, he earned his Master's degree from Rajasthan University in 2000. In 2006, he earned his Ph. D. (Mathematics) at the Malviya National Institute of Technology (MNIT) in Jaipur, India, one of the highest ranking universities in India. Dr. Agarwal has been actively involved in research as well as pedagogical activities for the last 20 years. His major research interests include Special Functions, Fractional Calculus, Numerical Analysis, Differential and Difference Equations, Inequalities, and Fixed Point Theorems.

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## **ZULQURNAIN SABIR**

**Doctor of Mathematics in Hazara University**

Zulqurnain Sabir was born in Pothi, Jhelum, Pakistan. He received the M.Sc. degree in mathematics from Punjab University, Lahore, Pakistan, and the M.Phil. degree in mathematics from Preston University Kohat, Islamabad Campus, Pakistan. He is currently pursuing the Ph.D. degree in mathematics with Hazara University, Mansehra, Pakistan.

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## **ABDON ATANGANA**

**Professor of Applied Mathematics. Natural and Agricultural  
Sciences, Institute of Groundwater Studies**

Prof Abdon Atangana is a leading applied Mathematics professor at the UFS. He obtained his honours and master's degrees from the Department of Applied Mathematics at the UFS with distinction. He obtained his PhD degree in applied mathematics from the Institute for Groundwater Studies. He serves as an editor for 18 international journals and is also a reviewer of more than 200 international accredited journals and has been awarded the world champion of peer review twice, in 2016 and 2017. He also serves on more than 20 editorial boards of applied mathematics and mathematics.

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### **SERGEI ODINTSOV**

**ICREA Research Professor at Institut de Ciències de l'Espai (CSIC - ICE). Experimental Sciences & Mathematics**

ICREA Research Professor at ICE (CSIC-IEEC) since 2003. Author of about 700 articles cited over 55000 times. Two ms were cited more than 3000 times, while six ms and two books – more than 1000 times each. Foreign Member of the Royal Norwegian Academy, member of Eur. Phys. Soc., Italian Grav. Soc. Awarded by Amaldi Gold Medal: European Prize for Grav. Physics 2014. Editorial Board Member of six journals, Editor-in-Chief of journal Symmetry and referee of about 20 journals (with dozen excellence certificates). Hirsh index  $h=115$ (Google S.),  $h=105$ (inspirehep),  $h=97$ (Scopus). Supervisor of 14 PhDs. Speaker/lecturer of about 120 and organizer of 40 int. workshops. Top Cited Clarivate Analytics Researcher in 2014-2018. Honorary Professorship: TSPU(2019), TUSUR(2020). Golden sign Grain of Truth from professors Union (2022).

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### **HACI M. BASKONUS**

**PhD, Professor (Full) at Harran University, Turkey**



Dr. Haci Mehmet Baskonus is currently an Assoc. Prof. in Harran University. He has published more than 165 articles in various reputed and leading journals being SCI and SCI-E and many others. His research interests include ordinary and partial differential equations, analytical methods for linear and nonlinear differential equations, mathematical physics, numerical solutions of the partial differential equations, fractional differential equations (of course ordinary and partial) and computer programmings such as Mathematica, Pascal and Maple. He is an active reviewer of a plethora of papers and books, and has received several national and international awards. He has supervised two PhD students, several MSc. and undergraduate students, and has been the external evaluator for many PhD theses various countries from all over the world.

ORCID: [0000-0003-4085-3625](https://orcid.org/0000-0003-4085-3625)

### **JUAN L. G. GUIRAO**

**Full Professor of Applied Mathematics**



Juan Luis García Guirao is Full Professor of Applied Mathematics at Technical University of Cartagena in Spain. He obtained his Degree in Mathematics at Universidad de Murcia (Spain) in 2001. Covering all the subjects of the Degree in four year, he used the last one for working on his Master Thesis. Under the supervision of Professor Francisco Balibrea, Full Professor of Mathematical Analysis and founder the Dynamical Systems Group of the Region of Murcia (<http://www.um.es/sistdynamics>) he defended his Master Thesis in 2001 and PhD Thesis in 2004. The PhD had European Mention and the predoctoral research stay was done at Instituto Superior Tecnico in Lisbon under the supervision of Professor José Sousa-Ramos, one of the main researchers in Dynamical Systems in Portugal, who passed away in 2007.

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# SCHEDULE

All conferences of the **Plenary Speakers** will have **morning hours** and will be offered openly to anyone who has **the link that will be sent via e-mail in the days prior to the start of the congress.**

During the presentation of the speakers, all microphones will remain closed until the speaking turn, which will be attended to one by one, until the schedule is complete.

All times indicated are **Spanish Time** (Madrid). UTC +2.

Schedules may be **subject to change due to technical issues.** However, they will be indicated as soon as possible, unless canceled.

The conference schedules for those **Selected Articles** will be informed by e-mail at least 15 days before the start of the conference.

## SEPTEMBER 28, 2023 - First Day

▽ 9:00 h. - 11:00 h.

**SPEAKER: ABDON ATANGANA**

*“On Fractional Calculus: A Review”*

Chairman: Juan L.G. Guirao

**Abstract:**

The aim of the talk is to make a review of the recent advances of fractional calculus. New results and new trends will be stated.

▽ 11:30 h. - 13:30 h.

**SPEAKER: JUAN L. G. GUIRAO**

*“Periodic Points in Dynamical Systems”*

Chairman: Abdon Atangana

**Abstract:**

In this talk we will make a survey on different methods for obtaining periodic orbits in dynamical systems. In particular we shall compare the classical combinatorial dynamics and the new methods coming from Algebraic Topology and Lefschetz fixed point theory.

## SEPTEMBER 29, 2023 - Second Day

▽ 9:00 h. - 11:00 h.

**SPEAKER: SERGEI ODINTSOV**

*“Modified Gravity for Unification of Inflation with Dark Energy: Higher-derivative Equations and Dynamical System Approach”*

Chairman: Zulqurnain Sabir

**Abstract:**

The brief review of modified or extended gravity which is higher-derivative extension of general relativity is given. Number of such models is presented. It is demonstrated that such theories may give the consistent resolution for the universe history puzzle, as they naturally explain early-time as well as late-time acceleration.

▽ 11:30 h. - 13:30 h.

**SPEAKER: ZULQURNAIN SABIR**

*“Modern Cosmology: An Overview on Dark Energy”*

Chairman: Sergei Odintsov

**Abstract:**

I develop the theory which should describe our universe evolution as a whole. My main purpose is to resolve the fundamental puzzle of modern cosmology: why and how the universe accelerates? What is Dark Energy and Inflation? In fact, I proposed the first modified gravity which may describe the consistent universe history. In relation with modified gravity we proposed new very general and non-singular entropy which generalises known earlier variants.

## SEPTEMBER 30, 2023 - Third Day

▽ 9:00 h. - 11:00 h.

**SPEAKER: PRAVEEN AGARWAL**

*“New Concepts of Fractional Quantum Calculus and Applications to Impulsive Fractional Q-Difference Equations”*

Chairman: Sergei Odintsov

**Abstract:**

We define new concepts of fractional quantum calculus by defining a new q-shifting operator. After giving the basic properties we define the q-derivative and q-integral. New definitions of Riemann-Liouville fractional q-integral and q-difference on an interval are given and their basic properties are discussed.

▽ 11:30 h. - 13:30 h.

**SPEAKER: HACI M. BASKONUS**

*“Cancer Treatment Model with the Caputo-Fabrizio Fractional Derivative”*

Chairman: Juan L.G. Guirao

**Abstract:**

A model for cancer treatment is examined. The model is integrated into the Caputo-Fabrizio fractional derivative first, to examine the existence of the solution. Then, the uniqueness of the solution is investigated and we identified under which conditions the model provides a unique solution.

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# CONSTRUCTION OF MULTIMEDIA HIGHER VOCATIONAL EDUCATION MANAGEMENT SYSTEM BASED ON K-MEANS ALGORITHM

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## ABSTRACT

Multimedia technology is one of the hottest technologies currently being used in all walks of life. The integration of multimedia technology in higher education will lead to a new teaching model in education. In this paper, a segmented sample data selection method based on the K-mean clustering algorithm is used to experiment with three different neural network classifiers in combination with manual and UCI datasets managed by multimedia higher education. The problems of applying multimedia technology to higher education and the solutions can effectively improve higher education teaching. BP had the highest correct rate on the test set of the training set with 84.64% under the training set where teachers were not mature enough to master the technology. On the lack of teacher-student interaction, the correct rate of LVQ was 66.47%. In terms of incorporating advanced network technology degree, LVQ has the highest correct rate of 65.79% on the test set. It indicates that the

sample set selected by the monks dataset has a high classification accuracy on LVQ.

## **KEYWORDS**

K-means; Multimedia Technology; Higher Education Institutions; Teaching Management

## **1. INTRODUCTION**

Multimedia technology is a new teaching tool, and the integration of multimedia technology in higher education teaching can not only change the learning mindset and improve teaching quality, but also stimulate students' enthusiasm and enthusiasm for learning and enhance their interest in participating in teaching [1-2]. Therefore, in higher vocational teaching, teachers should constantly learn new multimedia technologies, improve their teaching level, enrich teaching resources, and promote students' active learning initiatives [3]. Schools should continuously improve the network teaching conditions, provide convenience for student teachers, realize networked teaching, and then realize the overall improvement of teaching effect. With the continuous development of the Internet and multimedia technology, multimedia intelligence began to penetrate in all aspects of life, which has brought a lot of change thinking about the development of education [4-5].

The literature [6] analyzed the role of multimedia technology in physical education and put forward the method of computer-assisted physical education in conjunction with the development of multimedia technology in higher vocational education. The literature [7] pointed out that the application of multimedia technology in badminton teaching mode can improve the quality of badminton teaching in a targeted way, enhance the communication ability and cultivate the spirit of solidarity among students. In the literature [8], a scenario-based teaching in higher education institutions supported by 5G network technology and artificial intelligence was constructed based on information technology and artificial intelligence. Literature [9] used multimedia technology to update teaching methods, evoke students' enthusiasm and motivate them to learn. With the vigorous promotion of education informatization and in the process of

vigorously advocating innovative education, the extensive use of modern educational technology, especially computer multimedia, in the English classroom has become an inevitability [10].

This paper firstly puts forward the influence of multimedia technology on the management of higher education. Among the advantages of multimedia application in classroom education, it can make the teaching content more visual and concrete, and is conducive to inspiring students' innovative thinking. However, at the same time, there are problems in applying multimedia to classroom education, mainly including teachers' lack of maturity in mastering technology, lack of teacher-student interaction and insufficient integration with advanced network technology. Then, under the clustering algorithm of K-means, three training sample sets based on monks2 dataset are tested by BP, LVQ and ENN respectively under the segmented sample data selection method, which are used to verify the problems of multimedia application in higher education management system.

## **2. THE IMPACT OF MULTIMEDIA TECHNOLOGY ON THE MANAGEMENT OF HIGHER EDUCATION**

### **2.1. ADVANTAGES OF MULTIMEDIA APPLICATION IN CLASSROOM EDUCATION**

The application of multimedia technology can promote a new color of teaching methods, inject fresh blood into the traditional teaching mode, promote the teaching reform, and promote the development and progress of education. The advantages of multimedia application in the classroom can be reflected in the following aspects.

#### **(1) Make the teaching content more image specific**

Higher vocational education focuses on vocational skills training and application technology operation, which mainly cultivates students' operation ability. However, in many cases, students can't or shouldn't practice directly, at this time, the introduction of multimedia teaching will make up for this defect. Multimedia technology shows the teaching content through sound, video and other forms, turning invisible into visible and obscure into concrete, which enriches the teaching content and improves students' learning enthusiasm.

#### **(2) It helps to inspire students' creative thinking**



Higher vocational students are generally lazy in learning and lack the initiative to think in learning. Teachers can use multimedia technology to reasonably design pictures, animations, sounds and other forms to gradually guide students to learn, feel and understand the teaching content. Change the original sequential teaching into flashback or interpolation teaching, so that students can discover problems, seek solutions, expand their thinking ability and improve their innovative consciousness in the learning process, so as to achieve better teaching purposes.

## **2.2. EXISTENCE OF PROBLEMS**

### **(1) Teachers are not mature enough**

At present, most of the teachers in higher education are not professional multimedia technicians, and the technology they master is limited, so the designed courseware is relatively single, and the teaching content cannot be shown in a comprehensive and deep level. This restricts students' enthusiasm for learning, and the quality of teaching cannot be improved, which to a certain extent affects students' learning efficiency and quality, resulting in multimedia teaching staying in form, but no substantial breakthrough.

### **(2) Lack of teacher-student interaction**

The process of teaching is a process of cooperation and interaction between teachers and students, and the students' reaction will affect the teachers' teaching ideas and teaching process. Some teachers use multimedia teaching only as a process of playing, ignoring students' reactions and weakening the role of multimedia technology. Moreover, most higher vocational students lack self-confidence and are not willing to interact with teachers in class. This loses the original meaning of multimedia teaching and does not achieve the proper teaching effect.

### **(3) Insufficient integration with advanced network technology**

Due to objective or subjective reasons, the use of multimedia is not integrated enough with the network, and the network coverage rate of some schools is not high enough. In today's era of continuous progress and change, the form of teaching is constantly updated, and along with the advent of the information era, multimedia technology is being used more and more widely in modern teaching. With the

popularity of projectors, computers, tablet PCs and the Internet, multimedia technology is increasingly used in teaching, which injects new vitality into traditional teaching and provides new ways for students to learn, which is of great significance to improve the quality of teaching.

### 2.3. SURVEY RESULTS AND ANALYSIS OF THE CURRENT STATUS OF MULTIMEDIA TECHNOLOGY APPLICATION

Teachers are the main body of multimedia technology application, and whether the teachers' needs for equipment and technology are met is directly related to the efficiency of multimedia teaching. The following is an analysis of teachers' demand for multimedia technology training, hardware equipment demand and the demand for multimedia technology types. The results of the analysis of the current situation of the application of multimedia technology are shown in Table 1. Some teachers think they need to improve the college's network environment, some think they need to improve the school's computer configuration, some think they need to improve the college's audio and microphone, and some think they need to improve the college's projector.

**Table 1.** Analysis of the current application of multimedia technology

Multimedia technology application status	Test Dimension	Percentage %
Teachers' training needs for multimedia technology	Very much needed	34
	Need	39
	Not required	27
Teachers see the need for better hardware and equipment	Very much needed	29
	Need	46
	Not required	25
Faculty needs for types of multimedia technology	Very much needed	31
	Need	48
	Not required	21

### 3. ANALYSIS OF THE APPLICATION OF MULTIMEDIA HIGHER EDUCATION MANAGEMENT SYSTEM UNDER K-MEANS

Under the clustering algorithm of K-means, this paper designs a management system classifier design method based on K-means for multimedia higher education by using segmented sample data selection method. The method can select typical samples and reduce the number of training samples, while ensuring the quality of the

neural network classifier. The selected data train the neural network classifier, which effectively improves the performance of the neural network classifier. In order to verify the problems of multimedia application in higher education management system, 999 sample data were selected and the sample set was equally divided into each training set. Here, the monks2 dataset from UCI is used for the experiment, and the problematic sample data selection method is combined with the neural network classifier and the experimental results are analyzed and summarized, and the details of each dataset are shown in Table 2.

**Table 2.** Analysis of monks2 dataset

Training set	Sample set size	Network Model	Test set correct %
Teachers are not mature enough to master the technology	333	LVQ	70.34
		ENN	34.59
		BP	84.64
Lack of teacher-student interaction	333	LVQ	66.47
		ENN	33.46
		BP	65.74
Insufficient integration with advanced network technologies	333	LVQ	65.79
		ENN	34.54
		BP	64.70

For the three training sample sets of the monks2 dataset were tested by training BP, LVQ, and ENN respectively, all three neural networks failed to achieve the classification error accuracy (0.02). Under the training set where the teachers did not master the technique well enough, BP had the highest correct rate of 84.64% on the test set of the training set. On the lack of teacher-student interaction, LVQ had the highest test set correct rate of 66.47%, but it was not much different from that of BP. In terms of advanced network technology integration, LVQ had the highest test set correct rate of 65.79%.

#### 4. CONCLUSION

In this paper, based on the K-mean algorithm, the maximum influencing factors of the problems of multimedia applications in higher education management system are verified from the perspective of UCI dataset design, and the design effect of the method is verified in the process of practical application. Three training sample sets of monks2 dataset are used to test the three problems of multimedia application in higher education management

system by BP, LVQ and ENN training respectively. BP had the highest correct rate in the training set with 84.64% correct rate in the test set under the training set where the teachers did not master the technology maturely enough. LVQ had the highest test set correct rate on the lack of teacher-student interaction, with a test set correct rate of 66.47%. In terms of advanced web technology integration, LVQ had the highest test set correctness with a test set correctness rate of 65.79%. The sample set selected for the monks dataset has higher classification accuracy on LVQ, indicating that the sample set selected for the monks dataset has higher classification accuracy on LVQ.

## **5. FUNDING**

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## Computer-assisted teaching in the teaching of endodontics

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### **ABSTRACT**

The study of the practical results of computer-assisted teaching in endodontics is to better grasp the students' learning status and improve their ability to perform surgical operations. In this paper, a digital approach combining computer-aided design and fabrication techniques, 3D printing technology and digital colorimetric technology are used in order to achieve minimally invasive aesthetic restorations for oral surgery. At the same time, the hardware construction and teaching software production are optimized to maximize the teaching effect. The results showed that after the computer-assisted teaching surgical practice, the students' scores of root canal positioning treatment and interrupted tooth surgery reached 75 and 86, 5-6 points more than predicted, and the scores of simple surgical implantation and extraction reached 95-96, respectively, 9-10 points higher than before the practical training. This shows the positive significance of computer-assisted teaching in endodontic teaching.

## KEYWORDS

Computer-assisted instruction; Endodontics; 3D Printing; Digital

## 1. INTRODUCTION

With the rapid popularization and development of computer applications, computer-assisted teaching CAI, has become an important part of modern educational science and teaching methods [1]. As an important part of educational technology reform in higher education institutions, computer-assisted teaching is an advanced teaching method combining computer technology, information technology, educational theory and professional knowledge. Compared with the traditional chalk and blackboard teaching method computer-assisted teaching has great superiority in both form, content and teaching effect [2]. Since 1998, computer-assisted teaching has been tried in the theoretical teaching of endodontics, and hardware, software and teachers are the three elements of computer-assisted teaching. In order to give full play to the superiority of computer-assisted teaching, many efforts have been made in these three aspects by previous authors, and good teaching effects have been received through several years of practice and improvement [3-4].

In addition, there is a risk of postoperative infection, which can affect the aesthetics and masticatory function of the patient's teeth, and some media reports indicate that the long-term treatment effect of dry pulp surgery is poor [5]. Root canal therapy can effectively remove necrotic material from the root canal and pulp chamber of the affected tooth, and perfect root canal filling after adequate swabbing and disinfection of the root canal, which can avoid periapical lesions and improve the patient's masticatory function. Root canal treatment RCT is one of the basic treatment methods for endodontic disease, and the conventional treatment method is multiple times method RCT, which has better treatment effect. However, with the development of modern root canal treatment technology, disposable RCT is gradually promoted and applied in the clinic, and its efficacy and safety are affirmed by more and more clinicians [6]. Computer-aided teaching applied to medicine can be fully optimized in terms of treatment efficiency, medication, treatment time, tooth occlusion force, bleeding

index, gingival index, inflammatory factor level, and complications, shortening the surgical treatment cycle and reducing patients' pain [7].

Based on this, this paper investigates the effectiveness of computer-assisted teaching techniques in teaching endodontics. Firstly, through computer-aided design and computer-aided fabrication process, 3D printing technology and digitally optimized colorimetric technology are used to achieve the purpose of minimally invasive aesthetic restorations for dental treatment. Computer-aided teaching hardware creation and software production were used to reach the computer-aided teaching practical method, and the students' performance before and after the practical training was compared to verify the advantages of computer-aided teaching in endodontic teaching. Computer-assisted teaching is an important element of educational technology reform in higher education institutions, and has great superiority compared with traditional teaching. Computer-assisted teaching can improve students' receptivity and improve their surgical level.

## **2. Computer-aided design and computer-aided fabrication of digital minimally invasive restorations**

### **2.1. 3D Printing Technology**

While traditional processing techniques are mainly applied to the reduction process, 3D printing can quickly obtain personalized information and precisely control the forming material by the method of "layer-by-layer scanning, layer-by-layer stacking, and overall forming", and finally obtain a finished product that fits the affected area. In the treatment of malocclusion, 3D printing technology has been used to successfully locate the root canal orifice in vitro and to create a root canal orifice positioning guide, thus achieving precise positioning of the clinical root canal orifice [8-9]. In the treatment of invagination, 3D printed teeth can help clinicians to accurately distinguish the pulp chamber and invagination cavity, make an invagination cavity opening guide, thus avoiding pulp cavity damage and helping to preserve the living pulp. The use of 3D printing to



obtain a solid model of the periapical lesion area helps to develop surgical plans in vitro, simulate surgical operations, and create accurate apical surgical guides to achieve precise and minimally invasive surgical treatment of periapical lesions. With the arrival of the era of big data, the exploration, popularization and industrialization of 3D printing technology will bring new opportunities for the field of dentistry.

## **2.2. Digital colorimetric technology**

The digital colorimetric system includes data collector, data processor, terminal and related software, etc. Through the computer colorimeter, the color is converted into digital information, and the computer search database is applied to select the most matching restorative material. Using the combination of computer colorimetry and color matching technology, the colorimetric process is fast, quantitative, not affected by the environment, the colorimetric results are objective and credible, can provide a base color reference for special dental colorimetry, and repeatability is significantly better than visual colorimetry.

## **2.3. Computer-assisted teaching in endodontics in practice**

### **(1) Hardware Construction**

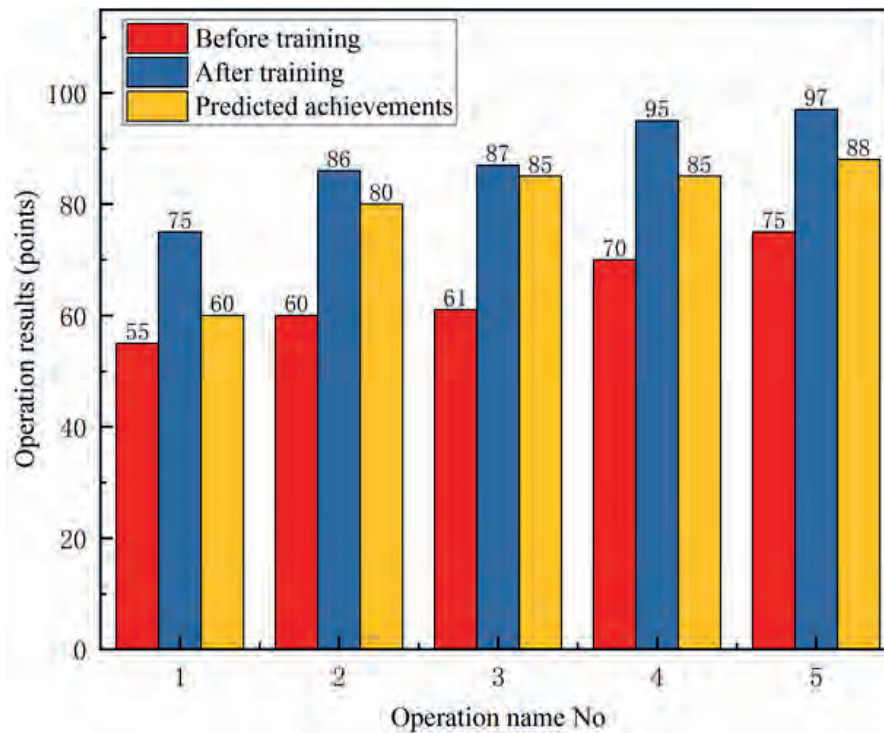
To meet the needs of teaching in the new situation, most institutions actively build multimedia classrooms, including multimedia computers, various media playback equipment, projection systems and sound reinforcement systems. At present, for university lectures above undergraduate students have all adopted multimedia presentation teaching. In order to facilitate the production of CAI courseware, colleges and universities have purchased hardware equipment such as scanners, digital cameras, CD burners, video capture cards and so on. Other institutions have established small local area networks for endodontic teaching using existing computers and network equipment, so that students can use teaching materials on the local area networks and obtain professional information through the Internet in small classes.

## (2) Software Production

Software is the core of computer-assisted teaching. According to the course characteristics and requirements of endodontics, this paper uses powerpoint, authorware, director and other tools to produce a full set of electronic teaching materials including seven-year, five-year undergraduate, three-year college and other levels of dentistry. At the same time, the key and difficult contents of the course cooperate with software companies and actively develop CAI teaching courseware. The courseware that have been completed and applied to teaching so far include caries, restorative dentistry, cavity preparation simulation training, endodontic disease expert diagnosis system, etc.

## **3. Analysis of the effectiveness of computer-assisted teaching in endodontics**

Computer-assisted teaching has the advantages of diverse forms, visualization, information richness and interactivity, but the actual teaching effect applied in endodontics is yet to be verified. In this paper, we compare the performance of students' oral treatment simulation surgery after receiving practical training of computer-assisted dental teaching with the performance of surgery before receiving practical training of computer-assisted teaching to investigate the differences between them. Root canal positioning treatment, interrupted tooth surgery, orthodontics, dental implants, and tooth extraction were numbered 1-5, respectively, and the results of the changes in students' performance before and after the practical training are shown in Figure 1.



**Figure 1.** Changes of students' scores before and after practical training

Before teaching, the instructor predicted that the average score of students' surgery would be 79.6, and in practice, the overall average score of students' surgery before receiving practical training was 64.2, and the overall average score of students' surgery after receiving practical training was 88. This shows that computer-assisted teaching can better promote students' practical training effect on surgery and achieve teachers' teaching expectations. Among the five types of oral surgery, the most difficult ones were root canal positioning treatment and interrupted tooth surgery. After long-term training, students scored 55 points for root canal positioning treatment and 60 points for the obstructive dentistry surgery, which basically just reached the passing level of the examination, but not up to the level of real practical surgery. After the application of computer-assisted teaching, the students' scores for the two surgeries reached 75 and 86 respectively, which were 5-6 points higher than the predicted value, and their scores basically reached the level of oral clinical treatment. In the simple dental implant and tooth extraction surgery students scored as high as 95-97 points, which is basically a perfect score. This shows that the application of computer-assisted teaching in endodontics is effective, and it helps to promote students'

intuitive perception of surgery, improve the practical level, and then promote the development of dental clinical treatment.

#### **4. CONCLUSION**

This paper investigates the effectiveness of computer-assisted teaching technology in endodontics teaching by using 3D printing technology and digitally optimized colorimetric technology to achieve the purpose of minimally invasive aesthetic restorations in dental treatment. In addition, computer-aided teaching hardware creation and software production were used to achieve the purpose of computer-aided teaching practical operation, and then the advantages of computer-aided teaching in endodontics teaching were investigated by comparing the students' performance before and after practical training. From the results of this paper, the overall average surgical score before the students received practical training was 64.2, and the overall average surgical score after the students received practical training was 88, an increase of 23.8 points. The score of root canal positioning treatment before practical training was 55 and the score of obstructed tooth surgery was 60.

#### **5. FUNDING**

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# **A study on the correlation between English learning anxiety and English learning autonomy based on artificial intelligence**

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## **ABSTRACT**

Studying anxiety and learning autonomy in English learning with artificial intelligence technology can help teachers and students conquer English learning difficulties together and expand students' English learning effectiveness. This paper explores the impact of artificial intelligence (AI) on teachers and students in English learning in the context of AI technology, and quantifies students' English learning anxiety and autonomy to derive the full-text study results. In learning anxiety, students' skill anxiety was 3.8512, which was at the highest of all anxiety symptoms, and general anxiety was 3.6501. In autonomous learning, self-requirement was 3.752 and monitoring and evaluation was 3.2150, and there was an association between students' English learning anxiety and learning autonomy. The deep integration of college English education and AI will help the development and change of college English teaching, and support expand teachers' teaching management and students' learning motivation.

## **KEYWORDS**

Artificial Intelligence; English learning anxiety; Autonomy; Teaching English as a Foreign Language

## **1. INTRODUCTION**

In the context of implementing the theory of "people-oriented" and "lifelong education", more and more foreign language educators are aware of the importance of cultivating learners' initiative, and improving students' English learning initiative has become an important issue [1]. AI technologies have been developed to the stage of multi-type cross-comprehensive use in many fields, among which the intelligent scoring technology is constructed on image and text recognition technology and natural language dispensation technology [2]. AI has become an operative means of enlightening efficiency and technology in numerous industries, and will also lead to inordinate changes, and the technology is till touching the transformation of education and calculation thoughts and models in all features [3]. The use of AI scoring is based on social demand, and this demand mainly comes from the need to develop language checking applies. The present development tendency of language checking is to expand the authenticity and efficacy of checking, and the introduction of AI technology is essentially to expand the authenticity, assessment efficacy, and scoring accuracy of assessment. In the future, the writing and translation of all exams including CET-4, CET-6 and College English will be graded by AI. [4].

Foreign language learning nervousness is a complex psychological phenomenon definite to foreign language learners. It is not a general classroom nervousness, but a complex self-image, beliefs, feelings and behaviors related to language classroom learning caused by the uniqueness of the language learning procedure [5]. Therefore, foreign language learning anxiety has become a focus of attention for foreign language research specialists as well as foreign language teaching professionals. Studies in Europe and the United States have shown a consistent negative correlation between foreign language anxiety and foreign language performance [6]. Students with high anxiety use much lower explanatory parts when describing pictures than students with low anxiety, which suggests that anxious students are reluctant to use their own thoughts to express some relevant information in foreign language conversation. One study found that anxiety reduces the performance of future language teachers in oral interviews [7]. Learning initiative refers to students' conscious and voluntary learning with purpose, governed by their sense of subjectivity. The more motivated students are, the better they will learn a new language. The

rate at which they learn a new language depends on how motivated they are as individuals [8]. If learners are motivated to learn a language and find it useful, they will learn it better than those who believe that the language they are learning is useless. If students believe that they cannot learn a new language well, then this belief can be a barrier to learning. The teacher is another influential factor for students in the language learning procedure, and if students respect the teacher who teaches the language, this will help them to learn more effectively [9].

This paper explores the impact of AI on students in terms of English learning anxiety and learning autonomy in the context of AI technology. First, AI technologies are classified into three categories of big data, speech recognition, and machine learning from the technical aspect to clarify the principles of AI technologies. Then the relationship between AI technologies in the field of English teaching and students' English learning is explored separately to clarify the principle of its role. Finally, students' English learning anxiety and autonomy are quantified and analyzed to arrive at the findings that AI technology has a positive effect on promoting students' autonomous learning and alleviating their learning anxiety.

## **2. AI Technology and English Learning**

In the context of the development trend of AI technology gradually penetrating into all aspects of society, the traditional language education industry is also deeply affected [10]. One of the most typical cases is English education. Nowadays, many schools are gradually introducing AI technology into English teaching to make up for the shortcomings of the traditional teaching mode and improve the teaching quality. At the present stage, English learning mainly has difficulties in three aspects: listening, writing and translation, and the application of AI can solve the problems in these three aspects.

### **2.1. AI Technology Components**

AI technologies are briefly described as follows:

#### **(1) Big Data**

Big data, till identified as huge data, denotes to a wide variety of information resources that require new data procedure methods in



order to be able to have very solid decision, keen comment, and precise use of procedure.

## (2) Voice Recognition

The technology of speech appreciation raises to the procedure of appreciation, analysis and understanding using machines. The pure adaptation of speech gestures into explicit words or pertinent instructions is a novel high technology. Speech recognition normally consists of three main aspects, which are information abstraction techniques, design matching philosophies and related testing designs. Speech recognition needs human and computer to collaborate with each other, fixing on solving the hearing problem of robots, mainly so that robots can obviously receive what people say. The furthestmost innovative technology in the change of AI up to now is speech appreciation.

## (3) Machine Learning

Machine learning requires that machines can have a sturdy learning ability like humans and study how computers simulate to complete the learning performance of machines. In order to contract more knowledge and expertise for learning, re-integrating the prevailing knowledge and then unceasingly improving and cultivating the presentation of the machine for several uses is the most significant part of AI.

## **2.2. The relationship of AI in the field of English language teaching**

The teaching procedure of college English includes various teaching objectives such as listening, speaking, reading, writing, translating, and discriminating, which is a very complex procedure and requires the use of AI based on information technology to develop scientific teaching modules to help students master the basic knowledge of English. By applying AI technology to college English teaching, students can watch videos or PPTs to preview or review their English knowledge through online teaching. Through homework exercises, students can memorize words at any time, complete a variety of vocabulary self-assessment questions, learn texts, listen to audio recordings, and continuously improve their learning style, anytime, anywhere, whenever they want to learn. The scientific teaching model

developed using AI can break the traditional college English classroom and pay more attention to language input. Students can learn through human-computer dialogue, friendly interaction, intelligent scoring of spoken language, and practice speaking on the go to get rid of the embarrassing situation of Chinese people's "dumb English". Through the intelligent assessment method to produce questions to form the paper, read the paper, score statistics and other time-consuming procedure, can greatly reduce the workload of teachers and improve efficiency.

### **2.3. The relationship between AI technology and students' English learning anxiety and autonomy**

The homework exercise element is designed with students as its foremost users. Students could see from high-quality videos to study texts, remember words, exercise speaking, income tests and query questions. This module shelters listening, reading, writing, word choice and satisfying in the blanks, and offers bright review purpose for essays. Besides, students who learn the same sequence can form a mutual learning community to contend with each other and study accommodatingly. Through individual homepage and learning dynamic display data, students could demonstrate their learning achievements, cut their learning practice, lodge the protection and weekly effort list, so that students can simplify their situation and inspire their learning interest. Students can also assess each other's answers to collaboratively complete learning tasks, share the learning procedure, create an exclusive circle of friends with mutual learning interests, and enhance students' initiative in English learning.

For students with insufficient vocabulary to learn writing, the AI word memory software can assess students' individual situation, make a learning plan that suits their steady vocabulary growth, push the daily learning plan words, and deepen their memory through the combination of sound and pictures. For students who have difficulty expressing themselves freely in writing with long and difficult sentences, the AI software can make a learning plan for complex and difficult sentences according to the students' personal situation, pushing exercises to explain them and helping students master key grammar effectively by doing problems. For students who need to improve their comprehensive writing, the automatic writing review

system plays an important role. For topics that need to be written about, the system will provide ideas, frameworks, and vocabulary references to help students write according to the grammar rules they have mastered. Once completed, the system will automatically correct the content, critique it sentence by sentence, analyze the errors and type a comment to give corrections. This immediate feedback and assessment helps students to find out their shortcomings in a timely manner so that they can go through the gaps and alleviate their English learning anxiety.

### 3. Analysis of the results related to English learning anxiety and learning autonomy

To investigate the relationship between AI and students' English learning anxiety and learning autonomy proposed in this paper, the English learning autonomy and English learning anxiety of non-English majors in a university were quantified and analyzed, and the results of the correlation between students' English learning anxiety and learning autonomy are shown in Table 1.

**Table 1.** Correlation between students' English learning anxiety and learning autonomy

Learning anxiety			Autonomous learning		
Type	Mean value	Standard deviation	Type	Mean value	Standard deviation
Negative comments	2.7080	0.6517	Teacher recognition	2.7798	0.6472
Skill anxiety	3.8512	0.5730	Self demand	3.7520	0.8520
General anxiety	3.6501	0.5312	Monitoring and evaluation	3.2150	0.6588
Correlation value between learning anxiety and autonomous learning (R)					
-0.451			-0.423		

We can see that the learning anxiety is -0.545 and the independent learning is -0.423 when the correlation value between learning anxiety and independent learning is R. The results are less than or equal to 0.4, so this paper verifies that the algorithm is valid. From the results, students with high self-directed learning ability generally have low anxiety, while students with low self-directed learning ability generally have high anxiety. Skill anxiety was 3.8512, which was at the highest of all anxiety symptoms, and general anxiety was the second highest at 3.6501, indicating that hindrance in skill learning in

English language learning can cause anxiety to students' learning. In descending order of the factors influencing independent learning, self-requirement was the highest at 3.752, monitoring and evaluation was the second highest at 3.2150, and teacher approval was the lowest at 2.7798, indicating that AI technology can facilitate students' independent learning. In conclusion, there was a correlation between autonomous learning and negative evaluation, skill anxiety, and general anxiety, and both were negatively correlated.

#### **4. CONCLUSION**

This paper examines the relationship between English learning anxiety and English learning autonomy based on AI technology. Firstly, the relevance of AI technology to students' English learning anxiety and English learning autonomy is explored by clarifying the technical support in the full paper from the technical aspect of AI and English learning. From the results of this paper, there is a correlation between learning anxiety and learning autonomy among non-English major undergraduate students. Students' skill anxiety was 3.8512, which was at the highest of all anxiety symptoms, and general anxiety was the second highest at 3.6501, where the hindrance of skills in English learning can cause anxiety to students' learning. Students' self-requirement is 3.752 and monitoring and evaluation is 3.2150, students' independent learning is more concerned with the improvement of their own ability. The current application of AI technology in English teaching in colleges and universities is still at a low level of development, and it is believed that with the development and improvement of AI technology, it will be more efficient to improve students' learning effect, so that both teachers and students can find pleasure in English teaching and learning.

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# The use of traditional elements in modern interior design based on decision tree model in the context of big data

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## ABSTRACT

The use of traditional elements in interior design is explored in order to meet the pursuit of new Chinese style by users in the current decoration market. This paper designs a modern interior design method based on decision tree model for traditional elements to optimize the current interior design effect. The principles of the use of traditional elements in modern interior design are constructed and tested to verify the advancedness of the proposed method. The data show that the overall integration of traditional style elements with modern interior design is 8.2, which is four times higher than the current market interior design integration, 8.0 in terms of visual effect creation, and 7.8 in terms of style matching, so it is relevant to explore the application of traditional elements to modern interior design to make it reflect the national cultural connotation.

## KEYWORDS

Decision tree model; Traditional Elements; Modern Interior Design; New Chinese

## 1. INTRODUCTION

Traditional cultural elements are the crystallization of the wisdom of the Chinese nation and the symbols of national characteristics in the current situation of globalization in the world. In the context of

modernization of interior design, preserving the excellent cultural traditions of the nation is an imperative that designers need to deal with [1]. As symbols of cultural elements with unique national characteristics and regional differences, traditional Chinese decorative elements are aesthetic symbols that convey specific messages, and these conform to the heritage and use in modern interior design should be designed and arranged in a unique way [2]. The relationship between traditional cultural elements and modern interior design is based on the understanding of modern interior design. Modern interior design is a complex discipline that involves a very comprehensive aspect and can be described as a synthesis of science and art as well as life. It requires not only architecture and sociology, but also an organic combination of knowledge from various disciplines such as material science and structural science [3-4].

The relationship between traditional Chinese culture and modern interior design is very obvious. Highlighting traditional cultural elements in modern interior design and emphasizing the use of traditional cultural elements in interior design has a guiding significance for modern interior design. This can lead to the acceptance of modern interior design by a wider audience and better outreach to the world. The connection between the two is mainly reflected in the way of thinking about interior design, the patterns or symbols with traditional cultural symbolic connotations used in the design [5-6]. Traditional elements are influenced by traditional culture and aesthetic views, and inevitably have certain limitations. With the development of the times, people pay more and more attention to the combination of practicality and culture, and the forms of traditional meaning and modern fashion have produced certain collision and conflict [7]. In the practical application, the traditional element forms should not be imitated singularly, but the refined traditional elements should be simplified, deformed and reconstructed to make them more modern, more refined and easier to produce. With a modern vision, we abstract and generalize them into a modern design language, and strive to use the essence of traditional elements from the past to the present, to push forward and explore, to summarize and design a modern interior space with the charm of Chinese style.

This paper explores the effectiveness of the application of traditional elements in modern interior design based on decision tree model in

the context of big data. Based on this, a modern interior design method based on the decision tree model is first designed to optimize the current interior design effect. In the design process, two basic methods are followed to create the visual focal point of the interior space by applying the emission composition technique and to create the rhythm of the interior space by applying the repetition composition technique to maximize the effectiveness of the interior design. Then the principles of using traditional elements in modern interior design are constructed in order to integrate traditional elements with modern interior design in a high degree of conformity with modern aesthetics. Finally, the advancedness of the method proposed in this paper is verified through testing. The use of traditional elements in modern interior design based on decision tree model in the context of big data is beneficial to the development of interior design and home improvement market.

## **2. A modern interior design approach to traditional elements based on decision tree model**

Decision tree model is a method for dealing with multidimensional data, and decision trees are built as a branch formation process, where each branch is a division of regions of the multidimensional space under certain rules, which are presented using a tree structure diagram [8]. Frequently used multidimensional interaction decision tree models include the cardinality automatic interaction detection method, classification and regression tree method, C4.5 algorithm, fast unbiased effective statistical tree method, ID3 algorithm, etc. Among them, the CHAID model, formerly known as the automatic interaction detection algorithm model, differs from CARTC4.5 in that CHAID deals with categorical variables. Its main features are multi-way bifurcation and forward pruning, and its advantages include the ability to generate multi-branch interaction decision trees, the ability to determine branching variables and segmentation values from the perspective of statistical significance, and the optimization of the branching process of the tree. the CHAID model is built in causality exploration to achieve numerous level divisions of input variables based on target variables. Applied to interior design, the specific methods are:



(1) Applying emission composition to create visual focal points in interior spaces

Emission constitutes a strong focus and symmetry in multiple directions and other characteristics that can create a strong visual impact, so that all images either focus toward the center or emanate outward.

(2) Applying repetitive composition to create a sense of rhythm in interior space

Repetition composition in interior design has the function of strengthening the visual image of space. It produces a continuous, rhythmic visual impression in interior spaces through regular repetition. The use of repetitive composition in interior design, using the same or similar visual elements, as a carrier to shape the sense of rhythm in the design of interior space, can achieve a repetitive, regular spatial composition, so that people visually produce a sense of coherence and fluidity.

## **2.1. The use of traditional elements in modern interior design**

### **2.1.1. Design of interactive objects with traditional elements**

In the process of traditional design, the size of the space to be used and the personal emotions need to be integrated into the design. By combining people and space, the interactive emotional experience of visual design can be fully expressed. This interactive visual experience can not only effectively meet people's physical and emotional needs, but also can be combined with traditional Chinese elements to make a closer connection between people and space. Through the traditional Chinese elements, it can promote a closer relationship between people and space, and realize the precipitation of design and culture in all aspects. In the face of different customers, the sense of artistic impact and experience that emerges is very different, and it is important to be creative and embellish the traditional elements in accordance with different designs.

### **2.1.2. The deformation and deconstruction of traditional elements**

Traditional elements are constantly being innovated in the development of the times, and people's spiritual needs for traditional

art are showing changes, and thus traditional elements are producing a series of structures and deformations. In order to meet the new requirements for the integration of cultural elements in interior design, designers should not only copy traditional cultural elements, but also restructure them through unique conceptual design to form a unique style of design language. Specifically, through the combination and matching of design elements with characteristics, and with reference to actual design needs, new forms of decoration are formed on the basis of maintaining the characteristics of traditional elements, which are more in line with modern aesthetic requirements. By extracting the essence of the mood in traditional painting and calligraphy and suspending it in the decorative space, it can manifest the cultural connotation and at the same time reflect the simplicity and vitality of the times, and the combination of real and imaginary moods, more modern and design sense. Element reorganization is to combine different elements, and on the basis of understanding the characteristics of various elements, the planned combination of the patchwork, forming a unique design model. In addition, when the corresponding inheritance of classical culture, certain improvements in the form, so that it can have the original fresh vitality, but also to a certain extent can help it and the combination of modern culture.

### **3. Analysis of the results of modern interior design with traditional elements**

This paper proposes a modern interior design method for traditional elements using a decision tree model algorithm, based on which the current commercially available interior design is compared with the proposed method in this paper to test the effectiveness of the practical application of the design method in this paper. The results of the comparison test of the two design methods are shown in Table 1.

Table 1. Detection Results of the wo Design Methods

	Visual effect	Style matching	Space image	Decorative components	Fusion degree
Current market	5.5	4.8	5.3	4.0	4.2
Methods in this paper	8.0	7.8	6.9	7.0	8.2

The current market interior design visual effect is 5.5, style matching is 4.8, spatial image is 5.3, decorative elements are 4.0, and overall integration is 4.2. This only meets the general needs of users, and users often need to pay a lot of money when they want to continue to add design elements. The decision tree model interior design method proposed in this paper has an overall integration degree of 8.2 for traditional style elements and modern interior design, which is four times higher than the current market interior design integration degree and basically meets the user's design requirements. In terms of visual effect creation, the level under the decision tree model algorithm reaches 8.0, and the style matching is 7.8, and users basically do not make secondary corrections to the proposed design scheme. This shows that the method designed in this paper has high efficiency, high precision and high performance in interior design, and can meet the high aesthetic requirements of traditional elements and modern interior design.

#### **4. CONCLUSION**

This paper explores the effectiveness of the application of traditional elements in modern interior design based on the decision tree model in the context of big data. By examining the results of the decision tree algorithm, it is found that the overall integration of traditional style elements with modern interior design by the design method proposed in this paper reaches 8.2, which is four times higher than the integration of interior design in the market. This shows that by tapping into the essence of traditional art elements and combining advanced algorithmic techniques with interior design methods, traditional Chinese cultural elements can be inherited and carried forward in modern design.

#### **5. FUNDING**

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# Motivation and motivation of higher education teacher trainees in teaching based on random forest algorithm Psychological Health

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## **ABSTRACT**

In order to improve the willingness of senior teacher training graduates to teach, this paper is based on random forest algorithm to study the motivation and psychological health factors of senior teacher training students. Firstly, the random forest algorithm model was constructed, and the prediction results were evaluated with rough set correction, so as to obtain the results of motivation and psychological quality of higher education teacher-training students. The data showed that among the factors of motivation for teaching, the correlation between self-efficacy factor and career choice satisfaction was -0.12, social utility value, social experience factor and career choice satisfaction was 0.60, personal utility value factor was 0.28, career pay was only 0.21, which was less than the

predicted value of 0.50, and psychological health satisfaction was 0.60. The research of this paper can provide some reference value for teacher-training students' motivation for teaching. The study of this paper can provide some reference value to teacher educators' motivation to teach.

## **KEYWORDS**

Random Forest; Higher education teacher training students; Motivation for teaching; Mental Health

## **1. INTRODUCTION**

Teacher educators are future educators who are in the pre-service period of teacher education - the "prospective teacher" stage [1]. Teacher educators' beliefs about teaching are a belief system based on their knowledge and deep understanding of the educational career they are engaged in. It includes a genuine desire to commit to and participate in the cause of education from the bottom of one's heart, a firm determination to overcome the difficulties and setbacks encountered along the way, and a high degree of conscious action governed by this scientific outlook [2]. The formation and consolidation of beliefs in teaching are not only related to the activity experience of teacher educators before their professional studies, but are also influenced by factors such as teaching practice, social environment, and their own knowledge reserves at a later stage [3]. Strong beliefs in teaching and the professional learning and growth of teacher educators in school are related to each other and influence each other. Beliefs about teaching influence whether teacher educators can be firmly and long-term dedicated to education after graduation, and affect the quality of teaching, students' outlook, and professional growth of teacher educators when they engage in education [4].

How to carry out the work of mental health education for teacher-training students is a major issue that higher education institutions must face [5]. Only by building a consensus and forming a synergy can higher vocational institutions do a good job of mental health education for teacher-training students. The purpose of education is to cultivate and develop people. The work of mental health education

in higher education institutions should adhere to the student-oriented principle and respect, cultivate and develop the subjectivity of students. It is student-centered, closely focused on students, and everything starts from serving students' growth and cultivating them into physically and mentally sound people [6]. Every educator should always take the responsibility to serve students, enter their inner world, enter their academic world, and approach their life world. On the road of students' growth, we will be the leader and guide of students' learning, promote their coordinated development and all-round development, and lay a solid foundation for higher education teacher trainees to embark on the education stage in the future.

This paper investigates the factors influencing motivation and mental health of higher education teacher educators based on the random forest algorithm. Firstly, the framework of the full-text technical level was laid down by constructing a stochastic algorithm model, followed by data correction of the random forest algorithm prediction result evaluation and rough set. The current situation of higher vocational teacher-training students' intention to teach and mental health education was investigated, and then the correlation result analysis between a higher vocational teacher-training student's motivation to teach, career identity, career choice, and satisfaction with psychological quality was proposed under the random forest algorithm, and the full-text conclusion was drawn. The factors influencing motivation to teach and mental health of higher vocational teacher training students studied in this paper have positive effects.

## **2. Random forest algorithm model construction**

The random forest algorithm obtains a sampling set containing  $m$  training samples by self-sampling method, after  $m$  times of random sampling in a given  $m$ -sample data set. Then a decision tree is constructed based on each sampled set for training, while at the node of the decision tree, a subset containing  $k$  attributes is first randomly selected from the set of attributes of that node, and then an optimal attribute is selected from this subset for division [7]. When the random forest is constructed, test samples are entered into each decision tree for type output or regression output. In the case of classification problems, the final category is output by voting; in the case of

regression problems, the mean value of each decision tree output is used as the final result.

## **2.1. Prediction result evaluation and rough set correction**

### **(1) Judging criteria for prediction results**

After the results were obtained by using the random forest regression model for forecasting, this paper used the mean absolute error, mean relative error, and R2 to measure the fit of the forecasting results to the true curve, i.e., the correlation coefficient pass rate to judge the forecasting results.

### **(2) Rough Set Theory**

When using random forest or other regression algorithms for regression prediction, the specificity of regression theory will make the prediction results tend to be conservative and smooth. When there are multiple peaks in the predicted curve or the variation of the difference square is large, it will make the prediction results have more error near the peak, and rough set can overcome this drawback. Rough set is a mathematical tool proposed by Z. Pawlak to deal with fuzzy problems and uncertainty in big data. It can effectively analyze and deal with incomplete information that is incorrect, needs error compensation, inconsistent and has data missing, and mine from it to get the implied knowledge and reveal the potential laws in the original data.

## **2.2. Willingness of higher education teacher trainees to practice**

From the perspective of personal characteristics, the factors influencing whether higher-level teacher educators are willing to teach include established circumstances such as gender, major, family income, family residence, parents' occupation, personality traits, social responsibility, and the professional identity, subject competence, and teacher quality competencies developed after entering teacher training institutions. From the perspective of training talents in teacher training institutions, the training objectives, training mode, and curriculum of teacher training students in teacher training institutions may affect the willingness of teacher training students to teach. From the perspective of teachers' treatment, the national policy orientation, social recognition, and the actual working treatment and environment may also affect teacher educators' willingness to teach.



Although the results of the study showed that higher-level teacher educators perceive teaching as low salary, demanding and stressful career, and negatively correlated or less correlated with career choice satisfaction in terms of alternative careers, personal utility value, and career pay, higher-level teacher educators still maintain a high level of career choice satisfaction. This result indicates that teacher attrition cannot be simply attributed to the specialized job requirements, heavy workload, and low salary and social status of the teaching profession. Social experience and social utility value factors are the most important factors driving career choice and career choice satisfaction of higher education teacher trainees. In addition, some studies based on narrative studies of Chinese teachers at different stages of their careers noted that those who entered teacher education programs reluctantly remained in the profession and began to develop altruistic values for their teaching. Some studies also point out that Chinese teachers are more attracted to jobs with establishment security, especially elementary school teachers, female teachers, and young teachers, so the overall career choice satisfaction of higher-level teacher education students remains high.

### **2.3. The significance of mental health education for higher education teacher trainees**

Teacher trainees have to take the teaching qualification exam while they are in school and will take various teacher recruitment exams when they graduate in order to take up positions in basic education, but most of them are rather confused and anxious at first and have no way to start. In the practice of mental health education with picture book reading, it can practically improve the teacher trainees' oral expression, teaching design and management skills, etc., and then improve their self-confidence. In the process of communicating with elementary school students, teacher trainees also have a clearer understanding of their profession and a good professional identity, which helps them to strengthen their ideal beliefs and actively pursue a healthy life. Some students said, "Since I entered school I have been preparing myself to become a teacher in the future, learning all kinds of skills and theoretical knowledge, however, when I actually stand on the podium, will these really be useful? So I'm glad that I had the opportunity to go to school to lead a reading during my school years, which really exercised my teaching ability. It also made me

more and more confident and comfortable when I stood on the podium." The mental health of teachers is a topic that must be taken seriously in order to develop a highly qualified teaching force.

### 3. Analysis of motivation and psychological quality of higher education teacher trainees in teaching

To verify the correctness of the algorithm proposed in this paper, the random forest algorithm was used to obtain the correlations among motivation to teach, career identity, career choice, and satisfaction with psychological quality of a higher education teacher-training student. The correlation results among motivation to teach, career identity, career choice, and psychological quality satisfaction are shown in Table 1.

Table 1. Correlation between teaching motivation, professional identity, career choice and psychological quality satisfaction

	1	2	3	4	5	6
Social experience	1	—	—	—	—	—
Social utility value	0.79**	0.66**	0.80**	—	—	—
Personal utility value	0.40**	0.38**	0.28**	1	—	—
Self efficacy	0.66**	-0.12**	—	—	—	—
Career giving	0.40**	0.46**	0.39**	0.32**	0.21**	1
Career rewards	0.42**	0.47**	0.44**	0.35**	0.36**	1
Satisfaction with career choice	0.77**	0.55**	0.78**	0.52**	0.49**	—
Psychological quality	0.79**	0.77**	0.70**	0.87**	0.65**	0.63**

The overall significant correlation between motivation to teach, career perceptions, and career choice satisfaction of higher education teacher educators. Among the factors of motivation to teach, the self-efficacy factor was significantly and negatively correlated with career choice satisfaction -0.12, indicating that teacher educators perceived that self-worth was not fully reflected in the influence of motivation to teach. Social utility value, social experience factor has the strongest correlation with career choice satisfaction at 0.60 and above. The personal utility value factor was 0.28, which had the weakest correlation with career choice satisfaction. Satisfaction with

psychological health all reached 0.50, and students' psychological quality is good, which indicates that students have a higher recognition of the talent training system of teacher training. Career awareness was positively and significantly correlated with career choice satisfaction, and career pay and career reward were positively and significantly correlated with career choice satisfaction, indicating that these factors may have a mutually reinforcing effect with career choice satisfaction.

#### **4. CONCLUSION**

This paper investigates the motivation and psychological health factors of higher education teacher trainees based on random forest algorithm. By constructing the random forest algorithm model, the prediction results were judged and corrected to obtain the results of motivation and psychological quality of higher vocational teacher-training students. The results showed that the psychological health level of senior teacher trainees was maintained above 0.6, and the psychological health education of teacher trainees in school was good. Among the factors of motivation for teaching, the correlation between social utility value, social experience factor and career choice satisfaction was 0.60, which was positively correlated. The personal utility value factor was 0.28, and career pay was 0.21, which was less than the predicted value of 0.50. It can be seen that low career reward and career pay harvest are the main factors affecting the current motivation of higher education teacher trainees to teach. Therefore, improving teachers' treatment and employment environment and social identity value have an improving effect on increasing higher level teacher educators' willingness to teach.

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# The Application of Artificial Intelligence Technology in Integrated English Reading and Writing Classroom Teaching in Universities

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## **ABSTRACT**

In order to improve the efficiency of integrated teaching of English reading and writing in colleges and universities, this paper explores the application of artificial intelligence technology in the integration of English writing in colleges and universities. Firstly, the focus of the integrated teaching mode of reading and writing is identified, and the automatic evaluation system of composition is used to revise and review students' writing essays, and the results of changes in students' writing levels are obtained. The data showed that it takes teachers 6 hours to review 100 essays, while the AI system takes only 0.33 hours, saving nearly 5.6 hours. In terms of score improvement, the low group increased from 10.2 to 18.3, an increase of more than 8 points, basically reaching the passing level. This shows that AI technology has an important role to play in improving students' English writing skills.

## **KEYWORDS**

Artificial Intelligence Technology; High School English; Read and write integration; Teaching Model

## **1. INTRODUCTION**

Computer-assisted teaching in the context of artificial intelligence is a new form of teaching that uses computers as a medium to integrate teaching content, teaching experience, and computer technology. It is a new form of teaching and learning that transmits knowledge and trains skills to students through lecture dialogues, simulation exercises and problem solving to achieve certain educational purposes [1]. The emergence of computer-assisted teaching has brought a series of changes to English teaching methods and teaching means. Artificial intelligence information technology has become an important part of the reform and practice of English teaching in universities and has a revolutionary impact on English teaching [2]. Technologies such as human-computer interaction, intelligent analysis, and deep learning are being continuously integrated into the teaching field, building intelligent and personalized intelligent learning environments that effectively optimize traditional classroom teaching [3]. While providing an intelligent and personalized smart learning environment, artificial intelligence also provides new ideas and methods for English teaching, which is an important part of the reform and practice of university English teaching [4].

At present, in the process of English teaching, there still exists the traditional teaching mode which is mainly based on teachers' lectures, and this teaching mode does not fully respect the main position of students. Students cannot learn independently, cannot practice well, and have an average learning effect. In the process of reading and writing English, students play the roles of reader and writer respectively. Although on the surface they seem to be relatively independent individuals, thinking about them from another perspective, there is an obvious interactive relationship between them [5]. According to the characteristics of the English curriculum and the integrated teaching mode of reading and writing, teachers can effectively enhance students' learning effects and exercise their thinking skills by adopting such programs as task teaching method and inquiry-based teaching method [6]. According to the input-output learning theory, students are constantly involved in the process of independent learning, which makes the English language thinking and thinking skills improve effectively. Therefore, we should adopt project-based, task-driven, and cooperative learning programs to

teach English courses, and under the basic learning mode of "reading-discussion-writing", students can constantly summarize and analyze what they have learned through the learning and application of knowledge, and gradually develop the ability to think about problems. Under the basic learning mode of "reading-discussion-writing", students are able to summarize their knowledge through learning and application, and gradually develop the ability to think about problems.

This paper studies the results of the application of artificial intelligence technology tools in the integrated teaching of English reading and writing in colleges and universities. Firstly, it expounds the theory of artificial intelligence computer-assisted language teaching and the teaching mode of integrated reading and writing to clarify the theoretical basis of the whole paper. Then it clarifies the necessity of artificial intelligence in the integrated English reading and writing classroom in colleges and universities by comparing the teacher's traditional correction speed and artificial intelligence correction speed. The effectiveness of the application of college English reading and writing integrated classroom teaching is explored through the automatic evaluation system of writing with artificial intelligence technology, and it is concluded that artificial intelligence technology has a facilitating effect on improving college students' English writing level. It shows that the integrated classroom teaching of English reading and writing in colleges and universities based on artificial intelligence technology can achieve good results.

## **2. Artificial intelligence computer-assisted language teaching theory**

Artificial intelligence computer-assisted language teaching theory, or ICALL for short, is used in foreign language teaching mainly for speech recognition and semantic analysis, intelligent assessment, intelligent feedback, online discussion, and personalized learning [7]. ICALL can stimulate students' interest and motivation in learning foreign languages, increase students' language output and improve students' writing ability. For example, the automatic scoring system of Critique.com can generate scores of students' essays based on timely feedback of writing problems based on corpus information.

Students independently revise their errors based on the feedback, and the improvement is particularly evident in areas such as writing vocabulary richness and sentence complexity. Thus the development and application of artificial intelligence has enriched teaching methods and approaches, and provided conditions and technical support for blended English writing instruction.

### **2.1. Integrated teaching model of reading and writing**

Reading and writing integration is based on the duality theory of language learning, combined with the current college English syllabus and the actual teaching situation, and selectively draws on the traditional English teaching methods to explore a new teaching mode [8]. Reading and writing are two important elements of English course learning, and it is of great significance to correctly analyze the connection between reading and writing and scientifically deal with the relationship between them to enhance the thinking ability of English majors. In the pedagogy, reading and writing are independent of each other and interdependent. In the teaching of English courses, reading teaching requires the ability to understand the basics of word recognition, grammar, context, etc., and to be able to analyze the structure of the text and understand the author's thoughts and opinions according to the expression of the text. The teaching of writing requires students to be able to express their own opinions appropriately and to apply the corresponding sentences and vocabulary to the layout of the structure of the text. Therefore, the integrated teaching mode of reading and writing fits the characteristics of the English curriculum and the rules of students learning language courses.

### **2.2. Automatic essay evaluation system**

In 1966, Ellis Page et al. developed PEG, the first software that could automatically review essays by computer, which marked the birth of automatic essay evaluation systems. Subsequently, in the 1990s, E-Rater and IEA emerged, and the development of automatic essay evaluation systems took a new step forward, but all of these software had certain defects, which led to the credibility still being questioned to some extent. At the beginning of the 21st century, Criterion, My Access and other software emerged, making the automatic essay evaluation system widely used in English tests such as TOFEL and



GRE, which marked the intelligent stage of the automatic essay evaluation system.

### **2.3. The Need for Artificial Intelligence in Integrated English Reading and Writing Classrooms in Colleges and Universities**

English teachers in colleges and universities generally teach in large class sizes and multiple shifts, and the volume of student writing corrections is quite hefty and very time-consuming. With the development of AI technology, the number of AI writing products in English writing teaching in colleges and universities has increased and improved. With the upgrading of AI and automatic grading systems, it has become possible to apply AI to English writing teaching. The level of the teacher's own composition review can also have an impact on students' ability to improve their expression. Most English teachers in colleges and universities only pay attention to whether there are grammatical problems, word spelling problems, and off-topic questions in single sentences when they roughly correct compositions, but they pay less attention to or carefully analyze the complexity of single sentence patterns, the inner articulation before sentences and sentences, and the difficulty of vocabulary richness, and so on, which does not guarantee 100% to correct all problems. On the contrary, if a college English teacher is asked to correct a composition in detail and to pick out the problem areas correctly and in detail, the teacher needs to read it repeatedly, consult a dictionary, and so on for a cumulative time of 6-6.5 hours or more. According to surveys and interviews, more than 75% of students who received feedback from teachers would only revise the English teacher's errors, and 25% of students would ignore the errors. The application of artificial intelligence technology to English composition correction in colleges and universities will greatly improve teachers' efficiency and increase the rate of correction errors.

### **3. The results of teaching English writing integrated classroom in colleges and universities**

This paper explores the effectiveness of the application of integrated English reading and writing classroom teaching in colleges and universities using artificial intelligence technology. In order to understand the changes in English writing levels before and after different writing level groups, students were divided into three groups:

high group, medium group and low group, and the method was compared with the traditional English writing classroom to test the effectiveness of the practical application of the method proposed in this paper. The comparative verification results of students' score changes after traditional writing and AI writing are shown in Table 1.

**Table 1.** Scores change after students' traditional writing and AI writing

Variant	Number of people	Traditional Writing		AI Writing		T value
		Average	Standard deviation	Average	Standard deviation	
Low grouping	20	10.2	3.72	18.30	3.51	0.56
Medium group	35	20.5	3.92	25.25	3.40	0.43
High grouping	15	24.5	3.10	28.10	3.21	0.20

The results showed that after the AI writing guidance and essay review, the essay writing level of students in the high, middle and low groups improved significantly. Among them, the low group had the largest increase, with the average score rising from 10.2 to 18.3, an increase of more than 8 points, basically reaching the passing level. The middle group had the next highest increase, with the mean score rising from 20.5 to 25.25, an increase of 5 points, and the students' writing ability reaching an excellent level. In contrast, the higher group increased by just over 4 points, but among the English writing scores out of 30, the average score of 28.10 is already quite a high level. It indicates that AI technology has a positive contribution to integrated English reading and writing classroom teaching in colleges and universities, which helps to improve students' writing ability and enhance their self-efficacy in writing.

#### 4. CONCLUSION

This paper studies the effectiveness of artificial intelligence technology in the integrated English reading and writing classroom in colleges and universities. From the results of this study, after AI writing instruction, the average score of the low subgroup rose from 10.2 to 18.3, an increase of 8 points. The average score of the middle group rose from 20.5 to 25.25, an increase of 5 points, and the students' writing ability reached an excellent level. The average score

of the high group reached 28.10, which basically met the requirements of high-level English writing. Thus, artificial intelligence technology in the integrated teaching of English reading and writing in colleges and universities can effectively help students improve their English writing ability and motivate them to write. This model is generally successful and worth promoting and applying in future teaching.

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# PACKAGE DESIGN FORM OPTIMIZATION RESEARCH BASED ON SPATIAL ANALYSIS AND LOCAL FEATURE EXTRACTION

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## ABSTRACT

This paper firstly continues to analyze the development trend of packaging design sex, including the development of new materials, new morphological shape development and the development trend of new process technology. Secondly, the basic steps of packaging design form recognition are analyzed based on two-dimensional space, and the steps of the two-dimensional space analysis algorithm are optimized using local feature extraction. Finally, the comparative analysis of recognition rate using product packaging design shows that the average accuracy of the algorithm in this paper is 86.72%, which is 3.47%, 4.55% and 20.24% higher than 2DPCA, 2DLDA and 2DLPP respectively. This shows that the packaging design form with spatial analysis and local feature extraction has good recognition rate, which in turn promotes the innovation and optimization of packaging design form.

## KEYWORDS

spatial analysis; local feature extraction; packaging design; morphology optimization; recognition rate; 2DPCA

## 1. INTRODUCTION

New products are constantly appearing, and some of them involve new areas that have not been accessible to humans before. For example, microelectronics, superconductors, biogenic products, nano products, etc. These new products pose new challenges to packaging design itself, how to protect and preserve them, how to get them safely into circulation, and how they can be successful in commercial sales [1-2]. These new topics have contributed to the constant updating and progress in packaging structures, new materials, and visual communication to adapt to the needs of new product packaging [3-4].

Design expression is the deepening and development of the design concept, not the end. The success or failure of a design depends on both artistic conception and formal expression, and a unique and clever artistic conception needs a certain artistic form to be fully reflected. The design performance cannot be limited to the image of the product itself, nor can it only start from the function [5-6]. The packaging design is shaped by the image of goods with strong artistic influence, which must have aesthetic value, meet the psychological feelings of consumers about the goods, and adapt to the aesthetic needs of consumers [7].

This paper analyzes the development trend of packaging design forms, including the development trend of new materials, the development trend of new form and shape, and the development trend of new process technology. Two-dimensional spatial analysis is used to identify the packaging design forms, and the algorithm is optimized by local feature extraction. In order to verify the effectiveness of the algorithm of this paper, a comparative analysis of experiments is conducted, and the results show that the packaging design form recognition based on spatial analysis and local feature extraction has a high recognition rate and can help designers optimize the packaging design form.

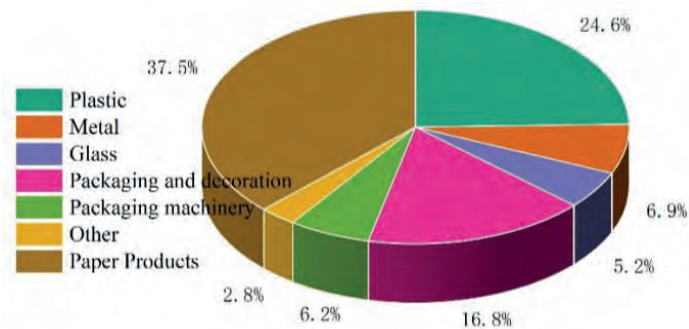
## **2. DEVELOPMENT TREND OF PACKAGING DESIGN FORM**

### **2.1 NEW MATERIAL DEVELOPMENT TREND**

With the deepening of economic globalization and the accelerated change of science and technology, many new materials are emerging in contemporary product packaging design. Product packaging materials and systems tend to reduce costs, invest in green technologies and materials, and commit to more applicable services and functional designs. The world of corrugated box manufacturing is now highly competitive, and the corrugated packaging industry in European countries is choosing the best cost solutions by analyzing orders and raw material inventories. As China's corrugated carton industry continues to advance in lightweighting and quantification technologies, it will be of value to the entire packaging industry and to the product industry as a whole.

Figure 1 shows the product packaging material output value possession analysis chart. According to the basic positioning and trends of the packaging industry in the last 5-10 years shown in the analysis of the basic status of the product packaging industry, the output value of the paper packaging category accounts for 37.13% of the entire packaging industry in the first place, plastic packaging second 25%, glass packaging 4.87%, packaging decoration accounted for 17%, packaging machinery 6%, 3% of other packaging industries. Paper packaging industry due to express logistics, physical marketing, brand promotion, increasingly become consumers and various industries

rely on the industry, and at a rapid pace, to absorb a variety of demand for technical components.



**Figure 1** Packaging Materials Production Value Share Analysis Chart

## 2.2 NEW FORM MODELING TRENDS

Zero packaging, simplified packaging, green packaging is becoming the new outer packaging development trend, green goods, green packaging combination has become more attractive to the public highlights. Modeling design changes from the traditional neat and tidy flat geometric outer packaging design, to shaped design, bionic shape design, curved shape design, breakthrough conventional visual aesthetics, in the realization of a unique new shape at the same time, the transformation of functional upgrades.

Shaped design is a design method to achieve special use, special product demand and special public taste with complex and unconventional shape; it has a new trendy sense of shape in display, show and sale. From the packaging design point of view, if there is a reasonable combination of design planning, shaped outer packaging design not only needs to be perfect in terms of storage and transportation, but also in terms of the fit of the product itself to be able to fit perfectly. Bionic design is a symbiotic design science that combines traditional and contemporary, natural and human, art and technology, micro and macro, unique and universal, and other popular multicultural fusion.

## 2.3 NEW PROCESS TECHNOLOGY TRENDS

In today's global economic boom and the rise of real and virtual industries, the packaging revolution is based on the concept of "zero-degree packaging", "green packaging" and "simplified packaging" and is being implemented. The implementation of environmentally friendly green goods and biodegradable green packaging has become a new social hotspot. Due to the growing demand for paper packaging market, the original plastic process is gradually used in paper packaging. Extrusion, stamping, integrated molding, these processes solve the traditional paper packaging form process problems, to assist the development of paper packaging form. Emerging wet processing

technology, ultraviolet drying technology, high-temperature bonding technology, vacuum technology, digital laser cutting technology are aiding the high-tech contemporary development of the paper packaging industry.

### **3. PACKAGING DESIGN MORPHOLOGY ANALYSIS BASED ON SPATIAL ANALYSIS AND LOCAL FEATURE EXTRACTION**

Based on the previous analysis of the development trend of packaging design form, in order to be able to understand more intuitively and help designers to carry out innovative design of product packaging. This chapter introduces spatial analysis and local feature extraction to provide a new research method for packaging design morphology analysis.

#### **3.1 PACKAGING DESIGN FORM RECOGNITION BASED ON TWO-DIMENSIONAL SPACE ANALYSIS**

One-dimensional principal component analysis first converts the packed two-dimensional image into a one-dimensional vector. The image is already high in dimensionality, and the transformed dimensionality is even higher, which greatly increases the complexity of calculating the sample covariance. Stretching the image data into a one-dimensional vector will destroy the original data structure of the image. Two-dimensional spatial principal component analysis can maintain the original structure of the packaging design data to a certain extent.

The 2DPCA algorithm process is as follows:

(1) Construct the matrix  $X = [x_1, x_2, \dots, x_N]$  and the covariance matrix.

(2) Construct the projection subspace, use the eigenvectors of the covariance matrix as the projection axes, and solve for the coordinates.

(3) Compress the data, and perform the corresponding transformations on the training and test samples to obtain the corresponding low-dimensional matrices, respectively.

(4) Classify and identify, and categorize the samples to be tested.

#### **3.2 OPTIMIZATION OF TWO-DIMENSIONAL SPATIAL ANALYSIS ALGORITHM INCORPORATING LOCAL FEATURE EXTRACTION**

Suppose we obtain the data  $X = [x_1, x_2, \dots, x_n]$ ,  $X \in M$  and  $M$  is a manifold hidden in the space of  $R^D$ . The main purpose of 2DPCA is to find the projection matrix  $A, R^D$  that maps the data  $X$  in space to the low-dimensional  $R^d (D \geq d)$  space,

and the projected sample is denoted as  $Y = [y_1, y_2, \dots, y_n]$ , where  $y_i = Ax_i$ . The idea of the algorithm can be briefly described as follows:

(1) Detect the acquired sample data  $X = [x_1, x_2, \dots, x_n]$ .

(2) Construct the adjacency matrix  $W$ , i.e., the weight matrix of the neighborhood connectivity graph, for the neighborhood of the sample  $x_i$ . The  $\varepsilon$ -neighborhood and  $k$ -nearest neighbor methods are usually used.

(3) Determine the weights, so that  $w_{ij} = 1$  or  $w_{ij} = \exp(-\|x_i - x_j\|^2 / t)$ ,  $t$  are parameters, which need to be set by us manually.

(4) Solve for the eigenroots, converting the optimization problem for the objective function  $\sum_{ij} (y_i - y_j)(y_i - y_j)^T w_{ij}$  and the orthogonal constraint  $y^T U y = 1$  into a problem of solving for the minimum eigenvalue and eigenvector of  $XLX^T a = \lambda XUX^T a$ , where  $L = U - W$  is called the Laplacian matrix.

(5) Let  $\{a_0, a_1, \dots, a_{k-1}\}$  be the solution of the above equation with corresponding eigenvalues  $\lambda_0 < \lambda_1 < \dots < \lambda_{k-1}$ , and be able to calculate the corresponding eigenvector  $A = [a_0, a_1, \dots, a_d] \in R^{d \times k}$ , i.e.,  $y_i = A^T x_i$ .

The 2DPCA algorithm incorporating local feature extraction, which can keep the local information of the data well and is linear mapping with good clustering and classification effect, well promotes the application of local feature extraction in packaging design form optimization.

#### 4. EXPERIMENTAL RESULTS AND ANALYSIS

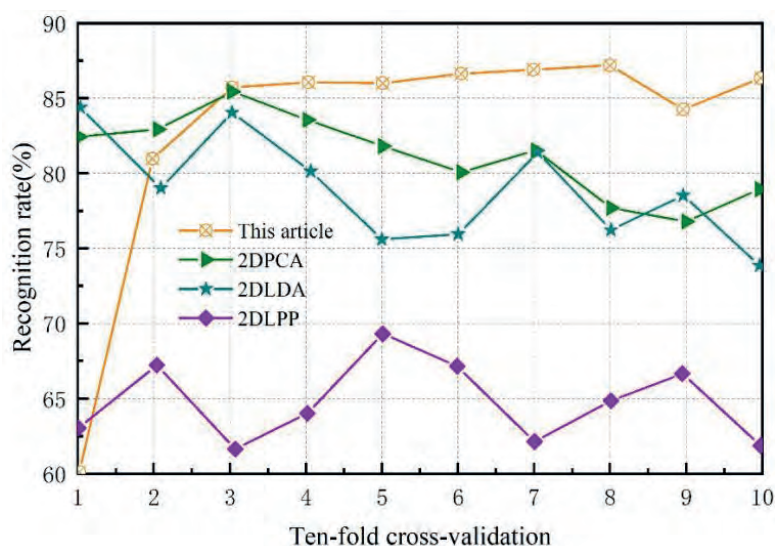
In order to verify the effectiveness of the method in this paper and its advantage in recognition rate, the experimental environment MATLAB is programmed to form a dataset by collecting the images of packaging products involved on the Internet. It is also compared with other existing algorithms to prove the effectiveness of the algorithm given in this paper on the recognition of packaging design forms.

This experiment pre-processes a total of 500 product packaging images in advance to facilitate subsequent operations without changing the gray scale. The first 80 images



are randomly selected as training samples to form a training set of 50\*80, and the rest are used as the test sample set, and the average value is taken as its final recognition rate using the ten-fold cross-validation method. The algorithms compared in this paper include 2DPCA, 2DLDA, and 2DLPP algorithms, and the classification method uses the nearest neighbor classifier with Euclidean distance. The comparison of recognition rates of each algorithm is shown in Figure 2.

From the algorithm comparison, the average accuracy of ten-fold cross-validation of the 2D spatial analysis algorithm incorporating local feature extraction in this paper is 86.72%, which is 3.47%, 4.55% and 20.24% higher than 2DPCA, 2DLDA and 2DLPP, respectively. This indicates that spatial analysis and local feature extraction can better identify packaging design forms, provide designers with more possible packaging design forms, and then promote the optimization and development of product packaging forms.



**Figure 2** Comparison of recognition rates by algorithm

## 5. CONCLUSION

Starting from the development trend of packaging design forms, this paper analyzes the trends of new materials, new form shapes and new process technology development. The two-dimensional spatial analysis algorithm is optimized by using local feature extraction to realize the effective recognition of packaging design forms. The results show that the average accuracy of this algorithm is 86.72%, which is 3.47%, 4.55% and 20.24% higher than that of 2DPCA, 2DLDA and 2DLPP respectively. This shows that the spatial analysis and local feature extraction can effectively carry out the recognition of packaging design forms, and then provide new possibilities for designers to innovate product packaging design forms.

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# **A statistical study of recent migration in Sichuan, Yunnan and Tibet based on the background of computerized big data**

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## **ABSTRACT**

In order to improve the accuracy of the statistics of recent immigrants in Sichuan, Yunnan and Tibet, this paper constructs a statistical model of recent immigrants in Sichuan, Yunnan and Tibet by relying on the big data statistical method. Firstly, the geographical scale is used to stratify the migration situation in Sichuan, Yunnan and Tibet. Secondly, the criteria of migration are determined by setting the criteria of migration according to the different zones. Finally, we rely on multidimensional data sources to obtain the recent migration situation in Sichuan, Yunnan and Tibet. For the accuracy of the model, simulation experiments are designed in this paper, and the results show that the model migration measurement results of this paper are very close to the actual statistical migration results of the experimental cities, and the errors are within 5%. It can be seen that the statistics of recent migration in Sichuan, Yunnan and Tibetan areas can be realized based on the computerized big data background.

## **KEYWORDS**

Sichuan, Yunnan and Tibetan immigration situation; Big Data Statistics ; Geographical scale division; Multidimensional Data Sources

## 1. INTRODUCTION

There are various factors affecting the economic development of a certain place, among which the influencing factor of topography is particularly prominent among many factors [1-4]. In addition, statistical work based on big data is performed by machines and algorithms from data collection, data storage to data processing, which greatly reduces human intervention and can ensure the objectivity of statistical results [5-8].

The literature [9] analyzed the changes in domestic population mobility using the United States as an example, quantified the evolution of internal mobility and migration patterns in the United States through domestic migration data, and pointed out that the human and natural environment had a great impact on population mobility in the United States, such as human development index, education level, climate, cost of living index, house price index, and crime rate. The literature [10] uses Sichuan province as the study area and county-level administrative districts as the study units. Based on the median values of ecological quality index and economic growth index of each unit, Sichuan province was divided into double pressure zone, economic backwardness zone, ecological crisis zone and coordinated development zone, and the coupling coordination degree of each unit was studied. The results of the study showed that the economic development of Sichuan province is very unbalanced and migration occurs in this context.

Therefore, based on the background of computerized big data, this paper relies on the big data statistical method and the accuracy-oriented big data statistical system of migration situation to construct a statistical model of the recent migration situation in Sichuan, Yunnan and Tibet. Firstly, the geographical scale is stratified into four levels: national, provincial, municipal, and county, and the migration situation in Sichuan, Yunnan, and Tibet is obtained. Secondly, the criteria of migration are determined by setting the criteria of migration according to the different partitions. The determination of migration criteria can rely on big data statistics to draw a portrait of each observer, outline the scope of their work and life, and draw the red line of migration. Finally, relying on multi-dimensional data sources, abnormal data are eliminated to obtain the recent migration situation

in Sichuan, Yunnan and Tibet, and the statistical data counted are verified and corrected. In order to verify that the statistical model constructed based on the big data statistical method can accurately measure the migration situation in Sichuan, Yunnan and Tibetan areas in recent times, simulation experiments are designed in this paper. The results show that the migration measurement results of the model in this paper are very close to the actual statistical migration results of the experimental cities. It can be seen that the statistics of the recent migration situation in Sichuan, Yunnan and Tibet can be realized based on the computerized big data background.

## **2. Migration statistics from a big data perspective**

### **2.1. Big Data Statistics**

Big Data takes data as the main subject, and statistics is the science about data. Accordingly, big data has injected new vitality into statistics with its four major characteristics: large data volume, many data types, huge commercial value and fast processing speed, and big data statistics has emerged and is increasingly becoming the direction of research applications in official statistics departments. Big data statistics use multiple data collection methods to integrate multiple data sources, and use modern information technology and architecture to process and mine data at high speed, which has high application value and decision support functions.

### **2.2. Accuracy-oriented statistical system for big data migration situation**

In order to make the statistical model of modern migration in Sichuan, Yunnan and Tibet meet the six key requirements of unified system, scientific application, methodological innovation, cooperation and global vision. Based on the big data statistics, this paper constructs a statistical model of the recent migration situation in Sichuan, Yunnan and Tibet based on a big data system that is in line with the development trend of the recent migration in Sichuan, Yunnan and Tibet and is compatible with the world data system and suitable for multi-dimensional data sources.

### **2.2.1. Geographical scale stratified statistics on migration**

The statistics of recent migrants in Sichuan, Yunnan and Tibet cannot be taken as the grassroots statistical unit at the county level, but should be summarized by reporting at each level to finally obtain the overall statistics at the municipal, provincial and national levels. The number of immigrants and other information obtained by using the county level as the basic statistical unit may have large errors. Big data statistics on migration should correctly assess and judge the current situation of migrants in their respective jurisdictions from different levels and pay attention to migration statistics at different scales. Stratified statistics of immigrants by geographical scale, reasonable assessment and judgment of geographical scale should be divided into four levels: national, provincial, municipal and county.

### **2.2.2. Differentiation of immigration criteria by region**

The rules for determining the migration situation should be different for different era backgrounds and regions. Wanting to set the judgment of migration differently by partition can rely on big data statistics to draw a portrait of each observer, outline the scope of his or her work as well as life, and draw the red line of migration. For example, if people in the Sichuan, Yunnan and Tibetan areas leave their jobs in the Sichuan, Yunnan and Tibetan areas for too long, that is, more than 6 months and have not returned to the Sichuan, Yunnan and Tibetan areas, they are considered immigrants.

### **2.2.3. Selection of multidimensional data sources**

The statistics of recent migration in Sichuan, Yunnan and Tibet based on big data mainly use the cell phone signaling data with full-area coverage to conduct statistics. With the popularity of cell phones, the current signaling data of three major communication operators have basically covered the full amount of users, full time location information data and behavioral data. Using the signaling data of communication operators as the main data source, after cleaning and reasonable model algorithm, it is basically close to the data of the full-area migration volume. While the operator's signaling data is the main data source, multi-dimensional data sources supplemented by other data are also used for modeling and computing. With its massive electronic and unstructured data, the multidimensional data source

greatly enriches the source of Sichuan, Yunnan and Tibetan migration statistics .

### **2.3. Statistical model of recent migration in Sichuan, Yunnan and Tibet**

Accordingly, this paper firstly stratifies the migration statistics according to the geographical scale, secondly eliminates the special data based on the migration criteria set by partition and multi-dimensional data sources, and finally derives the recent migration situation in Sichuan, Yunnan and Tibet. Then, a statistical model based on big data statistics is designed for the recent migration situation in Sichuan, Yunnan and Tibet.

When censoring special data on non-immigrants, the first step is to cull the regular commuters. Most of the regular commuters have been eliminated by setting the criterion of immigrants differently by partition, but students and workers are often ignored. Therefore, we need to calculate the students who leave Sichuan, Yunnan and Tibet to go to school in other provinces and cities and the students who come to school in Sichuan, Yunnan and Tibet from provinces outside Sichuan, Yunnan and Tibet based on the big data.

### **3. Comparison and validation of statistical data on recent migration in Sichuan, Yunnan and Tibet**

To verify that computer-based big data statistics can be derived for the recent migration in Sichuan, Yunnan and Tibet, this paper takes Leshan and Mianyang cities in Sichuan Province, Kunming and Zhaotong cities in Yunnan Province, and Tibet as examples, and measures the recent migration in the three regions using the above-mentioned methodological model and compares it with the actual data published in the three regions.

Since this paper only studies the recent migration in Sichuan, Yunnan and Tibet, it is not necessary to consider domestic and foreign migration when making data measurement and comparison.

**Table 1.** Comparison of Big Data statistical measurement and actual statistical results

Region	Model measurement value / 10,000 people	Actual value / 10,000 people	Error/%
Leshan	152	150	1.3
Mianyang	155	150	3.3
Kunming	138	132	4.5
Zhaotong City	170	168	1.1
Tibet	170	169	0.1

As can be seen from Table 1, the model measurement results of this paper are very close to the actual statistical results of the experimental cities. The number of immigrants in Leshan City, Sichuan Province is 1.52 million, and the actual number of immigrants in Leshan City is 1.5 million, with an error rate of 1.3%. The actual number of migrants in Mianyang City, Sichuan Province is 1.5 million, which is 50,000 less than the estimated value of 1.55 million by the computerized big data statistical model, with an error rate of 3.3%. The actual migration in Kunming City, Yunnan Province is 1.32 million, which is only 60,000 less than the model prediction, with an error of 4.5%. The model measured 1.7 million immigrants in Zhaotong City, Yunnan Province, but the actual number of immigrants in the city was 1.68 million, with a difference of only 20,000 between the two and an error rate of only 1.1%. The error between the statistical measurement of big data in Tibet and the actual statistical results is only 0.1%. Based on the computerized big data statistical model, the total number of immigrants in Tibet is 1.7 million, and the actual number of immigrants in Tibet is 1.69 million, and the number measured by the model is only 10,000 more than the actual number.

#### **4. CONCLUSION**

At present, migration statistics are still inferred based on traditional sample surveys or Internet data, which leads to the problems of high cost, low data accuracy, and poor data continuity in migration statistics. Accordingly, based on the relevant theories and existing research, this paper relies on three major dimensions of big data statistics: geographically scaled stratified statistics, partitioned and differently set migration criteria, and multidimensional data sources to eliminate special data to derive the recent migration situation in Sichuan, Yunnan and Tibet, and then constructs a statistical model of



the recent migration situation in Sichuan, Yunnan and Tibet. In order to verify that the constructed model can have accurate statistics of the recent migration situation in Sichuan, Yunnan and Tibet, this paper designs a simulation experiment and obtains the following results: the number of migrants in Leshan City, Sichuan Province is 152 based on the computerized big data statistical model, and the actual number of migrants in the area is 1.5 million, with an error of only 1.3%. It can be seen that the migration big data statistical model proposed in this paper has high accuracy and can realize the statistics of the recent migration in Sichuan, Yunnan and Tibet based on the computer big data background.

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## Research on the development of cross-innovative applications of computer imaging and newspaper design

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### **ABSTRACT**

In order to make newspaper design more in line with people's aesthetic requirements, this paper builds a coding software platform for computer-generated art. Data collection is conducted through sensors, and the coding program constructed by using multi-sensory perception conversion and data visualization technology converts data into images to realize the development of cross-innovative applications of computer imaging and newspaper design. The innovation effect was verified by the change of newspaper reading, purchase rate and positive feedback rate, and the result showed that the reading volume of newspaper increased from 158,000 copies to 364,000 copies. This shows that the intersection of computer imaging and newspaper design has achieved the innovative development of newspaper design.

### **KEYWORDS**

Computer-generated art; Perceptual conversion; Data Visualization

## 1. INTRODUCTION

Multidisciplinary cross research is the development trend of scientific research and design innovation today, and it has a wide range of theoretical significance and application value in hot research areas such as computer graphics, natural human-computer interaction, artificial intelligence, big data, emotional computing and medicine [1-3]. In recent years, with the rapid development of artificial intelligence, human-computer collaborative innovation design has been widely emphasized, which is not only important for computer-aided design research, but also puts forward new thinking and challenges for the future of design [4]. For example, interaction design based on affective computing, multi-channel cognition and interaction, intelligent habitat design, intelligent medical and health research, aesthetic computing, innovative design of new media art, and theoretical and methodological research of new media design and communication are all international research hotspots, and related technologies and achievements will have important impacts on future academia, industry and society.

The integration of art and science is an important direction for future research in cross-disciplinary fields, and its harmonious unity is a driving force for strategic, fundamental and forward-looking innovations. The literature [5] evaluates newspaper design in desktop publishing courses based on the opinions of graphic design students. Students pointed out that the existing newspaper design relies solely on art theory and lacks innovation. The literature [6] noted that the digital experience lacks the physical experience of flipping through a photo album, reading a newspaper, or strolling through a bookshelf, and that the use of computer technology is a promising way to bridge this gap. Based on this, the literature proposes an interaction design and recommends design guidelines. In summary, newspaper design relies more heavily on art theory and ignores technological tools such as computer imaging, to the detriment of innovation in newspaper design.

Therefore, this paper achieves cross innovation in computer imaging and newspaper design by building a coding software platform for computer-generated art. In the process of building the platform, firstly, relevant data are collected through specific sensors, and physical

analog parameters are used as input ports. Next, the coding program of the platform is constructed using a multisensory perceptual transformation construct approach and data visualization techniques. Then computer recognition of the input digital language is performed, and computer imaging technology is used to convert the data into images to achieve cross-innovation application development of computer imaging and newspaper design. In order to verify the effect of cross-innovation application development, this paper calculates the changes of relevant data of newspapers before and after cross-innovation. The significant increase of newspaper reading and purchase rate proves that the crossover of computer imaging and newspaper design has realized the innovative development of newspaper design.

## **2. Computer Imaging and Newspaper Design**

### **2.1. Computer image generation**

Computer imaging is in fact computer-generated art, i.e., algorithmic art [7]. This technique uses computer 2D animation and 3D animation software to generate the images needed for newspaper design, starting from the creation of the teaching word model until the generation of the images needed for newspaper design, without any conflict at all with the images taken by the camera during the whole process. The images generated based on the computer images are also referenced to real objects. When an image is taken and ready to be applied to a newspaper, a generation command is sent to the digital model. When the command is received, the computer immediately searches the repository for similar images that have been done or seen in the past. The computer then makes the necessary modifications to the similarly successful images in the repository according to the requirements of the given image and the newspaper design to produce an image that matches the newspaper design, i.e., the current frame generated is a partial modification of the previous frame. It can be seen that computer-generated art has designed certain rules through the construction of a programming language and given the computer great autonomy to obtain a computer-automated writing program. Relying on computer-automated writing programs allows the creation of artworks that are

visually associated, resulting in results that cannot be reproduced and have a unique visual form [8].

## **2.2. Multisensory perceptual transformation constructs**

The intersection of computer imaging and newspaper design enables the interaction of images and the search for connections between phenomena in different perceptual domains. Newspaper images are different from real-life situations and require the use of images to help readers perceive the world in a way that places them in a changing world filled with various colors of light and shadow, silence and sound, call and response. The aesthetic intervention of computer-generated art in perception introduces new perspectives to newspaper design through the construction of situations and temporal and environmental contexts, and the creation of video art. The transformation between perceptions is gradually explored, choosing the appropriate programming language and rules to relate and transform the various elements of newspaper design with each other. For example, sound is transformed into image or color, touch into visualization of visual motion images, etc. This crossover both affects the way people receive and perceive newspaper information, and makes the emotional expression of newspapers less one-way and unique. With the design of newspaper image generation based on computer imaging, people can truly receive information through multi-sensory channels.

## **2.3. Data Visualization**

The transformation of data into a visual representation within people's cognition and giving it the image flow, interaction and real beauty of the here and now is another embodiment of the application of computer imaging at the intersection with newspaper design [9-10]. It can provide newspaper readers with a sense that everything is connected through the collection, extraction, reorganization, planning and analysis of data, and even artistic expression and design, visually presenting the controlled energy of technology and nature together, allowing readers to participate in it for change and exploration, and also empowering the real world with the formal results it presents. When discrete data are combined together, an image with a hidden basis in fact is obtained, allowing readers to have a surreal sense of travel when reading the newspaper.

It is thus clear that to achieve the development of cross-innovative applications of computer imaging and newspaper design, computer technology can be used to capture behaviors through specific sensors, using physical analog parameters as input ports. A computer-generated art coding software platform is built using multisensory perceptual transformation constructs and data visualization techniques to construct a coding program that recognizes the input digital language by computer and then converts the data into artistic results, such as light on images.

### 3. Analysis of the effect of computer images applied to newspaper design

In order to verify the effectiveness of the platform constructed in this paper on cross-innovation of computer imaging and newspaper design, this paper calculates people's reading, purchase rate and positive feedback on newspapers before and after the application of the platform, and the results are shown in Table 1.

**Table 1.** Changes in newspaper readership, purchase rate and positive feedback

	Newspaper readership / million copies	Newspaper purchase rate/%	Good rating rate /%
Pre-cross innovation	15.8	61	40
After cross-innovation	36.4	89.3	66

Prior to the intersection of computer imaging and newspaper design using the computer-generated art coding software platform, the newspaper had a quarterly readership of 158,000 copies. However, after integrating computer imaging with newspaper design, the quarterly readership of the newspaper was 364,000 copies. Before and after the intersection of computer imaging and newspaper design, the newspaper readership increased by 206,000 copies per quarter. At the same time, the purchase rate of the newspaper increased significantly before and after the crossover between computer imaging and newspaper design. Before the newspaper design innovation, its purchase rate was only 61%. In other words, for every 100 copies of the newspaper printed by the publisher, 39 copies would be left unsold. In contrast, after the newspaper design

innovation, the purchase rate of newspapers increased by 28.3% to 89.3%. Similarly, just under 11 copies would be unsellable.

The change in favorable newspaper ratings was also extremely evident after the crossover innovation between computer imaging and newspaper design. Before the crossover of computer imagery and newspaper design was achieved using a coding software platform for computer-generated art, the favorable rating of newspapers was only 40%. Another 60% thought the newspaper was deficient in image design. In contrast, after the crossover innovation between computer images and newspaper design, the favorable rating of newspapers reached 66%, an increase of 26%. The increase in newspaper readership, purchase rate, and favorable rating shows that the crossover between computer imaging and newspaper design has achieved innovative development.

#### **4. CONCLUSION**

This paper innovates newspaper design by building a coding software platform for computer-generated art and crosses computer images with newspaper design, and verifies the innovative effect in the process of practical application. Compared with the traditional newspaper design, the purchase rate of newspaper increased from 61% to 89.3% after the intersection of computer image and newspaper design, and the positive feedback rate of newspaper increased from 40% to 66%. This shows that the intersection of computer imaging and newspaper design has achieved innovative development of newspaper design.

#### **5. FUNDING**

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# Research on the challenges and responses to the construction of university teachers' ethics in the era of big data

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## ABSTRACT

In order to meet the objective demand of teacher morality and teacher style construction in the era of big data, this paper designs a kind of evaluation mechanism of teacher morality and teacher style in colleges and universities based on big data analysis. Through big data analysis technology, the data of the grassroots, management and social layer are mined and designed by using top-level design, and on this basis, the multi-directional data are organized to construct the data evaluation index of teacher morality and teacher style. The simulation results show that the evaluation subject inclusion degree of this evaluation mechanism is 9.36, the comprehensive index parameter is 96.75%, and the number of evaluation indexes is 6+58. It can be seen that the big data analysis technology can improve the professionalism of college teachers and promote the construction of college teachers' ethics and morality.

## KEYWORDS

Big Data Analytics Technology; Teacher ethics and teacher style construction; Evaluation Indicators

## 1. INTRODUCTION

With the continuous expansion of the scale of colleges and universities, the crisis incidents involving the misconduct of teachers in colleges and universities gradually show a rising trend, and the

demand of society for excellent teachers in higher education is increasing [1-2]. In the face of the call for teacher ethics construction, scientific evaluation of college teachers in the context of big data is conducive to the overall improvement of teaching ability and professionalism of college teachers to meet the needs of the development of the new era [3-4].

With the gradual spread of scientific evaluation methods, they have played an important role in the work of teacher evaluation. For example, the literature [5] investigated teachers' perceptions of evaluation feedback and self-efficacy of teaching practices and tested the self-efficacy of teachers' teaching practices and the specificity of feedback from the evaluation system using the Teacher Efficacy Scale. The literature [6] analyzed teachers' and administrators' perceptions of implementing teacher evaluation policies through motivational theories that motivate professional behavior. The findings indicated that the overall goal of improving teacher practice through accountability was driven by intrinsic motivation to improve local control of stakeholder institutions. The literature [7] used a qualitative spectrum approach to teacher evaluation research, using factor analysis to rate items in relative order to identify common perspectives on the salience of items in a particular area. In summary, the current evaluation construction of teacher ethics and teacher morality is too heavily weighted toward quantitative evaluation and has insufficient credibility of the evaluation body and lacks an effective monitoring mechanism to meet the goals of teacher training in the context of the data era.

Based on this, this paper designs an evaluation mechanism of university teachers' ethics based on big data analysis based on the background of big data era. In the process of design, the data mining standard is unified from the perspective of top-level design through big data analysis technology, and the data of grassroots, management and social layer are mined and designed. On this basis, we collect and organize multi-dimensional data, and set 6 primary indicators and several secondary indicators to build teacher ethics data evaluation indexes by grasping from two dimensions of moral and moral development. And the practical effect of the evaluation mechanism is confirmed by simulation results. It shows that the evaluation mechanism of university teachers' morality based on big

data analysis promotes the construction of university teachers' morality and is conducive to the leading role of teachers' morality.

## **2. Big data analysis and evaluation mechanism**

### **2.1. Top-level design for data mining**

The network development in the era of big data has reconfigured the educational resources, and the extensive and complicated network information has impacted the teacher's authority, professional authority and academic authority of college teachers. In order to solve the current realistic problems in the construction of university teachers' morality and style, it is necessary to further improve the scientific evaluation mechanism of university teachers and fully mobilize the teachers' work enthusiasm. Based on the big data analysis technology for the construction of the evaluation mechanism of teachers' moral and moral style in colleges and universities, data mining is needed from the perspective of top-level design [8-9].

Data mining is the process of converting the collected raw data into useful information, and it is inherently difficult to extract the useful information implied in it from a large amount of fuzzy raw data [10]. Data mining with teacher ethics as the evaluation goal is not only dealing with numerical structured data in traditional databases, but also with semi-structured and unstructured data, which leads to a huge amount of data and uneven quality. Therefore, in the process of data evaluation mechanism construction, it is necessary to unify data mining standards to lay the foundation for subsequent data storage, data analysis and other operations. The specific work can be summarized into the following three levels:

(1) Data mining design at the grassroots level: The grassroots level mainly refers to the data collection at the college faculty level. The faculty is the main body of college teachers' performance appraisal, moreover, it is the organizer of college teachers' teaching and education and the receiver of information feedback, which has extremely rich information resources. With the continuous development of informatization construction of colleges and universities, the information of teachers at the faculty level has accumulated a lot of data. In the process of data mining at the

grassroots level, it is necessary to further extract the relevant data and information reflecting teachers' moral and moral style.

(2) Data mining design of management: Management mainly refers to the data collection of personnel management department of colleges and universities. Personnel management department is the researcher and maker of university faculty policy, which not only has the function of collecting data related to each faculty, but also has the macro design and guidance role. Especially in the cross-field data mining, the personnel department of colleges and universities can carry out data collection and processing related to teacher management information on behalf of the university.

(3) Data mining design of social layer: social layer is mainly the extension of colleges and universities to social level. The information collection space of college teachers is further expanded through the feedback information of relevant activities such as industry-university-research cooperation and various associations. The evaluation of teachers' ethics cannot only depend on a momentary event of teachers' behavior at school, but needs to collect information from social level extensively and analyze and summarize it in order to get comprehensive information feedback of teachers' ethics evaluation.

## **2.2. Building a data evaluation mechanism**

Big data analysis technology provides sufficient and reliable information and data for teaching resources, and also improves the comprehensive quality of teachers [11-12]. From the top-level design of data mining for teacher ethics construction, it can be seen that the real application of big data for teacher ethics evaluation is a systematic project with a large workload. Therefore, it is necessary to construct teacher ethics data evaluation indexes on the basis of the top-level design. As shown in Table 1, the index construction of teacher ethics evaluation mechanism can be grasped from two dimensions of morality and moral development, and six primary indicators and several secondary indicators are set.

**Table 1.** Indicators of Teacher Ethics Evaluation System

Classification	Tier 1 Indicators	Remarks
Basic	Academic Competence Indicators	Explicit Indicators
Li-Te	Political Performance Indicators	Hidden Indicators
	Personality Quality Indicators	
	Social Norms Indicators	
Tree People	Teacher Moral and Ethical Indicators	
	Academic Guidance Metrics	

The evaluation mechanism of university teachers' ethics based on big data analysis adopts visualization technology to show the basic data including evaluation subjects. The evaluation subjects show diversified expressions, and different evaluation subjects have different evaluation authority and weights. The evaluation system takes secondary indicators as the landing point for sub-evaluation, designs the focus of the algorithm according to the actual needs of the school, gives different indicators with different weights and divides them into different levels. Using big data technology, data from departments that generate direct or indirect relationships with teachers are integrated, and evaluation scores and grades are collected from different evaluation subjects, which are summarized and organized to form standard evaluation data. Teachers' academic ability indicators are also presented as explicit indicator data within the mechanism, and the rest of the implicit data are tagged and aggregated and displayed according to the rules set in the background. Through the corresponding label names configured, different dimensional data of teachers are displayed in the form of word clouds and radar charts according to the popularity of hot labels in order to achieve the goal of teachers' self-monitoring and improve the construction of teachers' ethics and morality in colleges and universities.

### **3. Analysis of simulation results of big data evaluation mechanism**

In this paper, we use visualization technology to promote the formation of evaluation mechanism in the background of big data era, and design a kind of evaluation mechanism of university teachers'

ethics based on big data analysis. The method is deeply applied to the actual teaching activities and compared with the traditional teaching system evaluation method, and the simulation comparison results are obtained as shown in Table 2.

**Table 2.** Simulation Comparison Results

Evaluation Type	Evaluation Subject Inclusion Degree	Number of Evaluation Indicators	Evaluation of Equipment Support Requirements	Comprehensive
Traditional Teaching System Evaluation Method	6.9	8	Teaching Service Platform	72.3%
Big Data Evaluation Mechanism	9.36	6+58	Internet Explorer	96.75%

The degree of inclusion of evaluation subjects in the traditional teaching system evaluation method is 6.9, and the evaluation subjects must use the school intranet to enter the teaching service platform to evaluate the teachers' moral and teaching style when using the traditional teaching system evaluation method, which is extremely inconvenient for the teachers and students who teach and attend classes at home. In contrast, the evaluation subject inclusion degree of the evaluation mechanism of teacher morality and teacher style based on big data analysis is 9.36, and the evaluation subject can evaluate teacher morality and teacher style only by using IE browser to log in the account password, which crosses the time and space barrier of the traditional evaluation method and helps the benign construction of teacher morality and teacher style.

The comprehensive index parameters of the evaluation method of traditional academic affairs system are 72.3%, and the number of evaluation indexes is 8. The comprehensive index parameters of the evaluation mechanism of university teachers' ethics based on big data analysis are 96.75%, and the number of evaluation indexes is 6+58, among which there are 6 primary evaluation indexes including academic ability indexes and 58 secondary evaluation indexes including the number and level of teaching papers. It helps teachers to have a comprehensive understanding of their own professional

quality level and actively search for the painful points of teacher moral failure, so as to promote the construction of teacher moral and teacher style in universities.

#### **4. CONCLUSION**

In this paper, from the perspective of data-based construction of teacher morality and teacher style, an evaluation mechanism of university teacher morality and teacher style based on big data analysis is designed, and the application effect of this evaluation mechanism is verified in actual teaching activities. Compared with the traditional teaching system evaluation method, the evaluation subject inclusion degree of the evaluation mechanism based on big data analysis is 9.36, the comprehensive index parameter is 96.75%, and the number of evaluation indexes is 6+58, which is an obvious optimization effect. It indicates that the evaluation mechanism designed in this paper is conducive to the implementation of teacher morality and teacher style construction of college teachers and promotes the benign development of college teachers' team.

#### **5. FUNDING**

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# The application of big data technology in the study of the development of the library business in modern Hainan

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## **ABSTRACT**

In order to promote the process of library information management, this paper applies the big data technology to the management process of Hainan library. The big data technology is used to establish data tags, build an intelligent book collection and editing system, and promote the integrated management of book resources. The big data transfer search technology is adopted to optimize the reference consulting service and provide users with personalized service methods. The simulation results show that the resource sharing efficiency of the method reaches 97.64%, the book recommendation performance reaches 84.6%, and the user demand mining time is 30 s. Thus, it can be seen that the application of big data technology to the management process of the modern Hainan

library can improve the management efficiency and service quality of the library.

## **KEYWORDS**

Big Data Technology; Library Management; Data Tags

## **1. INTRODUCTION**

With the rapid development of network information technology, library collections have realized the transformation from print-based resources to digital resources [1]. Hainan libraries generate a large amount of data information of diverse types when storing library materials and serving users [2]. How to integrate the resources of existing data and information to meet the dynamic reading needs of users and enhance personalized management services has become a key issue that needs to be addressed urgently in the construction of Hainan libraries.

In recent years, big data technology has been widely used in library management to provide new ideas for the management of traditional libraries. For example, the literature [3] constructed an information retrieval model for intelligent libraries starting from virtual reality technology, proposed a strategy for constructing an extended resource context for intelligent library knowledge services, and realized the interconnection of extended resource context for library knowledge services. The literature [4] designed an intelligent recommendation system for library books based on artificial intelligence. Artificial intelligence technology is used to clean and normalize the data, automatically extract the historical evaluation data of users for books, and demonstrate the service management performance of the system through user clusters. The literature [5] analyzed the video recovery and video software requirements of digital libraries, and proposed the design goals and concepts of video retrieval. The video retrieval experiments were carried out step by step from the video data of the digital library. The experimental results showed that the number of enhanced dynamic clustering algorithms increased to ensure the complexity of the images. In summary, the number of cooperative consultations for internal library management services is relatively small, and reference consulting services are still

in their infancy, which cannot help libraries to keep abreast of their readers and their own shortcomings.

Based on this, this paper applies the big data technology to the management process of Hainan library in order to innovate the management service concept of the library. Firstly, we use big data technology to establish book data tags, build an intelligent book collection system, and optimize the utilization process of books by using the interaction between the hardware layer, logic layer and application layer of the system. Secondly, it adopts big data transfer search technology to enrich the search form and update the information resources in the big data repository. Finally, the applicability of the method in Hainan library is proved through experiments, demonstrating its superiority in book resource management and service performance. It is shown that the application of big data technology to the management process of Hainan library can improve the information service management of Hainan library.

## **2. Library management based on big data technology**

### **2.1. Create a resourceful storage of books**

Big data technology allows people to get more in-depth value information resources from the data system to help people make major decisions in a timely manner. In the management process of modern Hainan library, big data technology can transform the stored data of Hainan library into information resources and provide personalized services for readers.

The use of big data technology to Hainan library's collection of books to establish the corresponding data tags, through the data tags can allow users to quickly find the library material resources they need [6]. Using big data technology to obtain, process and analyze data such as books in the collection and users' borrowing information, we can find out which part of the books have high utilization rate, so as to provide a basis for the consolidation and organization of books. At the same time, it can also collect and organize the feedback information of users with the help of big data to provide reference indexes for subsequent book procurement.

Big data technology can realize the retrieval of book resources anytime and anywhere, solving the limitation of having to access materials in the library, and through big data analysis of students' borrowing behavior, time and other related data, it can realize the functions of book reservation, automatic borrowing and return [7]. For Hainan library management, the application of big data technology makes the organization and classification of books, storage and storage and utilization processes have been optimized, advancing the combination of intelligence, books and collections, and enhancing the effectiveness of Hainan library management through integrated operation.

## **2.2. Building an intelligent book collection and editing system**

In the recent book harvesting process of Hainan library, book unpacking and acceptance, processing and cataloging and sorting shelves and other operations require a lot of manual processing [8]. The interaction between the hardware layer, logic layer and application layer of the intelligent book harvesting system based on big data technology can jointly complete the book harvesting function. Among them, the hardware layer mainly completes the signal transmission network erection of book data analysis system, electronic bookshelf and terminal equipment, and provides hardware support for the whole picking and editing system. The logic layer has the function of positioning engine, providing the required logical service content to the hardware layer, and realizing the management of input and output information through conversion, verification, screening and other functions. The application layer mainly realizes the interactive interface between the collection and editing system and the librarians and reader users, to meet the needs of library managers and readers, to realize the personalized and diversified services of Hainan Library, and to provide security for the database. The intelligent book collection and editing system based on big data technology realizes the automatic collection and editing of book resources in an automated, intelligent and visualized way, solving the problem of book backlog and shortening the collection and editing cycle.

## **2.3. Optimize reference consulting services**

Libraries need to always meet the needs of users in the first place, in the era of big data Hainan libraries want to achieve continuous development should be to meet the needs of users. Big data era of Hainan library need to computer and some other hardware facilities continue to improve, establish a more reasonable open network system, promote the progress of reference consulting services [9].

Hainan library's reference consulting user services are quite diverse, not only have ordinary users and professional users. Therefore, at this stage of Hainan library should enrich the search form, take big data transfer search technology to make the search content contains semantic search and other search modes, which is convenient for users to query and retrieve, meet the personalized needs of users and improve the service quality. In addition to update the information resources in the big data repository, to ensure the reasonable allocation of resources in the library, to establish a network service platform that meets the needs of users, to absorb and solve the comments and problems raised by users in a timely manner, to provide support for library operations. The library should also establish a perfect user interest model and use the model as a basis to find out the actual preferences of users, so as to provide them with accurate information delivery.

### **3. Analysis of Simulation Results for Library Data Management**

Based on big data technology, this paper improves the shortcomings of the management process of the recent Hainan Library, and applies the big data technology to the management process of Hainan Library in order to optimize the management services of Hainan Library. In order to verify the applicability of this management approach to Hainan Library, the operational effect experiment was conducted, and the simulation results are shown in Table 1.

**Table 1.** Comparison of Simulation Results

	Traditional Library Management	Management of Big Data Technology
Resource Sharing	83.2%	97.64%
Recommended Performance	32%	84.6%
Feedback Effect	72%	83.6%
Open Rate	83.6%	84.9%
Service Level	73.86%	97.56%
Digging time comparison	6min	30s
Borrowing convenience	72.8%	94.97%

Compared with the traditional management approach of Hainan Library, the library management approach based on big data technology has achieved 97.64% efficiency of resource sharing and 84.9% open shelf rate in terms of book resource performance. In terms of service performance, the level of information consultation service is 97.56%, the borrowing convenience is 94.97%, and the recommendation performance of user books reaches 84.6%, which is nearly three times higher compared to the traditional management approach. It shows that the management approach can provide personalized reading service mode for library users and optimize the allocation of information service resources of Hainan library. The user demand mining time of the library management approach based on big data technology is 30s, which can make the management service of Hainan library more efficient and faster, and de-boundaryize the traditional library storage, and truly realize the book management with user demand as the goal-oriented.

## **. CONCLUSION**

Based on big data technology, the paper improves the shortcomings of Hainan library in the management process and designs a library management approach based on big data technology to optimize the management service work of the library. The applicability of the method for Hainan Library is verified in the process of practical application, and the results show that: the library management approach based on big data technology optimizes the efficiency of library resources utilization by making the resource sharing efficiency and open shelf rate reach 97.64% and 84.9%, respectively, in terms of book resources performance. And the overall service performance reached 85% and the user demand mining time was shortened to 30 s. It shows that the management approach can facilitate the business



management of Hainan Library and promote the continuous improvement of Hainan Library's information service level.

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## **Cross-cultural penetration of folk traditional decorative arts with the aid of artificial intelligence**

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### **ABSTRACT**

In order to improve the cross-cultural communication ability of folk traditional decorative arts, this paper designs a cross-cultural penetration pathway of folk traditional decorative arts with the assistance of artificial intelligence. By building an intelligent platform, the interactive effect of art products is achieved by using human-computer collaboration technology. The immersive art product experience was carried out from the digital penetration subject, interactive recognition and building intelligent penetration scenes. The results show that the parameter indicators and impact values of cultural penetration and impact strength of each audience group reached 87.45% and 88.9% on average. It can be seen that the cultural penetration strength of folk traditional decorative arts has been improved with the assistance of artificial intelligence.

### **KEYWORDS**

Cultural penetration; Folk Decorative Arts; Human-Machine Collaboration Technology; Artificial Intelligence

## 1. INTRODUCTION

With the advancement of economic globalization and information networking, cross-border and cross-regional cultural exchanges are increasing, various cultures interact with each other, and cross-cultural penetration has become an inescapable phenomenon and communication method in today's world [1-2]. Folk traditional decorative arts are facing the threat of monoculture, and how to take active countermeasures to maintain traditional cultural security has become a key issue that needs to be urgently addressed in the cultural communication pathway [3-5].

Currently, traditional crafts have begun to be empowered by the use of emerging technologies in the process of penetration. The literature [6] studied the cultural characteristics and intelligent transmission of Chinese Xiang brocade by collecting qualitative data through in-depth interview method. It also measured more than 1,000 pieces of Xiang brocade from the Suzhou Archives in China and analyzed its artistic characteristics such as pattern design, color matching techniques and weaving processes, which provided important references for its cultural and weaving heritage. The literature [7] constructed a big data platform for an automated production line of handicraft structures to achieve a closed loop of art creation in a unique way with high efficiency and precision and stability. The literature [8] used new media and information technology to bring new development opportunities for folk art crafts, and tried to verify the value of folk traditional crafts to manufacturing enterprises by interweaving big data. In summary, the exploration of emerging technologies into the field of folk traditional arts is still in its infancy, and although folk crafts are aware of the value of emerging technologies to their penetration and dissemination business, there are still development challenges in terms of data quality and usage.

Based on this, this paper designs a cross-cultural penetration path for folk traditional decorative arts with the assistance of artificial intelligence. Firstly, it constructs an intelligent platform through intelligent interaction design and uses human-computer synergy technology to improve the interaction between art design products and the audience. Secondly, in the path of cross-cultural penetration, the immersive experience scene is created from digital penetration

subject, interactive identification and building intelligent penetration scene. Finally, the experiment proves that the cross-cultural penetration path with the assistance of artificial intelligence can effectively improve the cross-cultural communication ability of folk traditional decorative arts.

## **2. Artificial intelligence-assisted art and culture penetration**

### **2.1. Intelligent Interactive Art Design**

Along with the rapid development of artificial intelligence technology and the Internet, the interactive attributes of decorative art design have become more prominent and distinct. As a new art form, interactive art design is a fusion of folk traditional decoration technology and art, which can realize not only human-human interaction, but also human-computer interaction, thus bringing different sensory and psychological experiences [9-10]. The "interaction" in interactive art design refers to the two-way information exchange between the participants and the artwork, which can be either the interaction between the audience and the artwork or the exchange of ideas between the creator and the audience. With the application of artificial intelligence to traditional folk art design, the interaction of such works not only brings new creative experiences to the creators, but also increases the immersion and interactivity of the audience's experience.

### **2.2. Intelligent platform construction**

Intelligent platform-oriented interactive art design is the application of artificial intelligence to design platforms or the use of artificial intelligence to assist in the design of folk traditional decorative art products to form art designs that can be created by human-computer interaction in intelligent platforms [11]. When designing and creating folk traditional decorative art products in an intelligent interactive platform, it is necessary to analyze and model the massive amount of data and deconstruct the works from the database to simulate the works of intelligent decorative art design when the designer needs it. This intelligent platform is designed with four types of matching, namely text matching text, text matching image, image matching text and image matching image. The intelligent interactive art design platform can solve some design tasks of repetitive manual labor and

apply more energy to creative activities to improve the design quality of decorative art works.

### 2.3. Human-Machine Collaboration Technology

Intelligent machine-oriented interactive art design is a mode in which intelligent robots create works by simulating human works. This model has a more direct visual art effect than other models. Through the interaction mode of machine and human collaboration, designers can use language, expressions and brain thinking to create various decorative artworks, combining human-machine interaction to complete the works. In this process, the machine learns from human behavior, thus inspiring folk artists about traditional decorative art design and realizing the interaction between art design products and the audience.

## 3. Cultural penetration path

### 3.1. Digitalization of the penetration subject

With the assistance of artificial intelligence, folk traditional decorative arts show a trend of normalization, and intelligent communication devices are not only an effective cultural penetration channel, but also a new communication object. Through natural language understanding and machine real-time learning technology, intelligent communication devices become virtual inheritors in the process of folk traditional decorative arts dissemination. Compared with human inheritors, artificial intelligence has an extremely strong advantage in learning efficiency and logical combining, which can not only grasp a large amount of raw data and information in a short period of time, but also organize and connect unstructured data in series. It can also change to the existing knowledge output according to the change of external environment and the specific needs of the audience in different cultural communication environments.

### 3.2. Interactive penetration recognition

Through natural human-computer interaction technology, the audience's raw physiological data can be used to guide the production and creation of communication content, which can form a virtuous closed loop in which content dissemination and user feedback promote each other. The quantitative analysis of users' raw physiological responses can better enable the understanding and

processing of user experience. The widespread use of feedback interaction technology in various new media platforms enables audiences to publish, give feedback and communicate at any time in the process of receiving information, thus transforming broadcast communication into social communication. By combining with human-machine hybrid enhancement technology, experiential interaction technology effectively combines human comprehension and machine data processing ability to build a virtual cultural penetration environment for folk traditional decorative arts. This compensates to a certain extent for the shortcomings of the lack of experience of design works due to the differences in spatial environment.

### 3.3. Build intelligent penetration scenarios

With the maturity and popularity of artificial intelligence technology, artificial intelligence assistance can be used to innovate the cultural penetration of design works of folk traditional decorative arts in terms of form and content. A deep simulation of folk traditional decorative art and its growth environment, an intelligent and optimized reproduction of conceptualized scenes such as humanistic environment and architectural style on the basis of retaining detailed features, builds a simulation environment to display and disseminate in a more vivid way. With the help of mobile devices such as tablet PCs, viewers can independently choose the viewing angle and the direction of experience through natural movements such as movement and rotation. The design process of the work is viewed and felt in all aspects in the native environment of traditional folk decorative artworks, creating an immersive experience scene for users and generating a unique experiential penetration effect.

## **4. Analysis of the effect of art penetration with the aid of artificial intelligence**

This paper designs a cross-cultural penetration pathway for folk traditional decorative arts with the assistance of artificial intelligence, starting from digital penetration of subjects, interactive recognition and building intelligent penetration scenarios. To verify the feasibility of the penetration pathway, cultural penetration experiments were conducted for cultural audience groups aged 0-25, 26-40, 41-65 and over 65. The cultural penetration effect of the pathway was analyzed by the cultural penetration index parameters, the strength of cultural

influence and the degree of understanding of the artistic connotation of the works.

**Table 1. Result Analysis of Cultural Penetration Pathways**

	Understanding of Art Types	Understanding of the Content of Works	Strength of Cultural Penetration	Cultural Influence
0-25 Years	73.46%	86.64%	92%	95.64
26-40 Years	92.6%	94.65%	91.66%	91.72
41-65 Years	84.65%	81.9%	84.25%	83.2
65 Years Old and Above	72.6%	78.65%	81.94%	84.95

As can be seen from Table 1, after the art and culture infiltration of audience groups of different age groups, the degree of knowledge of each audience group about the types of folk traditional decorative arts reached more than 70%, and the degree of knowledge about the connotation of art works reached more than 80%. It indicates that with the assistance of artificial intelligence, folk traditional decorative arts have positive significance in the process of localized infiltration, further promoting the dissemination and development of folk traditional decorative arts. At the level of cultural penetration strength, the parameter indicators for different age groups of audience reached 87.45% on average. Among them, the audience group aged 0-40 performs the best, reaching an excellent level of 91.83%, improving the efficiency and quality of cultural penetration of folk traditional decorative arts. At the level of cultural influence strength of folk traditional decorative arts, the influence value of audience groups of different age groups reached an average of 88.9%, making folk traditional decorative arts gain a broader design space.

## 5. CONCLUSION

This paper actively explores the cross-cultural penetration path of folk traditional decorative arts with the assistance of artificial intelligence, and verifies the actual penetration effect of the path through the analysis of experimental results. The results show that the degree of understanding of each audience group about the types of folk traditional decorative arts and the connotation of the works reached over 70%. At the level of cultural penetration and influence strength, the parameter indicators and influence values of different age audience groups reached 87.45% and 88.9% on average. Thus, it

can be seen that with the assistance of AI, folk traditional decorative arts have improved their ability of cross-cultural communication and have positive cross-cultural penetration.

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# The application of big data technology in the informative teaching of college English speaking

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## **ABSTRACT**

This paper takes the combination of big data technology and English classroom as a premise to analyze the existing problems of teaching spoken English in college in the context of big data. It explores the current problems of teaching spoken English in the context of information technology, identifies the advantageous aspects of big data technology in the teaching process and verifies its advantages in classroom practice. In the initial stage, the students' scores in Contextual Spoken English out of 30 were 10 for fluency, 9 for completeness, 4 for grammatical correctness, and 12 for pronunciation. In the later stages, the scores increased in all categories, with fluency increasing by 10, completeness by 14, grammatical correctness by 16, and pronunciation by 15. Thus, it can be seen that the application of big data technology in oral information teaching can optimize the college English oral classroom and improve the English oral communication ability of college students.

## **KEYWORDS**

Big Data; University English; Informative Teaching; Oral Communication

## 1. INTRODUCTION

With the development of the times, network informatization teaching has been gradually promoted and applied in major universities. Universities are also scrambling to reform the traditional teaching mode with the help of online information technology teaching methods [1]. However, the reform of college English speaking course is not very strong, and some universities have hired foreign teachers to undertake the task of college English speaking teaching, but the achievement is not optimistic [2]. The application of big data technology in college English teaching can effectively collect and use various data resources, accurately analyze the actual learning needs of students, and help improve the relevance of teaching, and then achieve the goal of personalized teaching [3].

The advantages of big data technology in information collection, semantic analysis, data association, data storage and utilization provide convenient technical support for college English teaching. Using big data technology for English courseware production and presentation, building an online English interactive classroom, and simulating English speaking rehearsal scenarios has innovated the university English teaching mode [4]. First, it is conducive to the cultivation of scientific teaching concepts. The practice of college English teaching relies on scientific educational guidelines, and big data technology enables educational guidelines to be built on a solid data foundation, so that educational guidelines makers can obtain educational information in a timely manner, analyze data through science and technology, and overcome subjective bias [5]. Second, it is conducive to creating a good classroom atmosphere. College English teaching has formed a relatively solid teaching style, and students' interest in English learning needs to be improved [6]. Through big data technology, intelligent teaching courseware is designed to create speaking practice scenarios with the help of English film and TV clips, which can provide professional pronunciation guidance and enrich English teaching resources [7]. In addition, with the dynamic monitoring of classroom data, problems in teaching can be improved in a targeted manner. Third, it is conducive to smooth communication channels between teachers and students. College English teaching should pay more attention to students' learning initiative and enthusiasm, and close communication between

teachers and students is an important guarantee for teaching effect improvement. By building an English interactive window through big data technology, it can provide students with functional services such as knowledge Q&A, practical exercises, homework review, and demand feedback, so that teachers can grasp the learning dynamics of students in a timely manner [8].

Based on this, this paper studies the results of applying big data technology in the informatization teaching of college English speaking. Firstly, by analyzing the existing problems of university English speaking informatization teaching, the focus of the whole paper is derived, and then two major advantages of informatization English speaking teaching are proposed. Then, based on the research needs of this paper, the main points of informatized teaching of college English speaking and the possible misunderstandings in teaching practice are proposed and practically verified in the contextual English speaking classroom of college students. Under the background of big data, English teaching in colleges and universities faces a new development opportunity, and timely teaching reform can promote the overall improvement of English teaching quality in colleges and universities.

## **2. Big Data and Information Teaching of College English Speaking**

### **2.1. Existing Problems of College English Speaking Teaching in the Context of Big Data**

#### **(1) Traditional Teaching Model**

Since college English speaking courses are generally not taken seriously by major universities, the degree of innovation in major universities is relatively low. The teachers generally adopt the traditional lecture style teaching. Even in speaking courses, students' interest is not high and the difficulty in speaking is still a common situation among college students. Since the course is not taken seriously, teachers are not very motivated to innovate and reform the course. In fact, speaking is the key to language learning, especially in English, where the ability to speak is the final criterion for a student's English proficiency.

#### **(2) Hire foreign teachers**

Currently, more and more colleges and universities are hiring foreign teachers to teach college English as a foreign language. However, the current situation of hiring foreign teachers in universities shows that the number of experienced foreign teachers is low and they are usually fresh graduates. Therefore, foreign teachers can only create a good language training and communication atmosphere for students with good English proficiency, while students with average or poor English proficiency still cannot be effectively improved.

## **2.2. Advantages of Informative Spoken English Teaching**

(1) The use of information-based teaching can change the way of teaching and learning

The phenomenon of teachers lecturing unilaterally and students accepting passively mainly exists in traditional English classrooms, and this teaching mode ignores the subjectivity of students. The application of information-based teaching mode has broken the closed, isolated and one-sided way of English teaching, and the teaching tools have gradually developed from a single traditional paper textbook to diversified media, with multimedia courseware and various online teaching platforms becoming the common tools and carriers of English teaching [9]. This makes the presentation of knowledge more intuitive and clear, and the sources more abundant. The use of information-based teaching methods, especially online learning in the classroom using cell phones on learning platforms, has greatly stimulated students' enthusiasm for learning, increased their participation, and made the transfer of knowledge in the classroom more convenient and efficient.

(2) The application of information technology promotes the change of teaching evaluation method

Modern information technology can effectively monitor students' independent learning, and students' learning process on the online platform can also be automatically recorded by information technology, which facilitates later evaluation. In the traditional English classroom teaching, it is not correct to evaluate students only summatively; such evaluation is too one-sided and not objective. In order to promote students' learning efficiency and overcome the above drawbacks, a combination of teaching and assessment should

be used to set teaching goals, track and observe the teaching process, and provide feedback on the final effect of teaching.

### **2.3. The key points of the application of English speaking information teaching with big data technology**

#### **(1) Develop students' independent learning skills**

With the widespread use of information technology, the information-based teaching model should permeate all subjects in the context of the new curriculum reform. Teachers need to integrate the application of multimedia devices, computer systems, networks and social media, and other tools to promote the progress of the information-based teaching model and develop students' independent and autonomous learning abilities. It is recommended that teachers improve their teaching philosophy, respect students' subjectivity in the classroom, follow the teaching principle of tailoring teaching to students' needs, aim to cultivate students' independent learning abilities, and encourage students' innovative thinking. The potential abilities of students are explored in classroom practice, so that students can gradually become composite talents and lay the foundation for future job practice. For example, when teachers explain texts with certain cultural background connotations, teachers can use the Internet to introduce to students the differences in Chinese and American holidays and customs, and guide students to respect Western culture and do their pre-course work with a dialectical attitude. In turn, students can work on their own to enhance their interest and broaden their horizons and vocabulary in what they see in life, which will help them in their subsequent English reading, composition writing and speaking training.

#### **(2) Stimulate students' interest in learning English**

Information-based teaching plays an important role in the college English classroom, as it can greatly stimulate students' interest in learning. In fact, interest is the biggest motivation for students to participate in learning and get the best results, so using information technology to increase students' motivation for learning English can help them improve their own learning efficiency. Teachers need to make full use of fresh video and audio materials in their daily teaching process to attract students' attention to English learning content, so that students can be fully engaged in English classroom learning.

(3) Teachers and students use the information-based learning platform to communicate in English

Teaching English in college is not enough to use only the time in class, which cannot solve all the learning problems of the students. Therefore, teachers and students can build an English communication and learning QQ group together, so that students can ask questions together and exchange English learning experience with each other, and teachers can give online guidance to students in the group on important and difficult problems that they do not understand. Such an educational learning mode is not limited by space and time, and builds a bridge of online learning between teachers and students.

### **3. Misconceptions in Teaching English as a Foreign Language**

(1) Ignore the actual situation of students and make extensive use of digital teaching tools

Some teachers present all lectures in an informational way, which does not take into account the actual situation of students' learning. The teachers show the content that students need to think alone more directly, so that students do not have time to think and digest, and thus their logical reasoning ability is not improved. Some teachers simply show PPTs in the classroom, displaying all the content on the screen, and not only that, but also put all the knowledge on the information-based learning platform. In addition, in the process of making courseware, some teachers put too much emphasis on the playback effect, thus using a lot of sound effects and pictures to show their lecture contents, which in turn distracts students' attention in class and deviates from the teaching objectives.

(2) Neglecting individualized teaching evaluation

During personalized English teaching in colleges and universities, teachers need to reasonably apply big data technology to adjust teaching evaluation methods, comprehensively assess students' daily learning performance and assessment results, and give targeted guidance by comprehensively analyzing students' strengths and weaknesses in English learning through data. In addition to teachers' evaluation, students can also conduct mutual and self-evaluation to investigate students' satisfaction with teaching, and analyze and

study students' evaluation results through big data technology, and then adjust teaching programs in a targeted manner.

#### 4. Analysis of the results of information-based teaching of spoken English in college

In order to test the actual teaching effectiveness of big data technology in the teaching of English speaking informatics in college, five college students were randomly selected to analyze their performance in English contextual oral communication classroom. Each of the five students' spoken language was reviewed in the form of audio recordings to analyze the students' English speaking fluency, completeness of utterance, grammatical correctness, and pronunciation. The college students' English speaking performance is shown in Figure 1.

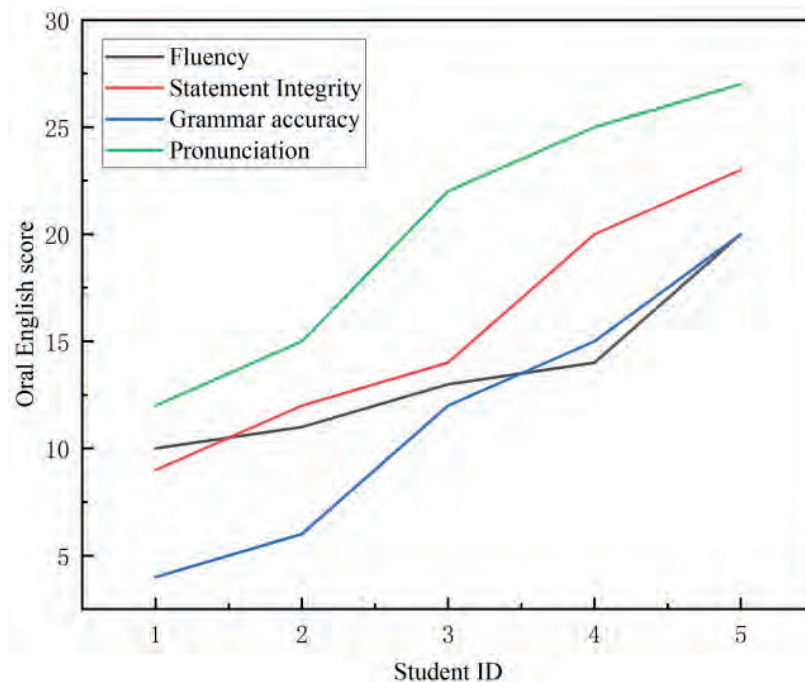


Figure 1. College Students' Oral English Performance

In the initialization stage, students scored 10 points for fluency, 9 points for completeness of utterance, 4 points for grammatical correctness, and 12 points for pronunciation in a contextual oral communication out of 30 points. In oral English teaching, students often lack fluency and completeness of their utterances due to interference such as poor language learning. With the unlimited expansion of students' English learning resources and learning platforms under big data technology, students' language accumulation is abundant, and emotions such as lack of confidence



will decrease in the face of oral communication. Under the guidance of university English speaking informatization teaching, students' scores of corresponding examination items have all increased, specifically: fluency 20 points, utterance completeness 23 points, grammatical correctness 20 points, pronunciation 27 points, an average increase of 10-16 points compared with initialization, students' English speaking ability has significantly improved, and teachers' teaching results have received positive feedback.

## **5. CONCLUSION**

This paper explores the results of the application of big data technology in the informational teaching of spoken English in college. By exploring the existing problems in the informational teaching of college English speaking, the focus of the full-text study is derived, and then two major advantages are proposed that informational teaching of English speaking can change the methods of teaching and learning and promote changes in the way of teaching evaluation. The distribution of students' English speaking scores under the guidance of informational teaching of college English speaking is 20 points for fluency, 23 points for completeness of utterance, 20 points for grammatical correctness, and 27 points for pronunciation, which is 10-16 points higher than the initialization. Thus, it can be seen that big data technology has a positive role in the informational teaching of college English speaking, and the integration and development of big data technology and college English is a new change in college English teaching and an important practice to explore a new model of college teaching in the new era.

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# Analysis of the value of virtual simulation experimental teaching in tourism management based on discrete regression algorithm in the context of big data

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## ABSTRACT

By constructing a virtual simulation experimental teaching model of tourism management based on big data technology, this paper seeks to explore the importance of virtual simulation experiments in the teaching of tourism management. Based on the virtual simulation experiment teaching case sharing platform construction, the students' written scores are compared with the practical training scores to verify the teaching value of the virtual experiment platform. After the practical training, the students' performance of guided tour explanation is 90 points, which is 5 points higher than the written performance, bed-making skill is 92 points, which is 17 points higher than the written performance, and meeting planning is 96 points, which is 18 points higher than the written performance. This shows that the virtual simulation experiment teaching is more suitable for tourism management students than the pure theory teaching mode.

## KEYWORDS

Big Data; Tourism Management Major; Virtual Simulation Experiment; Tourism Practical Training

## 1. INTRODUCTION

Along with the booming development of tourism industry, the construction of tourism management majors in China's general higher

education institutions has emerged and gradually connected with the international level, which has cultivated a large number of excellent tourism management and service talents [1]. It is an important mission for the high-quality development of tourism education in the new era to strengthen the cultivation of tourism management professionals in higher education institutions, especially the cultivation of application-oriented and excellent talents in line with the development trend of new tourism industry, new modes and new technologies [2]. Tourism management is a comprehensive and applied profession that covers both socio-economic content and natural science attributes. Virtual simulation experiments use computer, multimedia, artificial intelligence and other high technology to solve the problems of irreversible traditional practical teaching scenarios, high cost of courses and high risk of practice, and broaden the time and space of practical teaching, which has become the mainstream trend of practical teaching in tourism management majors in colleges and universities [3-5].

Due to the suddenness and irreducibility of tourism management situations, on-site practical teaching may have a longer period of waiting, higher time cost and high environmental risk, and traditional practical teaching can no longer meet the needs of tourism management professional talent training [6-7].

This paper firstly constructs the virtual simulation experimental teaching model of tourism management based on big data technology, establishes the virtual simulation experimental program over discrete counting, and archives the experimental materials of three directions of travel agency operation and management, hotel management and exhibition service and management. And then build the virtual simulation experimental teaching case sharing platform and point out the current realistic dilemma of practical teaching in tourism management to further clarify the research direction. In order to verify the effectiveness of the method proposed in this paper, the students' written results are compared with the practical training results in order to find out the necessity of virtual simulation experiments in teaching tourism management majors. By building a first-class virtual simulation experiment system, designing a first-class virtual simulation interaction and collaboration mode, forming a first-class virtual simulation sharing platform, taking the demand of tourism

industry as the guide, innovating teaching concept, and integrating tourism disciplines and information technology resources, we can give new momentum to the cultivation of excellent talents in tourism industry and sustainable development of industry.

## **2. Tourism management professional virtual simulation experimental teaching model building**

### **2.1. Over discrete counting tourism scenery virtual experiment program establishment**

Create a SAS scenic virtual dataset named "nbd1" using SAS data synchronization program:

```
data nbd1;  
infile 'd: \SASTJFX\mdvisit. Dat';  
input id numvisit reform badh age edu loginc;  
run;
```

Program Description: Enter all 2228 lines of data in this example into the computer in "text format" with the file name "mdvisit.dat" and store it in the D drive folder named "LVYOUSASTJFX " in the D drive folder named "LVYOUSASTJFX". There are 8 data in each line, named as "Travel Agency Management", "Hotel Management" and "Exhibition Service and Management". The three experimental materials will be archived one by one to generate virtual simulation sample materials for students' professional practice.

### **2.2. Travel virtual simulation experimental teaching case sharing platform building method**

#### **(1) Establishment of a special fund for sharing platform**

According to their own development requirements and their own economic conditions, each university raises funds to build a special sharing platform for the practice teaching case base of tourism management majors, so that the funds can be earmarked for specific purposes and the fund chain for the later construction of the sharing platform of each university can be guaranteed. For schools that are short of funds, they can raise funds through appropriation, fundraising and sponsorship, and make a perfect plan for using funds to achieve

comprehensive planning and integrated management in terms of equipment, technology and talent training.

#### (2) Development of unified platform construction, supervision and management standards

Led by outstanding colleges and universities, a team of experts is set up to develop a unified supervision and management standard for the shared platform of practice teaching case base in tourism management. Among them are case quality standards, case development standards, platform linking standards and standards for supervision and use. Emphasis is placed on being detailed and strict, and regulating every link and means of operation for the construction and use of the shared platform. After the standards are formulated, they should be quickly promoted and used to guide all universities to build their own excellent case base platforms under the unified standards and lay a solid foundation for the links and links established between major sharing platforms.

#### (3) Colleges improve practice measurement system

In order to ensure the quality of practice teaching, it is necessary to improve the practice measurement system and to strengthen the cooperation between schools and enterprises, as well as to strengthen the control of students. Schools should contact students and enterprises in a timely manner to get the current status of students so that they can evaluate the performance of the practice process. For example, regular inspections during the internship period allow students to give feedback and summarize the process, and the school should evaluate the practice process in combination with the final grade.

### **2.3. The realistic dilemma faced by the practical teaching of tourism management in the context of big data**

#### (1) Limited practical teaching courses

In the practical teaching of tourism management profession, students need to learn various operation or service skills in a real environment by creating complex and realistic scenarios. However, the current curriculum design of practical teaching in tourism management majors is limited, and the practical training sessions lack a specific scenario background. The practical teaching about tourism

destination planning only instructs students to carry out sandbox simulation practical training by means of pre-set scenarios, without considering the authenticity of the scenarios. The complexity of tourism scenarios makes the practical teaching of tourism management professions have the limitations of high cost, high risk and low efficiency . For example, the crisis management practice of sudden passenger congestion in scenic spots has high on-site teaching time and economic costs, and students face a large safety risk factor. In this context, virtual simulation experiments can organically integrate virtual and reality, and use big data and artificial intelligence science for practical teaching course design, opening up new ideas to solve the limitations of practical teaching course design.

## (2) Insufficient use of new technologies

At present, the achievements of new information technology revolution such as big data, cloud computing, 5G communication technology and artificial intelligence have been fully applied in many fields such as education, finance, marketing, business intelligence and enterprise management, and the new liberal arts talent training mode has undergone profound changes .

### **3. Analysis of virtual simulation experiment on tourism management students' service skills improvement**

The practical operations of students in the travel agency operation and management direction, hotel management direction, and exhibition service and management direction in tourism management were videotaped and analyzed by comparing them with their performance with the written design at the end of the experimental class, focusing on the changes in students' understanding of hospitality service skills and techniques. The students' service skill scores are shown in Table 1.

**Table 1.** Student service skill scores

Operation and management of travel agencies		
Practical training project	Average score of written design	Average score of practical training
Visiting guide	85	90
Progress supervision	80	92
Hotel management		
Practical training project	Average score of written design	Average score of practical training
Table setting table	80	88
Bedmaking skills	75	92
Exhibition service and management		
Practical training project	Average score of written design	Average score of practical training
Meeting arrangement	68	93
Meeting planning	78	96

The average score of students in the written design was between 75-80, and the score was distributed between 85-96 after the practical training operation, which improved by 10-16 points, which indicates that compared with the theoretical teaching, students accept the service environment simulated by the virtual experiment more. In the more abstract session of meeting layout, due to too many design elements, students are easily unable to find a sense of direction in the huge theoretical narrative, so they do not get high scores in the written design, only 68 points, not reaching the excellent level. Virtual simulation practice can directly simulate the required theme exhibition site for reference layout, which is easier for students to understand, which explains why the average score of students' practical training operation in meeting layout and meeting planning is as high as 93-96. The bed-making and table-setting in the hotel direction are more oriented to practice, and after several practice sessions, students' scores are as high as 88-92, which meets the standard of professional training for top-up practice. This shows that students' practical service skills have all improved after the virtual simulation test.

#### 4. CONCLUSION

This paper constructs a virtual simulation experiment program of tourism management based on big data technology, and points out the realistic dilemma of the current practical teaching of tourism management by building a virtual simulation experiment teaching



case sharing platform, which provides a reference for the reform and innovation of the practical teaching of tourism management in colleges and universities. In this paper, it is shown that compared with students' written design scores, students' scores increased by 10-16 points respectively after practical training operation, and the highest difficulty meeting layout scores increased by as much as 25 points. Thus, compared with theoretical teaching, virtual simulation experiment teaching uses modern information technology to innovate traditional practical teaching in terms of teaching content, teaching methods and teaching management, which can effectively solve the problems of high cost, high risk and irreversible reality of traditional practical teaching, fully reflecting the new trend of practical teaching in tourism management profession in the era of big data.

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# Research on the application of Shanghai's non-heritage resources IP in the field of cultural and tourism apparel products based on big data

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## ABSTRACT

Combining Shanghai's non-heritage resources with cultural travel apparel products is conducive to the secondary innovation of Shanghai's non-heritage resources. This paper explores the suitability of Shanghai non-heritage resources IP in the field of cultural and travel apparel products with the background of big data technology. By sorting out the types of Shanghai non-heritage items, integrating them with the Republican style apparel, and proposing a design, while the design samples were then put into the market for research. In terms of design elements, consumers expect 30% for Shanghai non-heritage elements, 15% for new Chinese style and old vintage style, and 31% for clothing cut. The solution proposed in this paper obtains the expectation of the consumer market, which is conducive to the promotion of the integration of Shanghai's non-heritage resources and cultural tourism resources with apparel products, thus expanding the dissemination of Shanghai's non-heritage resources.

## KEYWORDS

Big Data Technology; Shanghai Non-Foreign Heritage Resources IP; Cultural Travel Apparel

## 1. INTRODUCTION

Shanghai intangible cultural heritage (hereinafter referred to as "ICH") originates from Chinese civilization and is rooted in the soil of national folklore, which is not only a witness of historical development but also a precious cultural resource with important value [1]. With the arrival of the era of big data and the development of information technology, it provides a good opportunity for the digital protection of NRMs. At

the same time, the development of technological changes such as the Internet, artificial intelligence, virtual reality, and mixed reality has provided new media and means for the protection and dissemination of NRMs [2]. When society has developed into the network era, NRM cannot leave digital and network means even more [3]. The variety of NRMs, the complexity of resource types, the cultural space, inheritance forms and complexity of their existence, whether they can be managed and applied with the help of big data, and how to actively promote NRMs into modern life and promote the creative transformation and innovative development of NRMs are worthy of in-depth study by experts and scholars [4]. Today, with the rapid development of information technology, there is an urgent need for the public to deepen their knowledge of traditional culture, and we should dig deeper into the essence of traditional culture, stimulate the vitality of traditional culture, and enhance cultural confidence and self-awareness [5].

NRMs contain a rich cultural essence and are, to some extent, a kind of "living fossil". The excellent NRMs of the Chinese nation should also shine in today's society to further enhance people's sense of identity and belonging to the Chinese nation, promote cultural prosperity, and enhance cultural confidence [6]. The intervention of digital technology has brought about fundamental changes in the way NRM traditions are preserved. Its ability to preserve NRM resources systematically and from multiple perspectives reflects the regional cultural space of NRM in the community [7]. The big data drive empowers the further enhancement and application of digital conservation paths for NRMs. Digital acquisition and storage technologies transform information related to NRM items into digital resources that facilitate permanent and comprehensive preservation. In addition, the core of big data is not massive data, but data mining. Data itself does not have value, but mining the laws and values behind it is the basis of academic research and application. The construction of relationships among massive data can assist researchers in discovering the intrinsic knowledge of NRMs and the connections between them, which is conducive to the excavation of deep cultural connotations [8]. In conclusion, in the context of big data, massive data is an important information resource for research on non-hereditary heritage, the core for the dissemination and promotion of non-heritage, and a rich cultural resource for the tourism industry [9].

This paper takes the integration of Shanghai's non-heritage resources IP and cultural and travel apparel products as the starting point of the study, and explores more possibilities of Shanghai's non-heritage

resources based on the background of big data. At the beginning of the study, firstly, the types of Shanghai's non-heritage resources are investigated to clarify the scope. Then, according to the types of Shanghai's non-heritage resources, the suitability of the city's temperament with them is analyzed, and the combination of Shanghai's non-heritage resources IP with the Republican style cultural and tourism clothing is determined. Finally, we propose a corresponding costume research plan and put the designed costume samples into the market for testing to find out the feasibility of the designed plan.

## **2. Research on Shanghai's non-heritage resources IP and cultural tourism costumes**

As one of the earliest commercial ports opened in modern China, Shanghai is a place where Chinese and Western cultures converge and has the characteristics of modern industrial and commercial civilization. Therefore, Shanghai's NRMs are unique and very different from those of other urban areas where the agricultural civilization is the main focus [10]. Rescuing, protecting and utilizing Shanghai's NRM is an important step to enhance the soft power of culture. Shanghai has a scientific and perfect working system for the protection of NRM, and has been leading and pioneering in the protection of NRM in the country.

### **2.1. Shanghai Non-Foreign Heritage Projects**

As one of the second batch of famous historical and cultural cities in China, Shanghai has colorful and unique performing arts NRM resources. The prominence of these non-heritage resources reflects the regional historical and cultural characteristics of Shanghai and the folk customs and aesthetic interests of Shanghai people, and is an important carrier of Shanghai culture and an important resource for urban tourism development [11]. Performing arts NPLs are an important part of Shanghai's NPLs. Two of them, namely Kunqu and Peking Opera, are world-class NPLs in the performing arts category in Shanghai. As of the end of 2018, 20 of the 55 national-level ICH projects in Shanghai are performing arts ICH projects, and 50 of the 236 municipal-level ICH projects are performing arts ICH projects. The project categories include folk music, folk dance, traditional drama, opera and acrobatics. Among the many NPL projects in Shanghai, performing arts NPL occupies a very important position in

terms of both quantity and level. Some of Shanghai's NPL projects are represented as shown in Table 1.

Table 1. Representatives of Some Intangible Cultural Heritage in Shanghai

Entry name	Item No	Project category
Shanghai opera	IV-54	Traditional Drama
Puppet show (Shanghai style puppet show)	IV-92	
Comic opera	IV-156	
Rolling lamp (Fengxian rolling lamp)	III-16	Folk dance
Dragon Dance (Around the Dragon Lantern in Pudong)	III-4	
Pudong Storytelling	V-59	Traditional Quyi
Pudong Xuanjuan	V-118	
Suzhou Pingtan (Suzhou Tanci)	V-1	

## 2.2. Analysis of Shanghai's Urban Temperament and the Suitability of Republican Costumes

Starting from the 1930s, cheongsam was considered to be an important dress for Chinese women and flourished for a while. The main materials used in cheongsam are domestic and imported printed fabrics, silk, silk, cloth, as well as jacquard velvet, brocade, chambray, and even lace openwork fabrics and color woven fabrics and clothiers. The delicate cheongsam also has embroidery, lace, rolling, beading and other decorations. As a school uniform cheongsam is more simple and elegant, the length is a little shorter, the sleeves are completely western-style sleeves; factory women's cheongsam is usually simple, plain, economical and practical; two types of cheongsam are popular in Zhejiang in the Republic of China, which are Beijing cheongsam and Haifa cheongsam. Beijing cheongsam is characterized by Chinese flat cutting, wide clothes straight, ankle-length, emphasizing the decorative beauty of clothes, basically continuing the characteristics of Manchu cheongsam. While the sea school cheongsam is with western style cutting and clothing making way, to reflect the female body curve beauty as the

characteristics, with which is the western style coat, velvet jacket, glass silk stockings, high heel shoes, big wave perm, handbags, etc.. This kind of cheongsam is mainly worn by socialites, while the cheongsam of female college students is slightly slim and elegant with color, between Beijing cheongsam and Haifa cheongsam.

### **2.3. Research and Development Program of Shanghai Non-Foreign Heritage Resources Republican Style Costumes**

The Republican period is a special period in history, which symbolizes the fierce collision and integration of traditional and western cultures, and the formation of pluralism and integration, which is reflected in the clothing culture and the emergence of many characteristic clothing. This project proposes a feasible design concept by applying knowledge of national costume culture, costume aesthetics, dressing psychology, and qualitative and quantitative evaluation of existing costume design elements. Four series of clothing and cultural tourism products are designed, which are businesswoman clothing series, young student clothing series, casual life clothing series, and wedding dress series. The design is inspired by the "East-meets-West architecture", "Jiangnan water town" and "Shanghai culture", analyzing the color, style and style of Shanghai architecture, and extracting the typical cultural elements of Shanghai. For example, the lake, silk, bamboo, fan, calligraphy, lotus leaves of Xiaolianzhuang, etc. are used as design elements to form the style, tone and pattern of the Republican style clothing. The description of the design of "Businesswoman's Dame Series" mainly reflects the elegant and delicate, gentle and soft characteristics of Jiangnan women. Cheongsam is the main style, using satin, brocade, lace openwork fabric, supporting clothing accessories include lace shawl, pearl necklace, wool wig, exquisite embroidery fan, embroidered silk clutch bag, embroidered and lace decorated satin umbrella. The design of the "Young Students' Wear Series" mainly reflects the intellectual, innocent and beautiful characteristics of young students. The style of the top and the bottom of the skirt is the main style, and the style of female students is a seven-part sleeve, slightly loose style, knee-length pleated skirt, and the color system is mainly blue dress and black skirt or light white top and long blue skirt. The color palette is generally plain and elegant, with lotus flowers and bamboo as the main dress patterns, and simple tie-dye and simple embroidery as the main patterns. In addition, a small number of cotton and linen material cheongsam with plaid, stripes, plain as the main fabric pattern, clothing accessories are bamboo handbag, bamboo luggage, oil paper umbrella.

### **3. The effectiveness of the integration of Shanghai's non-heritage resources IP and cultural tourism clothing**

Based on the above research and development scheme of Shanghai non-heritage resources and Republican style cultural travel apparel products, some research samples are first put into the market for testing. The three major aspects of the market environment, market demand and market supply survey are scrutinized in the embodiment of cultural travel apparel products in Shanghai's non-heritage elements, as well as the embodiment of clothing scene suitability, material and tailoring, transmission of new Chinese style and vintage style. We also collect consumers' evaluation and consumption orientation of this type of clothing style, and then grasp personalized consumption behavior.

The results of the design clothing sample market first test are shown in Figure 1. In the market survey, it is found that there are not a large number of cultural travel clothing about Shanghai's non-heritage elements on the market, and there are only a few market suppliers. This indicates that the market saturation of Shanghai non-heritage cultural travel apparel is not high, and the apparel design solution proposed in this paper has market prospect. In the sample sales feedback, the market expectation of consumers for the integration of Shanghai non-heritage elements into apparel is 30%, and the apparel cut is 31%. This indicates that we should continue to increase the integration of Shanghai non-heritage IP in the subsequent garment sampling, and explore more and wider elements that can be integrated, instead of just limiting to traditional single elements such as Shanghai opera style, dragon dance and lion dance. Consumers have the highest expectations for clothing style cutting, so special attention should be paid to the standard of clothing cutting, to prevent the situation that the goods are not the right version. In terms of clothing style, the expectation value of both the new Chinese style and the old vintage style is 15%, which means that both are favored by consumers. In research and development, we should focus on the mass production of new Chinese style and old vintage style to meet consumer demand, so as to better drive the dissemination of Shanghai's non-foreign heritage IP. The feedback on the applicability of clothing scenes is only 9%, and the restrictions on clothing are not too strongly reflected by consumers in a free dressing environment. Thus, the design of Shanghai non-heritage resources IP and Republican style clothing cultural travel clothing products proposed in this paper has market feasibility, and with the promotion of the market, Shanghai non-heritage resources will be known to more people,



which will help the development and protection of Shanghai non-heritage resources.

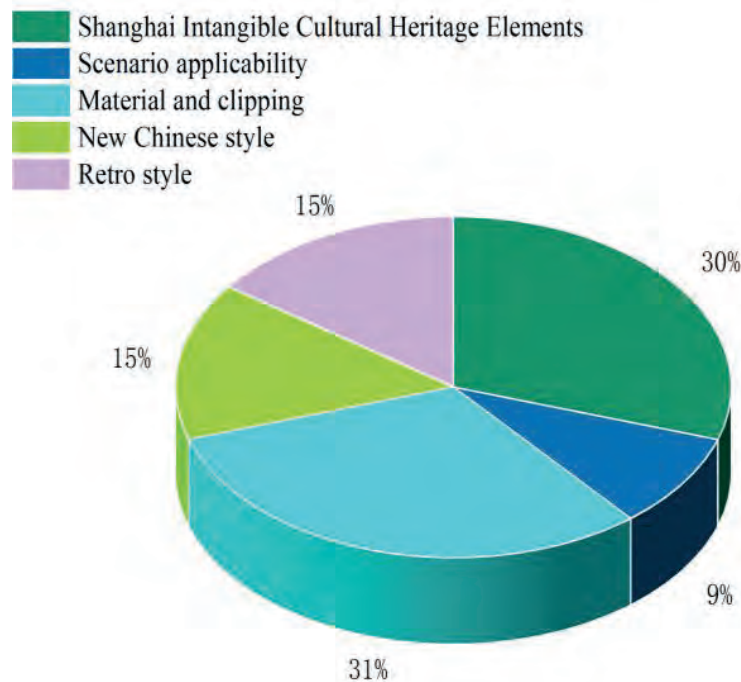


Figure 1. Market leading test results of design clothing samples

#### 4. CONCLUSIONS

This paper takes the integration of Shanghai's non-heritage resources IP and cultural travel apparel products as the starting point to explore more possibilities for the design of Shanghai's non-heritage resources and cultural travel apparel products. The innovative proposal is to combine the IP of Shanghai's non-heritage resources with the Republican-style cultural travel apparel, and the designed apparel samples are first put into the market for testing, so as to explore the feasibility of the proposed scheme. In the sample test, the expectation value of integrating Shanghai non-heritage elements into clothing is 30%, the clothing cut is 31%, the clothing style is 15% for both new Chinese style and old vintage style, and the clothing scene is 9%, and the market feedback is more positive. Thus, the scheme designed in this paper is innovative, market prospective, and helps open up the awareness of Shanghai's non-heritage resources to a certain extent.

#### Fund projects

1. A School-level Educational Teaching Research Project at Shanghai Business School in 2023: Exploration of Curriculum Development for "Women's Clothing Design (2)" in the Context of

Intangible Cultural Heritage Inheritance and Innovation (SBS-2023-XJJG-07).

2. Shanghai Cultural and Educational Integration project in 2023: "Business and Art Integration - Shanghai style Cultural and Creative Industries" Design Talent Workshop.

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# Optimal allocation of English teaching resources in universities based on decision tree model

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## **ABSTRACT**

Rational and optimal allocation of English teaching resources is favorable to charitable full show to the effectiveness of using various types of English resources and balancing the demand for the use of English resources by college students. This paper tries to explore the possible results of applying the conclusion tree model to the allocation of English teaching resources in colleges and universities, and proposes a scheme for the normal distribution of teaching resources. According to the scheme planned in this paper, the allocation of each resource is as follows: online video course resources 60%, online reading materials 55%, English examination question bank 70%, paper English reading materials 30%, and paper English examination question materials 40%. The mean score of teachers' approval of the program was 7.8, and the mean score of students' satisfaction was 8.6. The article analyzes and researches the problem of rational allocation as well as efficient use of university English teaching resources, which has strong practical significance.

## **KEYWORDS**

Decision Trees; Teaching English in Higher Education; Resource allocation; Student Satisfaction

## **1. INTRODUCTION**

Since the relevant documents of the Ministry of Education were issued, university English teaching (ET) in China has developed in leaps and bounds. This situation shows a bright future for the development of university ET, but at the same time, it is also necessary to calmly see that university ET is facing serious challenges and problems [1]. China's university ET started late, and

there is an obvious gap between the level of university foreign language teaching and that of the western developed countries, especially in the allocation and utilization of teaching resources and independent development [2]. Even in China, there is a considerable gap in the level of university ET between the east and the west, between big cities and small towns, and between urban and rural areas. Less economically developed regions, compared with more developed regions, have a large imbalance and unevenness in the allocation and utilization of teaching and learning resources due to the constraints of economic conditions [3].

Teaching resources are of great significance in teaching actions and are the basic conditions for teaching actions to be carried out [4]. In order to better implement the spirit of the Outline and realize the transformation of knowledge and skills to competence, reasonable allocation of college ET resources can optimize college English classroom teaching to a great extent [5]. The reasonable expansion and operation of teaching possessions is an important part of building an efficient classroom. In college ET, teachers actively develop ET resources and use them in classroom teaching, which can expand the professionalism of college English classroom and inspire students' interest in learning English [6]. It is only by following economic principles and educational laws to allocate and use university ET resources that teaching resources can be enriched and the quality of teaching in university English classrooms can be further improved [7]. ET in colleges and universities must be oriented to all students, show its humanistic concern, and focus on the grouping of appreciation education and quality education [8]. In actual teaching, college English teachers should pay attention to students' thoughts and emotions, fully stimulate their eagerness and interest in English learning, and guide them to establish a sense of achievement and self-confidence, thus continuously improving college students' language application ability, humanistic literacy, practical ability and novelty realization. The development and progress of students is the starting and ending point of English course teaching in colleges and universities [9]. Therefore, teachers would aggressively change their teaching concepts, establish a humanist view of education, and reflect their unique humanist spirit.

Based on this, this paper takes decision tree model and college ET resources allocation as the entry point of the study, and explores the possibility of smearing decision tree model to college ET resources allocation. Firstly, the problems in the allocation and application of college ET resources are studied, and the decision tree ET resources allocation improvement method is proposed according to the

problems, and there is also the application scheme and application method for the reasonable distribution of college ET resources. Then the allocation ratio of five common English resources for college students is derived according to the scheme, and the satisfaction of teachers and students with the scheme is tracked to determine the credibility of the proposed scheme, which leads to the conclusion of the whole paper.

## **2. Research on the method of optimizing the allocation of ET resources in colleges and universities**

### **2.1. The problem of resource allocation and application of university ET**

(1) Teachers lack the ability to develop and deploy teaching resources

Teachers' ability to allocate and utilize teaching resources directly affects the quality of the expansion and application of college ET resources. Most college English teachers do not have a correct concept of English curriculum resources and tend to regard themselves as the chief body of teaching activities when allocating and utilizing teaching resources. Teachers ignore the role of teaching resources and do not realize that the reasonable allocation of teaching resources can promote the improvement of college English classroom teaching. Because of the lack of proper methods, the teaching resources developed by many teachers have a single structure and do not match the learning requests of college students.

(2) Teachers' conception of teaching resources application is insufficient

Under the inspiration of traditional teaching philosophy, most college English teachers attribute too much position to textbook teaching and mostly use teachers' books to guide themselves to use teaching materials. Some teachers also regard textbooks as the only ET resources, neglecting the expansion and utilization of special teaching resources on campus, and do not take the initiative to develop ET resources outside campus. College English teachers think that teaching is their main task, and only care about the development and utilization of teaching resources, neglecting the development of students' learning resources. The insufficient concept of developing and allocating teaching resources makes college ET unable to keep up with the needs of the times and is not favorable to

the cultivation of correct English learning concepts among college students.

## 2.2. Decision Tree ELT Resource Allocation Improvement Method

First, optimization of teaching data. When using the resolution tree to build the evaluation model of the effectiveness of business English practice teaching, repeated calculations are needed to ensure the performance of English majors, which puts a certain burden on the teachers when conducting the assessment and decreases the efficacy of the conclusion tree procedure to a positive amount. Particularly when the number of teaching data rises, the speed of conclusion tree operation becomes very sluggish, which rises the school's expenses on data procedure. To enhance the conclusion tree, the data can be treated according to the data set in the practice teaching to reduce the time consumed. When processing data, the data can be restricted to a fixed value, assuming that the fixed value interval is  $[c, d]$ , and the teacher can use the computer to procedure the data as a function. For example, when the current data float is marked, when  $(x) > 0$ , the data will be concave in the occupation table, and when  $f(x) < 0$ , then the data will be convex in the number table. When estimating a student's presentation, the teacher can hand-pick a value to carry it into the  $[c, d]$  interval. For example, if a student scores 98 in Business English practice, the teacher can transport the dissimilar scores of the student into the formula 
$$\frac{f(x) = a_0 + a_1 + a_2 + \dots + a_n}{a_n}$$
 to find the average score of the student.

First see if the value found matches the value in the intermission, then see if the score is in  $f(x) > 0$  or  $(x) < 0$ , and finally evaluate the shape of the student's grade in the function table.

Second, the training content is optimized. In conducting English practice teaching, as the number of practices increases, the decision tree will also change to some extent. In the procedure of data dispensation, the conclusion tree will build dissimilar trees according to the growth of content. Due to the growth of trees, misperception can occur when exchanging information, which leads to the effectiveness of decision tree assessment affecting the teachers' processing of data. To make the decision tree assessment more operative, the first step is to expand the content in business English practice teaching. The memory of the data processing system should

be expanded, the practice content should be integrated, each student's presentation in business English training should be evaluated, and a table should be drawn based on the students' practice skills. The decision tree is prone to algorithmic instability, so it has been improved to meet the teaching needs. The decision tree can be used to evaluate the effectiveness of the practical teaching system, which can transfer more practical contents and use the data with the least variation as the basis for estimation.

### **2.3. Rational allocation and application methods of university ET resources**

Only by reasonably allocating and applying university ET resources can the advantages of rich teaching resources be developed and the level of university English classroom teaching be promoted. Optimizing the allocation and utilization mode of university ET resources is the only way to make university ET keep pace with the development of the times.

(1) Changing the role of teachers, rational allocation and use of teaching resources

Contemporary university English teachers should change from the traditional role of knowledge transfer to that of classroom activity designer and organizer, and actively improve their personal ET skills. In the process of appropriating and utilizing ET resources, teachers should be open-minded and make reasonable use of teaching resources so that they can play the role of "treasure trove". First, strengthen the awareness of personal curriculum resource allocation and utilization. Teachers' choice determines the characteristics and nature of college English courses. In the process of developing university ET resources, teachers should actively identify all kinds of resources, choose the most suitable part for their students, and combine them with the classroom teaching content, insisting on the method of localization and specific analysis of specific problems.

(2) Reform the teaching mode, rational allocation and use of teaching resources

Develop ET resources using modern technologies. Accepting brand-new teaching resources and developing and utilizing these teaching resources with the nature of the times requires college English educators to actively update classroom teaching methods. Teachers should guide college students to understand the meaning of English learning in the English classroom, master the necessary basic English knowledge points, and organize some communicative



activities in the classroom to mobilize college students' English learning enthusiasm. Communicative competence development is an important goal of college ET, but the fact is that communicative activities are rarely implemented in English classrooms. College English teachers should recognize the shortcomings of traditional college English classroom teaching and use new teaching resources to make up for the loopholes of traditional teaching and make the college English curriculum system more complete.

### **3. The effectiveness of optimizing the allocation of ET resources in colleges and universities**

Based on the trend of paperless reading for college students, the resources tend to be divided into 5 main categories of online video course resources, online reading materials, English examination questions, paper English reading materials, and paper English examination materials in the allocation of college English resources. With the decision tree ELT resource allocation improvement scheme as technical support, the allocation ratio of the 5 main categories is calculated by combining the reading material preferences of college students.

The allocation ratios of the main English resources in the five universities are shown in Table 1. According to the paperless learning habits of college students, the percentages of various resources given by the improved ET resource allocation scheme under the decision tree algorithm are 60% for online video course resources, 55% for online reading materials, 70% for English examination question banks, 30% for paper English reading materials, and 40% for paper English examination question materials. The teacher recognition scores assigned out of 10 were 8, 7, 9, 9, and 6, with an average score of 7.8. The overall score of teachers' rating is moderate and the program is approved by teachers. The main body of ET in higher education is student-centered, so students' satisfaction with the distribution of resources and ease of use needs to be investigated. In actual use, students assigned a score of 10 to online video course resources, 9 to online reading materials, 9 to English test bank, 8 to paper English reading materials, and 7 to paper English test materials, with an average student satisfaction score of 8.6, which is in the upper middle level. The program is highly recognized by students and the research in this paper has practical value.

Table 1. The proportion of English resources in five major universities

	Online Video Course Resources	Online reading materials	English Test Bank	Dissertation English Reading Material	Paper English examination materials
Allocation proportion of technical level(%)	60%	55%	70%	30%	40%
Teacher recognition (points)	8	7	9	9	6
Student satisfaction (points)	10	9	9	8	7

#### 4. CONCLUSION

This paper takes the decision tree model under which college ET resources can be allocated moderately as the main point of research, tries to explore the rationality of applying the decision tree model to college ET resources allocation, and proposes an application scheme for reasonable allocation of college ET resources. Under the scheme proposed in this paper, the shares of each resource are as follows: 60% for online video course resources, 55% for online reading materials, 70% for English examination question bank, 30% for paper English reading materials and 40% for paper English examination question materials. Meanwhile, the opinion evaluation scores of university teachers and students on the distribution program were obtained, in which the average score of teachers' evaluation was 7.8 and the average score of students' satisfaction was 8.6. It can be seen that the scheme is highly recognized by teachers and students, and the ET resources in colleges and universities based on the decision tree model can be reasonably and optimally allocated.

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# Policy construction of national promotion of film and television industry based on SVM model in the context of media convergence

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## ABSTRACT

This paper is an attempt to apply the SVM model to the policy construction of the film and television industry, with the aim of exploring effective ways to standardize the policy of the film and television industry. This paper first clarifies the existing film and television policy construction contents in key regions of China, tries to find out the aspects that have not been covered by previous authors,

and based on this, proposes the policy construction principles as the keynote of the study, and judges whether it holds according to the prediction accuracy of SVM model. The data show that the mean values of the accuracy of the film and television drama policy construction are 0.7065 for financial subsidies, 0.6581 for industry standards, and 0.5891 for the release licensing system, which are all less than the predicted value of 0.8, i.e., the model is valid. The research in this paper can help optimize the film and television industry policies and promote the healthy development of the film industry.

## **KEYWORDS**

Media convergence; SVM model; Film & TV Industry; Policy Construction

## **1. INTRODUCTION**

The film and television industry is an important part of the cultural industry, characterized by high capital activity, high creative concentration, high talent density and high product refinement. It shoulders the important mission of inheriting a new culture of modernity and nationality, gathering new momentum for economic growth, creating a new mode of economic development, and shaping a new image of international communication, and has become the object of most attention in the development strategy of China's cultural industry [1-2]. At the present stage, Chinese domestic films and TV dramas are developing well, not only in terms of production and social benefits, but also gradually developing overseas markets, playing an increasingly important role in the construction of China's cultural communication and soft power.

Chinese domestic films have made some progress in terms of creation concept and financing [3]. First of all, in terms of creation, a combination of melodrama, art and commerce has been formed, and the aesthetic idea of reflecting national values is gradually highlighted, based on the popularization of emotions. In terms of financing, the channels of sole proprietorship, joint venture, private financing and cross-strait co-production have initially formed a virtuous cycle. In the field of TV series, the industry investment and

financing system has been initially completed, and with the promotion of the integration process of the three networks, the broadcasting platform and marketing methods have become increasingly diversified, but the situation of supply exceeding demand makes the competition within the industry fierce [4]. The film and television industry is not only a commercial activity, but also an important form of culture and art to build national ideology and meet the needs of the people for a better life, and must adhere to the principle of putting social benefits in the first place and unifying social and economic benefits [5]. Since the founding of New China, state-run film studios have been established in various regions, contributing a large number of excellent film and television works to the promotion of regional characteristics and the construction of a socialist cultural system [6]. since the 1980s, China's film and television industry has become more and more market-oriented, with diversified types of development, constantly updated industrial policies, and regional characteristics in the development path [7]. Broadcast film and television is the core element of traditional media, which should not only clarify its own positioning and become a link between the government and the masses, but also be a facilitator and integrator of the development of the times [8].

This paper uses the SVM model to study the effective ways of policy construction in the film and television industry. Firstly, we explore the development of film and television industry and its policy construction in key regions of China in the context of media convergence, and find out the shortcomings of existing policies and make them the focus of this article. Based on the research, the principles of policy construction for the film and television industry are proposed as a guide for the subsequent research. Then, based on the proposed SVM model to predict the accuracy of the film and television policy construction and determine whether it holds, the focus of the film and television policy construction in this paper is determined. Only in this way can we understand the direction of the policy construction of China's broadcasting film and television industry and promote the film industry to continuously improve its influence, gain more public support, and achieve its own sustainable development.

## **2. Policy Construction of China's Film and Television Industry in the Context of Media Convergence**

### **2.1. Policies of China's key regional film and television industries in the context of media convergence**

#### **(1) Film and Television Production Policy**

The policy of film and television production is mainly for script creation, film and television shooting and location, film and television post-production and technology research and development policy support [9]. For script creation policy, domestic key cities usually adopt three ways to support it: first, prior funding, script creation projects before film and television production. For example, in Xiamen, Fuzhou, and other cities, a certain amount of script creation funding is given to scripts that have been formally established or funded by the state or provinces; secondly, post-facto rewards are given to scripts after the film has been completed. Such as Haikou, Xiamen, Fuzhou and other cities, direct rewards for film and television drama scripts that have obtained film screening licenses or TV series distribution licenses, or rewards based on a certain percentage of the script transaction amount; third is the local theme script rewards. For example, cities such as Haikou, Fuzhou and Shenzhen offer additional rewards for screenplays reflecting local themes, reflecting the importance each city attaches to shaping the city's cultural image through film and television dramas.

#### **(2) Film and television investment and financing and film and television activity policy**

Film and television investment and financing policies are usually linked to cultural and financial policies, and film and television event policies are mainly support for film and television festivals and exhibitions, both of which are external conditions for the high-quality development of film and television industries [10]. Film and television investment and financing policies are currently focused on film and television project investment incentives, financing interest subsidies, and film and television industry fund incentives. Investment incentives for film and television projects are awarded according to a certain percentage of the actual investment amount, usually the proportion does not exceed 5%. Film and television enterprise financing interest subsidy refers to the film and television through bank loans or other

institutions of financing, according to a certain percentage of the financing interest to subsidize, usually the proportion of about 50% of the interest. Film and television industry fund rewards refers to film and television enterprises or other institutions to set up film and television industry funds, the government in accordance with a certain percentage to reward, usually the proportion of the total fund within 2%, and set a reward ceiling.

### (3) Film and television award-winning re-incentive policy

The re-incentive policy for film and television awards is mainly divided into two segments: domestic awards and international awards. The domestic awards section refers to winning the "Five Ones", i.e. the key awards such as the Huabiao Award, the Hundred Flowers Award, the Golden Rooster Award, the Flying Lotus Award, the Golden Eagle Award, the Hong Kong Golden Film Awards, etc., and rewards the award-winning film works or creators, and some cities also give rewards to the award-winning works of the Beijing International Film Festival and the Shanghai International Film Festival. The international award-winning segment refers to winning the Academy Awards and the major awards of the four major international film festivals, such as the Berlin, Cannes and Venice Film Festivals, and giving re-awards to the winning film works or the creative units [11]. Considering the above policies, the author believes that the existing policies focus excessively on awards, which leads some film and television creative teams to pursue a rare aesthetic culture or political culture in order to cater to the preferences of various awards, deviating from the mainstream ideology and the theme of people's aspiration for a better life, so it is recommended to dilute these awards. In addition, while awarding these prizes, it is also recommended to expand the number of outstanding film and television works selected or nominated, and to break the single evaluation standard of only the winner.

## **2.2. Principles for the construction of national policies to promote the film and television industry**

### (1) Market-driven based on free competition

Due to the industrial and economic nature of the film and television industry, it should follow the general laws of the market economy since. Respect for the laws of the market and the free market



economy is the prerequisite foundation for the development of the film and television industry. One of them is to take the state's respect for freedom of contract as the cornerstone. From the Contract Law (1999), the Property Law (2007), the General Provisions of the Civil Law (2017), and then to the consideration of the various sub-part (draft) of the Civil Code. Both the moral consensus of the nation and the awareness of the rule of law have been coalesced in the country's increasingly improved legislative process. The more positive side of the civil legislation is that through the establishment of market transaction rules and the protection of civil rights, it indirectly delineates the space of the role of public power and separates the "political state" and "civil society". The film and television industry is essentially in the category of "civil society", so under the prerequisites stipulated by law, film and television enterprises are free to choose their location and set up, and are free to choose the scope of business, transaction forms and objects of transactions. Second, freedom of contract is based on national legislation setting fair and reasonable competition rules, so that the film and television industry can compete fairly on the basis of the rule of law. For example, national legislation regulates unfair competition, protects intellectual property rights, and so on. Unlike the "night police state" era, the government has a clear comparative advantage in overcoming market defects, and can overcome the dilemma of free-riding, imperfect information and adverse selection in a pure market economy by providing public goods and establishing a social welfare system. Third, beyond freedom of contract and creation of rules, the state constructs a competitive environment with different relevance based on the characteristics of the supply and demand sides of different industries. As far as the supply side is concerned, the core of free competition lies in a sufficient number of suppliers offering goods, thus providing consumers with more opportunities for choice. Talent is the first resource, but in the film and television industry, due to the complexity and diversity of the industrial chain, the characteristics and factor contribution rates of talent in different industrial chains differ greatly, so there are both general rules and diversified and targeted requirements for the cultivation and promotion of talent in the film and television industry. From the demand side, the "people's growing need for a better life" includes the demand for cultural products, including film and television products. Therefore, fostering an overall

cultural atmosphere in society and a healthy cultural mentality among all citizens, guiding the promotion of consumer demand, and taking necessary measures to improve the matching of supply with demand are the cornerstones of the film and television industry's survival and development, which need to be reasonably guided by the government.

## (2) National promotion is complementary

The cultural and public nature of the film and television industry mainly lies in the following: first, it has the attributes of stimulating cultural and artistic creation, enhancing the development of national cultural undertakings and promoting cultural pluralism and other public interests; second, in the process of the in-depth development of world multipolarization, economic globalization, social informatization and cultural diversification, the film and television industry plays an important role in demonstrating cultural soft power. The state adopts necessary policy tools to promote its development, not only to realize the industrial connection of local culture to the country and even the world, but also to drive economic transformation and enhance international competitiveness through the development of the industry. On the one hand, the state has the responsibility to provide the basic services of the film and television industry that have the characteristics of public cultural services. Take China's Law on the Protection of Public Cultural Services (2016) as an example, which specifies that the state has fundamental responsibilities and obligations for the provision of cultural products based on the purpose of meeting citizens' basic cultural needs. In order to achieve the purpose of equalizing public cultural services, the law sets the basic framework and basic norms for standardization, achieving regional parity, urban and rural parity, and group parity.

### **2.3. SVM model building**

In this study, the SVM model is used to analyze the movie policy data of each file by using the "one-to-one" processing method, and K-fold cross-validation is chosen to test the data repeatedly in the process of SVM model. The principle is to cut the data samples into K subsets, select K-1 subsets for training, and use the remaining subsets for training model validation, repeat the operation K times, and use the grid search method to determine the optimal parameters of the model.

### 3. Prediction Accuracy of Film and TV Industry Policy Construction Based on SVM Model

In this paper, for the determination of model prediction accuracy, the average value of accuracy is predicted by taking the three policies with the highest degree of concern for film industry policies: financial subsidies, industry standards, and the release licensing system. The accuracy prediction values of film and television policies are shown in Table 1.

Under the model proposed in this paper, the predicted accuracy of financial subsidies is 0.7065, industry standards is 0.6581, and the release licensing system is 0.5891, and the average prediction accuracy of film and television industry policies is less than the predetermined value of 0.8. Among them, the k-value of the release permit system is 0.347, which is the first in the policy concern and is the key to the film industry in the pre-preparation and post-premiere. The current policy construction should continue to improve the issuance of film licenses according to the current industry development and forecast prospects, so that new directors with film talent can gain access to the film industry and break the status quo of "film masters" monopolizing the market. The industry standard k value is 0.442, ranking second in terms of concern. The industry standard is directly related to the subsequent development trend of the film industry, and the subsequent film policy should be constructed in a loose and tight combination, moderately relaxing the restrictions on the film industry in terms of themes and other aspects, and promoting the blossoming of films. However, in terms of the supervision of political opinions on movies, the requirements should be appropriately strict to avoid misleading audiences with improper comments in the name of movies. In terms of financial subsidies, it is recommended that appropriate subsidies be given to the film industry mainly to encourage the film industry to rebound under the epidemic.

**Table 1.** Prediction Value of Film and Television Policy Accuracy

	K	K-1	Accuracy average
Financial subsidies	0.451	0.9620	0.7065
Industry standards	0.442	0.8741	0.6581
Release permission system	0.347	0.8312	0.5891

## 4. CONCLUSION

This paper attempts to explore an effective way to construct a policy for China's film industry in the era of media convergence. The SVM model is used as an attempt to demonstrate the mean prediction accuracy of the model from three aspects: financial subsidies, industry standards, and theatrical licensing system. Empirically, the accuracy of the model is 0.7065 for financial subsidies, 0.6581 for industry standards, and 0.5891 for the release licensing system, all of which are smaller than the predicted value of 0.8, making the accuracy of the model credible. If China's broadcasting industry is to be developed effectively, it should formulate better industry standards, respond to the needs of the times and the actual needs of the people, continuously adjust the reform direction of the industry, and make innovative breakthroughs to expand the development space of the film industry.

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# IoT-based multi-channel information fusion method for wireless sensor networks

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## **ABSTRACT**

To solve the current problems of poor information fusion and long information fusion time in wireless sensor networks, this paper tries to propose a multi-channel information fusion method for wireless networks based on the Internet of Things. The methodology of infinite sensor network and IoT information fusion is adopted to model the research method, and the feasible matrix is established according to the algorithm to verify the multi-channel simulation results of wireless sensor network. The results show that the initial position of information fusion is 0.0021 and the end is 0.1218 by the calibration of information fusion system, and the fitting results are good. The proposed method in this paper has high effectiveness and feasibility in fusing information of wireless network multi-channels.

## **KEYWORDS**

Internet of Things Technology; Wireless Sensors; Multi-channel information fusion; Simulation Analysis

## **1. INTRODUCTION**

The emergence of the Internet of Things (IoT) has improved the way humans live and work, and is of great significance to the development of modern society. In order to further enhance the application of the Internet of Things, it is necessary to strengthen the application of a variety of advanced science and technology, including wireless

sensor network technology, to achieve the purpose of comprehensive monitoring and management by improving the quality and efficiency of data collection. Wireless sensor networks enable monitoring of a specific area through a large number of sensor nodes with communication, sensing and computing capabilities deployed in a certain area [1]. The research of sensor networks started in the late 1990s, and after nearly two decades of vigorous development, they have been widely used in national defense and military, intelligent buildings, environmental monitoring, and other fields [2]. Following the rapid development of semiconductor technology, communication technology and computer technology, wireless sensor network technology was then born [3].

Technology often brings great change, and wireless sensor network technology is widely regarded as a gold mine that has not yet been fully exploited. According to analysts, the future development of IoT will go through four stages, widely used in logistics, retail and pharmaceutical fields before 2010, objects interconnected from 2010 to 2015, objects entering semi-intelligent stage from 2015 to 2020, and objects entering fully intelligent stage after 2020 [4]. By preliminary estimation, the development and application of China's IoT industry chain will likely create an output value of about 100 billion yuan. Some provinces and cities on the development of the Internet of Things during the 12th Five-Year Plan, has accelerated the formation of the basic framework of the Internet of Things industry and a series of "intelligent" action, indicating the determination to vigorously develop the Internet of Things [5]. As one of the key objects of IoT, the improvement and development of sensor network technology is bound to have a huge role in the development and application of IoT [6]. The IoT contains three levels: the perception layer, the network layer, and the application layer. At present, the most lacking product and technology in China is the perception layer, which is the capture and aggregation of information [7]. In the perception layer, the maturity and cost of sensor technology hinders the large-scale development and application of wireless sensor networks and IoT. Jianmei Yu pointed out that there are four factors that will ultimately determine the popularity of IoT, one is the further low power consumption of wireless sensors, the second is the development of wireless power supply or power harvesting

technology, the third is the ultra-miniaturization of energy sources, and the fourth is the miniaturization of wireless sensors themselves [8]. In addition to this, multi-channel information fusion technology for sensors is also an important aspect of wireless sensors that needs to be considered for improvement. Therefore, the main research work of the current sensor technology needs to focus on the above four factors, breakthroughs in these research hotspots, the level of development of the Internet of Things is bound to soar, the application will also be widely popular, and the market scale will be further expanded. At that time, the Internet of Things can truly realize the connection of things, and become a "talking", "thinking", and "acting" information exchange network [9].

In this paper, we try to propose a multichannel information fusion method with the methodology of wireless sensor network and IoT technology fusion, and establish a feasibility matrix to determine the feasibility of the methodology. Firstly, a brief introduction of IoT and wireless sensor networks is given to discover the importance of IoT technology in wireless sensor networks, and its methodological advantages in multi-channel information fusion technology are stated. Subsequently, a methodology for multi-channel information fusion in wireless sensor networks based on IoT technology is proposed and the results are simulated to verify the fitting results.

## **2. Internet of Things and Wireless Sensor Networks**

### **2.1. Overview of the Internet of Things**

The rapid development of Internet technology has given rise to the Internet of Things (IoT) technology, which is widely used in all aspects of society. The so-called Internet of Things (IoT) can be interpreted literally as the effective connection of things to things. The professional definition of IoT is to connect physical objects to the Internet using technologies and tools such as radio frequency identification, infrared sensors, and GPS systems, so as to facilitate the exchange and transmission of information between them and provide support for improving the monitoring and management effects of physical objects [10]. The Internet of Things (IoT) technology enables the connection between things, which ultimately relies on the sensors, processing devices and communication modules installed on the objects. Its main function is also to sense information and pass it



to the processing equipment, and finally, the information processed by the equipment can help us to monitor the target in real time and to master the status of the target being measured. It is the access of these sensors that makes the application of IoT more extensive compared to the Internet. Nowadays, the fifth generation of mobile communication technology is maturing, and the Internet of Things is coming into every aspect of our life, presenting a variety of applications.

## **2.2. Wireless Sensor Networks Overview**

Wireless sensor network refers to the deployment of a certain number and type of sensor elements in a certain area according to the actual needs, so as to build a network for comprehensive monitoring and scanning of the entire area. In this network, due to the large number of sensors and the different functions of these sensors, information on all aspects of the area can be collected comprehensively, and after transmitting this information to the control system, a more realistic and accurate conclusion can be obtained through the analysis of this data, which can help in the management of the area [11].

## **2.3. The importance of wireless sensor network technology in IoT applications**

In today's rapidly developing society, the community has put forward higher requirements for production and service work, and only by ensuring that production and service work meet the requirements can we promote the further development of modern society. In this context, the application of Internet of Things penetrates into various fields and has achieved good results and promoted the development of society. However, for the existing IOT technology, such as detection range is narrow, monitoring indicators are relatively single, etc., to a certain extent affect the application of IOT technology effect. The application of wireless sensor network technology can effectively improve this problem.

## **2.4. Advantages of IoT-based multi-channel information fusion method for wireless sensor networks**

### **(1) Formation Freedom**

The network builder can set up a fully functional wireless sensor network at any time, anywhere, easily and quickly, and can also

perform maintenance and management work within the network after set up. Therefore, in practical applications, a single person can carry part of the sensor nodes, according to the environment and terrain convenience to build and disassemble the sensor network.

### (2) High signal-to-noise ratio

Synthesizing multi-angle and multi-directional information in distributed nodes improves the signal-to-noise ratio.

### (3) Unattended

In a harsh external environment, where human behavioral activities are threatened, it will not be possible to keep watch over the sensors in real time, while wireless sensor networks do not require human guarding and can maintain themselves when problems arise. If a sensor node is in a state of power shortage, then the network can automatically find a replacement node for this sensor internally.

## **3. Methodology for information fusion of wireless sensor networks and IoT technologies**

In wireless sensor network information fusion systems, measurement errors (noise) are inevitably introduced throughout the measurement process due to the lack of a priori knowledge of the tracking environment and the constraints of the sensors' own performance. In addition, the exact number of targets is often unpredictable, and even if there is only one target, some measurements may be multiple due to clutter interference, which requires statistical methods to establish target-measurement correspondence. This is especially true in a multi-target environment. That is to say, the sensor observation process and the multi-target tracking environment have various uncertainties as well as randomness, which destroy the correspondence between echo measurements and the expected targets, so that the solution must be sought by using IoT technology.

For wireless network information sensor systems, after solving the correlation problem of data, the final results must be obtained with more accurate or readable by estimation fusion techniques. The so-called estimation fusion is the organic combination of traditional estimation theory and data fusion theory, or data fusion for estimation problems, i.e., the study of how to best utilize the useful information contained in multiple data machines in the process of estimating

unknown quantities. For the case where a quantity falls into the intersection region of a tracking gate, the implication is that the quantity may originate from multiple targets. The purpose of joint probabilistic data association is to calculate the probability that each measurement is associated with each of its possible original targets. Taking a tracking system with 2 targets and 3 echoes as an example, the meaning of the confirmation matrix is shown in Table 1. The confirmation matrix, which can be regarded as the set of all feasible matrices, is obtained directly from the measurement vector and the tracking gate, while the feasible matrix, on the other hand, needs to be obtained by splitting the confirmation matrix. The confirmation matrix splitting algorithm can be implemented by a recursive algorithm for the number of echoes.

**Table 1.** Definition of Confirmation Matrix

$\Omega$	Clutter t=0	Target t=1	Target t=2
Echo j =1	1	1	1
Echo j =2	1	1	0
Echo j =3	0	0	1

#### **4. Analysis of multi-channel simulation results for wireless network sensor networks**

To verify the accurate performance of multi-channel information fusion in wireless sensor networks, two sensors are taken for testing in this paper. The range variance of sensor 1 is 2 km and the angular variance is 0.5 degree; the range variance of sensor 2 is 4 km and the angular variance is 1 degree, and the filter uses N=6000 particles and 120 Monte Carlo simulations.

The results of the multi-information fusion fitting of the wireless sensor network are shown in Figure 1, which gives the comparison curves of the mean square error of the tracking position of the two sensors as well as the fusion system. Even the poorly performing sensor of the two sensors contributes to the fusion results, while the fusion system outperforms the better performing sensor. At the initial position, sensor 1 is 0 with an end of 0.2226, and sensor 2 has an initial position of 0.0046 with an end of 0.7899. After the information fusion system is calibrated, the information fusion between the two has an initial position of 0.0021 with an end of 0.1218, and the fusion system completes the start at about 15 points and maintains the

superior performance thereafter. In other words, using a sensor 1 with high range accuracy and low angular accuracy and a sensor 2 with low range accuracy and high angular accuracy for simultaneous detection while fusing using the method in this paper, we can obtain higher than accuracy single sensor tracking performance.

The proposed fusion system in this paper obtains tracking results that are closer to the real trajectory than any single sensor. In practical applications, the tracking performance of conventional filters is poor when the observation accuracy of a single sensor is low. Using multiple sensors, the tracking accuracy can be improved by fusing the measurement information. The multi-sensor fusion algorithm is based on the Kalman filter, but for strongly nonlinear problems, the Kalman filter tracking is poor or even divergent. In this chapter, a multi-sensor fusion algorithm based on particle filter is proposed to fuse the measurement information from multiple sensors by likelihood under the particle filter, which improves the information fusion accuracy. The algorithm fuses the information from multiple sensors from a probabilistic point of view, which is not limited by the type of information and is applicable to the information fusion of arbitrary nonlinear and non-Gaussian systems.

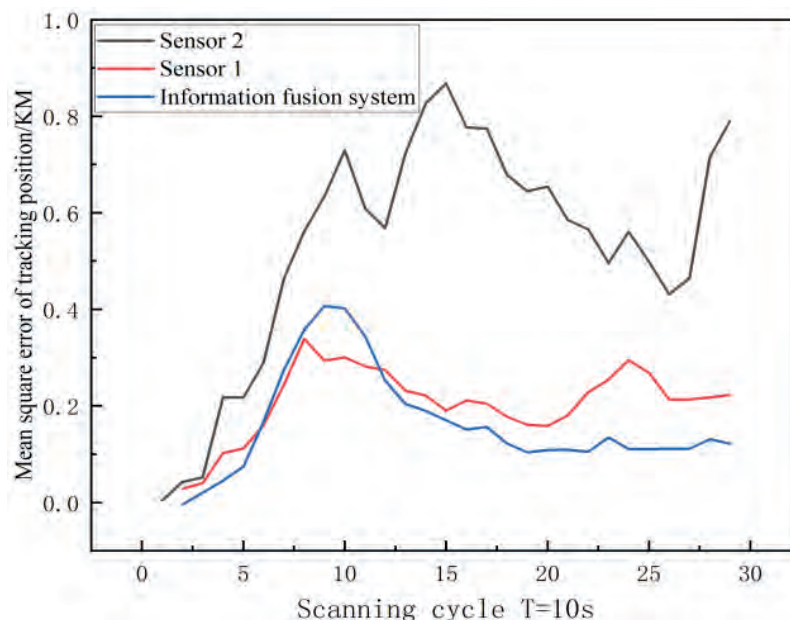


Figure 1. Multi information Fusion Fitting Results of Wireless Sensor Network

## 5. CONCLUSION

In order to study the wireless sensor network multi-channel information fusion method in depth, this paper proposes a methodology for the fusion of infinite sensor networks and IoT technologies, establishes the algorithm feasible matrix, and tests the multi-information fusion fitting effect of wireless sensor networks. The experimental results obtained that after the calibration of the information fusion system, the initial position of two sensor information fusion is 0.0021 and the end is 0.1218, and the multi-fusion system finishes the start at about 15 points and keeps superior performance than the high precision single sensor thereafter. That is to say, the proposed method in this paper has better fusion effect when fusing multi-channel information of wireless network, and the fusion delay is shorter and has better real-time performance.

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# Statistical Inference of Panel Data Models with Measurement Errors

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## **ABSTRACT**

In this paper, we study the statistical inference of the Panel data model containing measurement errors with the aim of optimizing the existing Panel data model algorithm. First, the statistical inference theorems for the Panel data model with measurement errors are given, and the parameter estimation methods are determined, and the paper focuses on testing the correctness of the proposed data model with the parameter Bootstrap. Then the main conclusions of the corrected least squares estimation of the unknown parameter vector and the measurement error Panel data model are tested according to the full text. The results show that the corrected least squares estimates and constraint estimates of the unknown parameters are 0.0203, their asymptotic distributions are infinitely close to 0, the differences of the corrected residual sums of squares are less than or equal to 2.15, the mean value of  $U[-1,1]$  is less than 2.0, and the mean squared error is less than 0.9, so the constructed test statistic holds. This paper studies Panel data model has important theoretical significance and practical value.

## **KEYWORDS**

Panel Model; Measurement error; Least squares estimation; Statistical Inference

## 1. INTRODUCTION

Panel data models are a class of mixed-effects models with time series and cross-sectional data, which have been widely used in various fields such as market analysis, repeated measures, econometrics, and biomedicine [1]. The number of redundant parameters in Panel data models is usually more than the parameters of interest, which makes it difficult to solve practical problems by traditional statistical methods. The problem of statistical inference about this model has attracted a lot of attention from many statisticians, and at the same time, if different estimation methods are used for the unknown parameters in the model, it will lead to different statistics of the constructed hypothesis tests. Therefore, before exploring the statistical inference of the parameters of interest, the estimation methods of the regression coefficients and unknown variance components need to be analyzed [2].

For regression coefficients, numerous scholars have used estimation methods such as best linear unbiased estimation, least squares estimation, two-step estimation, generalized least squares estimation, Between Time estimation, Within estimation, and Between Individual estimation [3]. For unknown variance components, the estimation methods such as least squares unbiased estimation, analysis of variance estimation, spectral decomposition estimation, and minimum variance unbiased estimation are used [4]. In the statistical inference of Panel data models, hypothesis testing regarding regression coefficients is usually used for variable selection as well as to test the reasonableness of linear model assumptions, so it has attracted many scholars to explore. For example, some scholars have constructed the consistent most dominant test statistic under the condition that the variance components are known. However, in the process of practical statistical analysis and application, the variance components are often unknown, and the two-step test statistic for regression coefficients is given using the phase fit estimation of variance components [5]. Under two-stage sampling, a correction method for the F-statistic was proposed to reduce the effect of intra-cluster correlation coefficients; however, none of these methods is an exact test method [6]. In view of this, two exact F-tests have been established by linear transformation of the model, which in turn constructs a combined test with higher efficacy. In addition, exact



tests and confidence intervals for regression coefficients and variance components under different Panel data models were constructed based on the concept of generalized P-values and generalized confidence intervals [7]. The simulation results show that the generalized method constructed based on generalized P-values and generalized confidence intervals can control the test levels better [8]. However, existing studies also show that this method lacks stable test results under different sample sizes and parameter settings [9].

In this paper, we consider the problem of parameter estimation and testing of the Panel data model containing measurement errors under constraints. Firstly, the statistical inference theorem of the Panel data model with measurement error is given, followed by specifying the parameter estimation method of this paper with the parameter Bootstrap test. Then, for the hypothesis testing problem of the linear constraint, the difference between the sum of squared corrected residuals under the original and alternative hypotheses is used to construct a test statistic to test its mean and mean square error distribution, and the asymptotic distribution of this test statistic is proved. Finally, the validity of the proposed estimation and testing methods is verified by numerical simulation studies.

## 2. Statistical Inference of Measurement Error Panel Data Model

### 2.1. Parameter estimation

Among the theories and methods of parameter estimation for Panel data models, the most basic and commonly used is least squares estimation. Also, two-step estimation methods can be used to solve the parameter estimation. Therefore, in this subsection, the regression coefficients are estimated using least squares and two-step estimation methods, respectively.

Four least squares estimates for  $\beta$  :

$$\hat{\beta}_i = (X_i' X_i)^{-1} X_i' y_i, \quad i = 1, 2, 3, 4. \quad (1)$$

Here, it is assumed that  $(X_i' X_i)^{-1}$  exists, which is easily satisfied in the analysis of economic data. Then the covariance matrix of  $\hat{\beta}_i$  is

$\text{Cov}(\hat{\beta}_i) = \sigma_i^2 (X_i' X_i)^{-1}$ . In turn, using the residual estimate  $\hat{u}_i = y_i - X_i \hat{\beta}_i$ , the unbiased estimate of  $\sigma_i^2$  is obtained as:

$$\hat{\sigma}_i^2 = \frac{\hat{u}_i' \hat{u}_i}{\text{rank}(P_i) - k} = \frac{y_i' (I - X_i (X_i' X_i)^{-1} X_i') y_i}{n_i}, \quad i = 1, 2, 3, 4. \quad (2)$$

Where  $n_i = \text{rank}(P_i) - k$ , by the definition of  $\chi^2$  distribution,

$$V_i = \frac{n_i \hat{\sigma}_i^2}{\sigma_i^2} \sim \chi_{n_i}^2.$$

According to Rao's least squares unification theory, it is known that  $\hat{\beta}_i (i = 1, \dots, 4)$  is the best linear unbiased estimate of  $\beta$  in model (1), respectively, and in this paper, the four models are coupled to obtain the least squares estimate and the best linear unbiased estimate. The results are:

$$\hat{\beta}_{LS} = \left( \sum_{i=1}^4 X_i' X_i \right)^{-1} \left( \sum_{i=1}^4 X_i' y_i \right), \quad (3)$$

$$\hat{\beta}_{GLS} = \left( \sum_{i=1}^4 \frac{X_i' X_i}{\sigma_i^2} \right)^{-1} \left( \sum_{i=1}^4 \frac{X_i' y_i}{\sigma_i^2} \right). \quad (4)$$

This can be seen:

$$\hat{\beta}_{LS} \sim N\left(\beta, \Sigma_{LS}(\sigma_1^2, \sigma_2^2, \sigma_3^2, \sigma_4^2)\right), \Sigma_{LS}(\sigma_1^2, \sigma_2^2, \sigma_3^2, \sigma_4^2) = \left( \sum_{i=1}^4 X_i' X_i \right)^{-1},$$

$\left( \sum_{i=1}^4 \sigma_i^2 X_i' X_i \right) \left( \sum_{i=1}^4 X_i' X_i \right)^{-1}$ . However,  $\hat{\beta}_{GLS}$  in equation (4) contains

unknown variance components. Thus, the two-step estimation of  $\beta$  is obtained by replacing  $\sigma_i^2$  with  $\hat{\sigma}_i^2$ .

$$\hat{\beta}_{TS} = \left( \sum_{i=1}^4 \frac{X_i' X_i}{\hat{\sigma}_i^2} \right)^{-1} \left( \sum_{i=1}^4 \frac{X_i' y_i}{\hat{\sigma}_i^2} \right), \quad (5)$$

This can be seen:

$$\hat{\beta}_{TS} \mid \hat{\sigma}^2 \sim N\left(\beta, \Sigma_{TS}(\sigma_1^2, \sigma_2^2, \sigma_3^2, \sigma_4^2)\right), \hat{\sigma}^2 = (\hat{\sigma}_1^2, \hat{\sigma}_2^2, \hat{\sigma}_3^2, \hat{\sigma}_4^2),$$

$$\Sigma_{TS}(\sigma_1^2, \sigma_2^2, \sigma_3^2, \sigma_4^2) = \left(\sum_{i=1}^4 \frac{X_i' X_i}{\hat{\sigma}_i^2}\right)^{-1} \left(\sum_{i=1}^4 \frac{\sigma_i^2 X_i' X_i}{\hat{\sigma}_i^4}\right) \left(\sum_{i=1}^4 \frac{X_i' X_i}{\hat{\sigma}_i^2}\right)^{-1}$$

## 2.2. Regression coefficient test

Consider first the problem of non-singular linear hypothesis testing of the regression coefficients

$$H_0 : H\beta = d \quad \text{versus} \quad H_1 : H\beta \neq d. \quad (6)$$

Where  $H$  is a  $m \times k$  row full rank matrix and  $H\beta = d$  is compatible. In this paper, we will construct the test statistic for the hypothesis testing problem (6) based on  $\hat{\beta}_{LS}$  and  $\hat{\beta}_{TS}$ , using the parametric Bootstrap test.

### 2.2.1. Parameter Bootstrap test

Consider first the problem of non-singular linear hypothesis testing of the regression coefficients.

For the hypothesis testing problem (6), the parametric Bootstrap test statistic is constructed based on  $\hat{\beta}_{LS}$  and  $\hat{\beta}_{TS}$ , respectively. First define:

$$T_1 = (H\hat{\beta}_{LS} - d)' \left[ H\Sigma_{LS}(\sigma_1^2, \sigma_2^2, \sigma_3^2, \sigma_4^2) H' \right]^{-1} (H\hat{\beta}_{LS} - d), \quad (7)$$

$$T_2 = (H\hat{\beta}_{TS} - d)' \left[ H\Sigma_{TS}(\sigma_1^2, \sigma_2^2, \sigma_3^2, \sigma_4^2) H' \right]^{-1} (H\hat{\beta}_{TS} - d). \quad (8)$$

If  $\sigma_i^2 (i = 1, 2, 3, 4)$  is known, then  $T_1$  and  $T_2$  are the test statistics for the hypothesis testing problem (9). However, in practical applications  $\sigma_i^2$  is mostly an unknown parameter. Therefore, replacing  $\sigma_i^2$  with  $\hat{\sigma}_i^2$  is obtained.

$$T_1 = (H\hat{\beta}_{LS} - d)' \left[ H\Sigma_{LS}(\hat{\sigma}_1^2, \hat{\sigma}_2^2, \hat{\sigma}_3^2, \hat{\sigma}_4^2) H' \right]^{-1} (H\hat{\beta}_{LS} - d), \quad (9)$$

$$T_2 = (H\hat{\beta}_{TS} - d)' \left[ H\Sigma_{TS}(\hat{\sigma}_1^2, \hat{\sigma}_2^2, \hat{\sigma}_3^2, \hat{\sigma}_4^2) H' \right]^{-1} (H\hat{\beta}_{TS} - d). \quad (10)$$

Since the distributions of  $T_1$  and  $T_2$  are unknown, the Bootstrap method is used to generate the test statistic by sampling from the estimated model. Therefore, the Bootstrap test statistics based on  $T_1$  and  $T_2$  are respectively.

$$TB_1 = (H\hat{\beta}_{BLS} - d)' [H\Sigma_{LS}(S_{B1}^2, S_{B2}^2, S_{B3}^2, S_{B4}^2)H']^{-1} (H\hat{\beta}_{BLS} - d) -$$

$$= (H\hat{\beta}_{BLS} - d)' \left[ H \left( \sum_{i=1}^4 X_i' X_i \right)^{-1} \left( \sum_{i=1}^4 S_{Bi}^2 X_i' X_i \right) \left( \sum_{i=1}^4 X_i' X_i \right)^{-1} H' \right]^{-1} (H\hat{\beta}_{BLS} - d), \quad (11)$$

$$TB_2 = (H\hat{\beta}_{BTS} - d)' [H\Sigma_{TS}(S_{B1}^2, S_{B2}^2, S_{B3}^2, S_{B4}^2)H']^{-1} (H\hat{\beta}_{BTS} - d)$$

$$= (H\hat{\beta}_{BTS} - d)' \left[ H \left( \sum_{i=1}^4 \frac{X_i' X_i}{S_{Bi}^2} \right)^{-1} H' \right]^{-1} (H\hat{\beta}_{BTS} - d). \quad (12)$$

Which,  $(H\hat{\beta}_{BLS} - d) \sim N(0, H\Sigma_{LS}(\hat{\sigma}_1^2, \hat{\sigma}_2^2, \hat{\sigma}_3^2, \hat{\sigma}_4^2)H')$ ,  $S_{Bi}^2 \sim \frac{\hat{\sigma}_i^2}{n_i} \chi_{n_i}^2$  ( $i = 1, 2, 3, 4$ ),

$(H\hat{\beta}_{BTS} - d) \sim N(0, H\Sigma_{TS}(\hat{\sigma}_1^2, \hat{\sigma}_2^2, \hat{\sigma}_3^2, \hat{\sigma}_4^2)H')$ .

For the hypothesis testing problem (6), the following p-values can be given using  $TB_1$  and  $TB_2$ :

$$p_1 = p(TB_1 \geq t_1 | H_0), \quad p_2 = p(TB_2 \geq t_2 | H_0). \quad (13)$$

Where  $t_1 = (Hb_{LS} - d)' [H\Sigma_{LS}(s_1^2, s_2^2, s_3^2, s_4^2)HH']^{-1} (Hb_{LS} - d)$  denotes the observation of  $TB_1$ ,  $t_2 = (Hb_{TS} - d)' [H\Sigma_{TS}(s_1^2, s_2^2, s_3^2, s_4^2)H']^{-1} (Hb_{TS} - d)$  denotes the observation of  $TB_2$ ,  $b_{LS}$  and  $b_{TS}$  denotes the observation of  $\hat{\beta}_{LS}$  and  $\hat{\beta}_{TS}$ , respectively, and  $s_i^2$  denotes the observation of  $\hat{\sigma}_i^2$ ,  $i = 1, 2, 3, 4$ . In addition,  $p_i$  ( $i = 1, 2$ ) can be calculated using Monte Carlo method simulations.

Algorithm 2.1 Given  $a, b, c, \sigma_\mu^2, \sigma_\nu^2, \sigma_\gamma^2, \sigma_\xi^2, H, \beta_0, \beta$  and  $X, y$  is randomly generated according to equation (2) to calculate  $t_1$  and  $t_2$ .

For  $k = 1, 2, \dots, m$

$$\text{Let } (H\hat{\beta}_{BLS} - d) \sim N\left(0, H\Sigma_{LS}(\hat{\sigma}_1^2, \hat{\sigma}_2^2, \hat{\sigma}_3^2, \hat{\sigma}_4^2)H'\right), S_{Bi}^2 \sim \frac{\hat{\sigma}_i^2}{n_i} \chi_{n_i}^2, i=1,2,3,4, ,$$

$$(H\hat{\beta}_{BTS} - d) \sim N\left(0, H\Sigma_{TS}(\hat{\sigma}_1^2, \hat{\sigma}_2^2, \hat{\sigma}_3^2, \hat{\sigma}_4^2)H'\right);$$

Calculation  $TB_1$  and  $TB_2$ ;

If  $TB_1 \geq t_1$ , then  $q_1 = q_1 + 1$ ; Similarly, if  $TB_2 \geq t_2$ , then  $q_2 = q_2 + 1$ ;

end(k);

Then the hypothesis testing problem (6) with  $p_1 = q_1 / m, p_2 = q_2 / m$ .

### 3. The main conclusion of the Panel of measurement errors proves

On the tight support set  $[-1,1]$ , the kernel function  $K(\cdot)$  is a symmetric probability density function and is Lipschitz continuous with the mean and mean square error correlation results shown in Table 1.

In the case of covariates with measurement errors in the parametric part, the problem of estimating the parametric and nonparametric parts of the model is carried out in three broad steps. Firstly, under the assumption of model identifiability conditions, the data are averaged between groups, and secondly, the modified Profile least squares idea is used to obtain improved estimates of the parametric and nonparametric components of the semi-parametric Panel model with measurement errors. Finally, the asymptotic normality of the estimates given in this paper is further derived under some conventional canonical conditions. When numerical simulations are performed, the problem of correlation and endogeneity between the transformed model variables is considered, and there is a corresponding requirement for data generation. The comparison between the Naive estimation and the improved estimation in terms of the mean and mean square error of the estimated quantities shows that the estimates given in this paper are better than the Naive estimation. Three transformations of the model, using corrected least squares and Bootstrap test, yielded corrected least squares estimates and constrained estimates of 0.0203 for the unknown parameters, whose asymptotic distribution is infinitely close to 0. Secondly, the

difference between the corrected residual sum of squares under both the original and alternative hypotheses is less than or equal to 2.15, and the constructive test statistic holds. Finally, the validity of the proposed estimation and testing methods is verified after data simulation with limited samples.

**Table 1.** Mean value and mean square error

Error	N	T	$\delta$	$\theta(n)$		$\theta$	
				Mean	MSE	Mean	MSE
N(0,1)	50	100	0.1	1.9823	0.0065	2.0045	0.0073
			0.5	1.9053	0.0155	2.0458	0.0212
	100	100	0.1	1.9945	0.0055	2.0380	0.0213
			0.5	1.6850	0.0524	2.0163	0.0166
U[-1,1]	50	100	0.1	1.8765	0.0034	2.0014	0.0030
			0.5	1.6734	0.0678	2.1301	0.0121
	100	100	0.1	1.7114	0.0129	2.0171	0.0045
			0.5	1.5817	0.0375	2.0410	0.0124

#### 4. CONCLUSION

This paper studies the statistical inference methods for the Panel data model of measurement error under constraints. Firstly, the statistical inference formula and parameter estimation model of the Panel data model of measurement error are given, focusing on the parametric Bootstrap test, the corrected least squares estimation of the unknown parameter vector is given, and the asymptotic properties of the Panel data model under some conditions are tested. The results show that using the corrected least squares and Bootstrap test, the corrected least squares estimates and constrained estimates of the unknown parameters are 0.0203, and their asymptotic distribution is infinitely close to 0. The differences of the corrected residual sums of squares are all less than or equal to 2.15, which proves the asymptotic distribution of the test statistic. It is thus clear that the statistical inference of the algorithm in this paper holds for the Panel data model containing measurement errors.

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# BP neural network-based short video dissemination path optimization for agricultural products in the context of rural revitalization

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## ABSTRACT

This paper aims to analyze the communication characteristics of agricultural-related self-publishing through case studies and BP neural network algorithm verification, and tries to explore the communication value of agricultural-related self-publishing and its optimal communication path in the context of rural revitalization. Under the proposed algorithm, the accuracy rate of the BP neural network training set is 82.40%. Among the platform disguised correlation values, 0.124 for Jitterbug Live and 0.116 for Xiaohongshu Live are higher than the predicted values. This indicates that the agricultural product value assessment model constructed by BP neural network has a high degree of reliability. In addition, with the development of society and the continuous emergence of new technologies, the countryside is bound to become a new territory for the spread and proliferation of new technologies, and rural revitalization will be greatly influenced by the impact brought by the Internet and new media technologies. Therefore, this study can also provide a study reference for future rural communication research.



## KEYWORDS

BP Neural Network; Agricultural products self-publishing; Rural revitalization; Rural Communication

## 1. INTRODUCTION

The rural revitalization strategy focuses on solving the key problems of rural development, aims to enhance the sustainable development capacity and competitiveness of rural systems, and promotes rural transformation and urban-rural integration through the "five major constructions" (industrial prosperity, ecological livability, civilized countryside, effective governance, and affluent living) [1]. The rural revitalization strategy places rural areas in the main role of national development, and changes the previous thinking of formulating agricultural policies from an urban perspective, so that rural areas can get rid of the dependence on cities and help them achieve sustainable and benign development through a series of policies [2]. The constant updating of digital technology has impacted the old model of mass media allocating social resources only to a few elite groups, and the development of technology has constantly impacted and changed the ecology of information production and communication, and ordinary people can also have a microphone in their hands to access social resources [3].

The emergence of new media technologies has reconfigured the shape of our society in all dimensions and has gradually spread to all aspects of life [4]. The penetration and influence of the Internet on rural areas are gradually expanding, and due to the potential business opportunities and academic research value in the policy context, the industry and academia have launched a lot of discussions and studies on this issue one after another. The industry has revealed the huge investment potential and opportunities for rural economic development under Internet technology by releasing several poverty alleviation projects, vigorously promoting the development of live streaming technology, and increasing capital investment in rural economy [5]. With the emergence of social media, which carries obvious characteristics of interactivity, immediacy, and interpersonal communication, each individual can have a voice, spatial and temporal boundaries are blurred, and the originally stable

communication relationship is broken. Individuals are no longer just receivers but also producers of information, and they transform from readers and audiences to consumers and users [6]. Short videos and live streaming provide the value of the scene, and the civilian culture, which has been marginalized for a long time, begins to rise, and social mobility is greatly enhanced. Ordinary people took control of the discourse, and everyone could become an opinion leader, and a new group of opinion leaders such as KOLs, vloggers, and netizens emerged [7-8].

This paper attempts to start from the development status of agricultural self media and its existing problems, proposes a BP neural network-based agricultural product value assessment model and validates its economic empowerment, in order to contribute to the healthy development of agricultural self media in the current stage of short video traffic era. In this process, according to the current problems, two major methods are proposed to optimize the communication of agricultural-related self media, namely, diversified realization-driven economic empowerment of agricultural products and improving media literacy.

## **2. The development of short video of agricultural products in the context of rural revitalization**

### **2.1. The generation of agricultural-related self-publishing**

The emergence of farming-related self-marketing can be traced back to 2013's "Killing Horse Meets Washing Haircut", which had a play volume of up to 5 million at that time, and it was because of the explosion of this video that farming-related self-marketing was first labeled as "rustic". 2015 saw the emergence of farming-related short videos and the formation of a relatively independent content area. Li Ziqi, a famous self-publisher, started to enter the public eye in 2016 by filming ancient-style rural food, and has been actively exploring overseas markets since 2017, with over 7.3 million fans on YouTube. Nowadays, short video platforms such as Racer and Today's Headlines are developing rapidly and actively penetrating into third and fourth-tier cities and rural areas.

## **2.2. Problems of Agricultural-related Self-Media Communication in the Context of Rural Revitalization**

(1) Pseudo "three agricultural" self-publishing emerges, conveying bad value guidance

The "coquette 9 sisters" annual income of 10 million, which is undoubtedly a huge temptation for other "three agricultural" self-media field. As a result, some of the self-publishers are doing content that has nothing to do with the "three rural areas" under the guise of "three rural areas". For example, "Rural Trio", three young men who just graduated from school are certified as "members of the Poverty Alleviation Group" and creators in the field of quality "three rural areas", but the videos they shoot are in It is hard to see the content related to "three rural areas", as the videos are about "eating and drinking" in the city or unpacking the express delivery from fans. This kind of video can easily convey the tendency of "greed for pleasure", and it is difficult to play the role of positive guidance.

(2) Production and marketing imbalance, lack of health supervision

Some "three agricultural" self-media see the business opportunities in the self-media, to do e-commerce, products from flour, vermicelli, to spicy cabbage, pancakes and other farm specialties, a wide variety of goods. It is undeniable that the development of "three agricultural" e-commerce has broadened the sales channels of agricultural products and promoted the development of rural economy, but we should also see that the stability of the quality of products cannot be guaranteed when the self-media sell their own handmade food. In addition, the lack of hygiene inspection and supervision of these homemade food products sold on the Internet has caused some hidden worries about food safety.

## **2.3. Building a BP neural network based agricultural product value assessment model**

(1) The basic principle of BP neural network

BP neural network is a learning algorithm that continuously mediates the value of the hidden layer by the sum of the squared difference between the output value and the actual value derived after the input. In this paper, we use the Z-Score normalization method to normalize

the training and test set data. The formula of Z-Score normalization method is:

$$Z = (\chi - \mu) / \sigma \quad (1)$$

In the formula  $z$  indicates the final result of normalization,  $x$  indicates the data value,  $\mu$  is the mean, and  $\sigma$  is the standard deviation. The specific quantity of  $z$  indicates the difference between the original value and the mean value, which may be negative.

## (2) Model construction and training

This paper uses Python software for neural network patent value assessment model construction. For parameter setting:

1) BP neural network structure contains input layer, implicit layer and output layer, the number of implicit layers may not be unique. The number of implicit layers is three, and the accuracy of this model is high when tested several times by Python. Therefore, this paper uses a three-layer neural network structure for training and learning, i.e., it contains three hidden layers.

2) In this paper, during the operation of constructing the patent value evaluation model based on BP neural network, 12 indexes are used after the rough set using Johnson's algorithm knowledge reduction.

3) In this paper, the patent value is evaluated, and thus the output layer neuron with only one output value is the patent value. Therefore, the number of neurons in the output layer is one and only one.

4) The number of neurons in the hidden layer is determined. The number of neurons in the hidden layer is tested by continuously modifying the number of neurons in each hidden layer, comparing the accuracy of the model under different conditions of the number of neurons, and keeping the relatively better and more stable parameters.

5) Carefully consider many factors, in order to ensure high accuracy and the highest operational efficiency under the same accuracy condition,  $10^{-4}$  is chosen as the target value of the model error here.

### 3. Analysis of the optimization of the communication path of agricultural products-related self-media

#### 3.1. Multiple realizations drive economic empowerment of rural agricultural products

In addition to the traditional entertainment function, with the development of e-commerce and shopping function into the major self-media platforms, self-media nowadays also has the function of bringing goods. The main ways of realizing cash by each platform are shown in Table 1.

**Table 1.** Main realization methods of each platform

Index	Code
Tiktok live broadcast	C5
Live broadcast of Little Red Book	C2
Tiktok Store	C14
Little Red Book Shopping Cart	C17
Paid courses	C8
Platform private message customization	C22
Kwai Shop	C7
Kwai live broadcast	C3
Video drainage realization	C10
Graphic and text drainage and realization	C21
Video+image text drainage	C1
Arrive with goods	C11

According to the realization methods of each platform, BP neural network was used to detect the importance of video elements in the process of agricultural self-media operation. The model obtained by training and learning for the training set is predicted on the training set itself, and the accuracy rate obtained is 82.40%. This indicates that the agricultural products patent value assessment model constructed by BP neural network has high confidence in patent value prediction, and the algorithm of this paper is established. The top four among the 12 platform cashing methods are: Jitterbug live 0.124, Xiaohongshu live 0.116, Jitterbug small store shopping 0.112, Xiaohongshu shopping cart 0.097. These four methods are also the mainstream short video platforms at present, with large user usage traffic and fast cashing, and the breakthrough of agricultural products self-media transformation can start from these four. Cut to find the characteristics of Xiaohongshu and Jitterbug users, according to the different user fan groups of the two platforms, separate the diversion,

and maximize the realization of agricultural products to cash and positive communication of rural values. In addition, for people who do not like to watch or do not have time to watch live, graphic, video, graphic + video and other diversion methods are the fastest and most convenient "grass" channels, to seize the rapid traffic brought by these three, optimize the video and graphic content, and strive to absorb powder and solid powder as soon as possible, to achieve the flow of cash.

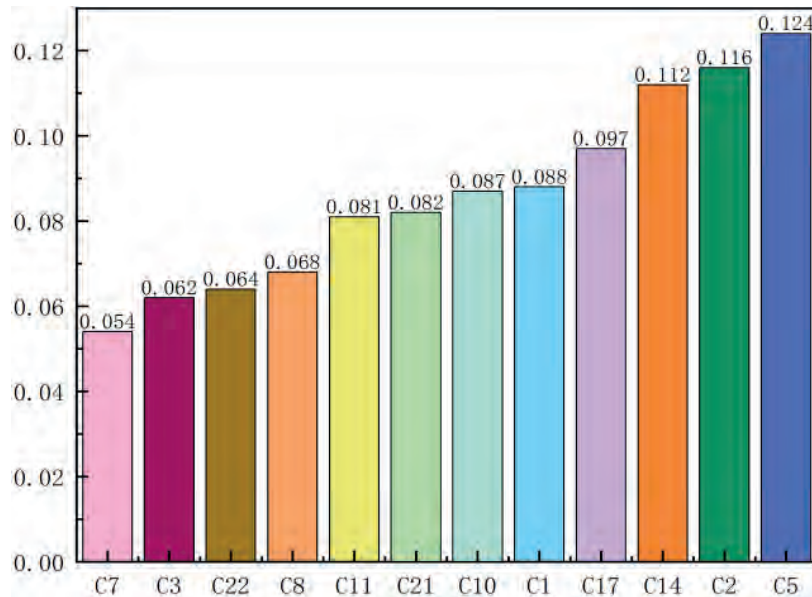


Figure 1. Importance of agricultural products we media video element features

### 3.2. Improving media literacy

At present, the problems in the production of short videos on rural themes are largely related to the low media literacy of producers. As the main content producer of rural short videos, the producer should first actively pursue positive energy and establish bottom-line thinking in the main theme of short videos. On the basis of the clear boundary of their own free expression, try to expand the breadth and depth of content production, have their own correct values and expression, not to be a "slave" of traffic. Secondly, producers should actively get rid of inert thinking in the production process, continuously improve their cultural literacy level, enrich their perspective and level of view, actively seek innovation, and avoid borrowing or even plagiarism. As "opinion leaders", they should guide the network culture correctly and make themselves go farther on the road of self-media. In addition, rural short video producers should also focus on reflecting the actual

problems faced in rural life, such as rural education, medical care, the heritage of cultural skills and the "hollowing out" of the countryside in the process of urbanization. Rural short video producers are mostly from rural areas, so they can take advantage of their familiarity with the real life in rural areas, try their best to present the rural landscape comprehensively and accurately, learn to understand the requirements and connotations of the new rural construction, and become high-quality rural short video producers in combination with the rural revitalization strategy.

#### **4. CONCLUSION**

This paper takes BP neural network algorithm as the technical means to explore the effective path of short video dissemination of agricultural products under the background of rural revitalization, in order to explore the background of the generation of agricultural-related self media and the existing problems in an attempt to find out the direction of optimizing the future development of short videos of agricultural products, and build a BP neural network agricultural products value estimation model to verify the problems involved. The two major platforms for platform realization are Jieyin Live 0.124 and Xiaohongshu Live 0.116, which show deeper innovation possibility and development potential in the form of short video-based performance, which is conducive to promoting socialist rural construction and realizing rural development and comprehensive revitalization. However, to achieve the healthy and sustainable development of agriculture-related self media, this requires a good balance of the degree of constraints on agriculture-related self media by all parties. With the strategy of rural revitalization and core values as the guide, the government, society, capital platforms and participants from all parties need to work together to actively guide and regulate the agriculture-related self media in order to achieve the goal of building a new socialist countryside and gathering the sense of organic community in urban and rural areas.

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# The dilemma of cultivating cross-border e-commerce innovation and entrepreneurship talents in the context of big data driving and the path to break it

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## **ABSTRACT**

This paper is of great significance in exploring the growth of cross-border e-commerce (CBE) talents and enterprises driven by big data. Firstly, it elaborates the dilemma confronted by the CBE college talent cultivation mode, analyzes the deficiencies in enterprise operation, and puts forward a new strategy for CBE talent cultivation in colleges and universities. Through big data, we collect the demand of enterprise talents' ability and use it as a reference for talent cultivation. According to the big data analysis of CBE enterprise talent demand ability ratio, the top three are platform operation ability, accounting for 92%, English ability, accounting for 92%, and supply chain management ability, accounting for 85%. Cultivating talents of CBE in the new era through school-enterprise collaborative innovation and entrepreneurship education can greatly promote the growth of China's transnational e-commerce industry.

## **KEYWORDS**

Big Data Driven; Cross-border e-commerce; Talent Growth Model; School-Enterprise Cooperation

## 1. INTRODUCTION

With the increasing growth of the Internet economy and economic globalization, CBE and cross-border trade have become a new economic situation. It relies on the unique connectivity and convenience of the e-commerce economy to link the economies of various countries and generate huge economic benefits [1]. China's e-commerce economy has flourished in recent years, and CBE in various industries is doing well and occupies a large proportion of China's foreign trade. As the exercise base of CBE talents, universities are burdened with the important responsibility of delivering e-commerce talents to the country and enterprises. How to cultivate innovative and entrepreneurial talents of CBE in the new era is a problem faced by all universities [2]. At the similar time, enterprises, as the platform for CBE talents to show their talents, should also afford a moral environment for the survival of talents [3]. With the quick growth of the Internet and the new round of globalization of cross-border trade, consumption and services, CBE platforms as a novel mode of international skill are also facing opportunities and challenges [4].

The trade rules and regulatory approaches developed by governments for CBE retailing can have an important impact on the growth of CBE retailing. However, governments also face common challenges in regulation, such as the lack of efficient and low-cost management methods [5]. The Chinese government and industry attach great importance to the growth of CBE, considering it as a new engine for China's economic growth, a new mode of industrial transformation and a new window for opening up to the outside world in the new era [6]. Through continuous enhancement of policies and systems and revolution of business models, China has originally recognized a "systematic and all-round" CBE retail regulatory model in the course of more than a decade of growth, which has formed a good foundation for encouraging the growth of CBE in China [7]. However, as a new mode of international trade in China, CBE requires the Chinese government and industry to continuously improve their understanding and policy design to encourage the healthy and sustainable growth of the industry [8]. Meanwhile, the macro policy environment for technology growth is also improving, and big data is gradually rising as a national strategy. Starting from

2021, the State Council proposed to support the R&D and industrialization of software related to massive data storage and processing, and to encourage the R&D and industrialization of key products for information security. The Growth and Reform Commission and the General Administration of Customs have carried out the deployment of "China's cross-border sweater e-commerce service pilot" [9].

This paper firstly starts from two major directions, namely the dilemma of CBE talent exercise in universities and the problems of CBE enterprise operation, and clarifies the research direction of the whole paper. Then, we analyze the request for CBE enterprise talents according to the big data and propose an operative path to break the predicament of CBE innovation and entrepreneurship talents cultivation. That is, universities need to improve the cultivation mechanism of innovative and entrepreneurial aptitudes, strengthen the construction of CBE faculty, collaborate with platform data to improve services, and deal with cross-cultural issues under data-driven four initiatives.

## **2. The dilemma in CBE talent training in the context of big data drive**

### **2.1. The dilemma of training CBE talents in colleges and universities**

#### **(1) Faculty is not strong**

The education model of today's colleges and universities is generally dominated by teachers and counselors in charge of classwork and life, and students passively accepting learning. Teachers of professional courses have little experience in entrepreneurship due to the limitation of CBE platform, so they are more inclined to theoretical learning of CBE. But CBE requires a wide range of knowledge, including both professional knowledge theory and subject knowledge in sales, art, language, economy and other aspects. Teachers in colleges and universities do not have practical experience in CBE, so it is difficult for them to master all the knowledge required for CBE, which requires teachers to strengthen the learning of various knowledge in the field of CBE to meet the requirements of subject education. Since the CBE profession is partial to practicality, the

teaching as well as practical participation of CBE profession needs more high-quality professionals [10].

#### (2) Inadequate school-enterprise collaborative education

Innovation and entrepreneurship education and professional innovation education should be in line with contemporary values, and the two should complement each other in order to effectively encourage the growth of quality education. It is necessary to establish the sense of dialectical thinking that professional education is the foundation of innovation and entrepreneurship education and innovation and entrepreneurship education reacts to professional education.

#### (3) Imperfect teaching conditions and relative disconnection between practical training and vocational jobs

The training of CBE talents requires a high practical environment. At present, some colleges and universities have established CBE training rooms and equipped them with professional simulation software to simulate the real environment for students to practice and exercise, in an attempt to improve students' practical skills through various practical training modes and meet market demand and job requirements. However, with the rapid growth of "Internet+", it is difficult for the simulated system to catch up with the pace of system upgrade after all. In addition, there is a gap between the simulated environment and the real operating environment, and there is a big difference between the practical cases of students in school and the real projects in enterprises.

## **2.2. The main problems in the operation of CBE enterprises**

#### (1) Commodity homogenization is widespread

At present, some CBE business giants have already dominated the market. Comprehensive platforms, especially import platforms, cover beauty, mother and child, electronics and other commodities, and the problem of homogeneity prevails. Whether it is for new entrants or competitors who wish to continue to plow through and gain a leading position, differentiation and value for money are the goals that help companies break through. Whether online or offline, the collection of customers to attract traffic to enhance the transaction volume is the fundamental retail. The previous model of relying on price promotion

and taking the competition of price war not only examined the enterprise's own operation and cost management, but also tested the enterprise's ability to control the supply chain and occupy a favorable position.

## (2) Localization of operating strategies

CBE retailing faces the problem of cross-cultural differences and individualized needs. It needs to consider the differences in human environment, business environment and political environment from region to region more than traditional e-commerce at the operational level. In addition to the procurement, logistics and tariff issues in the supply chain, the customer-facing end of the shopping process involves differences in information access, value perception, end-use habits, payment methods, shopping scenarios and so on, all of which make it impossible to transfer the successful experience of e-commerce companies in one region to another. Users will also choose the best way to meet their preferences and habits with their own experience and feelings among many merchant choices. CBE enterprises how to deepen the local market environment to adjust their own operating model has become a need for continuous exploration of the problem.

## **3. Effective path for cultivating innovative and entrepreneurial talents in CBE in the context of big data drive**

In order to break the dilemma of CBE innovation and entrepreneurship talent cultivation, this paper uses big data to collect the current CBE enterprise talent demand ability situation according to the main existing dilemma of CBE talent cultivation mode above, and seeks to amend the talent cultivation mode of universities according to the enterprise talent demand ability situation. Strengthen the cooperation between schools and enterprises to cultivate elite talents who can adapt to the market demand.

The statistics of talent demand of CBE enterprises are shown in Table 1. The skills required higher in the demand of CBE talents in order are: having strong platform operation ability of 92%, English ability of 92%, supply chain management ability of 85%, crisis protection awareness of 82%, market decision-making power of 81%, and marketing ability of 80% inside and outside the station. These six competencies have the characteristics of strong integration and high

practical requirements, which means that universities should strengthen the cooperation between schools and enterprises in the process of talent training, and should not be detached from the emphasis on theory and light on practice. According to the statistical table of talent demand of CBE enterprises, this paper proposes a series of more detailed training initiatives, which are listed in the following.

**Table 1.** Statistics of talent demand of CBE enterprises

Number	Cross border e-commerce capacity demand	Statistics proportion
1	R&D capability	60%
2	Supply chain management capability	85%
3	Market decision-making power	81%
4	English ability	90%
5	Multilingual ability	65%
6	Strong platform operation ability	95%
7	Crisis protection awareness	82%
8	Marketing ability inside and outside the station	80%

### **3.1. Improve the mechanism of cultivating innovative and entrepreneurial talents in universities**

Integrate and improve educational and teaching resources, including and not limited to courses, projects and competitions. Based on the actual situation, higher vocational institutions actively encourage enterprises to participate in the process of cultivating innovative and entrepreneurial talents for CBE in schools. With the help of enterprises, they should set up teaching objectives based on the actual working needs of CBE, develop training courses and evaluation systems, and improve and enrich teaching contents. With the market needs and students' demands as the basic objectives, the curriculum of CBE is optimized and designed; the professional curriculum is the basis, the professional practical training courses are the skeleton, and the courses in multiple fields such as innovation and entrepreneurship and language learning are the auxiliary support to improve the cultivation mechanism of innovative and entrepreneurial talents in higher vocational institutions. At the same time, according to the local characteristics of the institutions, according to the needs of the countries along the "Belt and Road",

multilingual elective courses are set up to help students to engage in the language needs of the CBE industry. In order to meet the needs of CBE innovation and entrepreneurship talents, the curriculum should be set up, optimized and improved, and students with innovative and entrepreneurial ideas in the CBE industry should be properly supported and guided to a certain extent to expand their experience.

### **3.2. Strengthen the construction of CBE faculty**

The following strategies can be adopted: (1) higher education institutions, based on government policy requirements, set up research innovation and entrepreneurship topics with enterprises, which can add scientific research boost for enterprises and also enhance the ability of teachers to extend the implementation of CBE project research; (2) strengthen school-enterprise cooperation. The form of cooperation can be divided into two types, one is to implement the project of attracting enterprises to the school, and the other is to run a mixed ownership secondary college (department) model. Through these two models, attract high-quality teachers to join the enterprise mixed CBE teacher team, so that teachers can take up teaching tasks in both enterprises and schools, and allow teachers to check and fill in the gaps in the process of joint practice, joint practice and joint teaching in enterprises and schools, so as to improve teachers' professional ability in a shorter period of time; (3) encourage teachers to go to enterprises through policy establishment. It allows teachers to gain a deeper understanding of and participate in CBE start-ups and operations to enhance their real-world experience.

### **3.3. Collaborative Platform Data Enhancement Services**

China's e-commerce is in a period of rapid growth, and the geometric growth of user data is behind the spurt of e-commerce growth. E-commerce has the natural advantage of applying big data, and the collaborative sharing of data can better encourage the maximization of data asset value. The growth of Internet technology provides the possibility of handling massive amounts of data and extracting valuable information from complex fragmented data relationships. Within the enterprise, data operations of different system platforms need to establish mutual connections based on independent division of labor. Establishing an intelligent business data management

platform, quantifying strategies and methods, and evaluating results in an integrated manner will gradually improve the efficiency of data utilization and the quality of data application. The results of data collection and analysis from different channels and perspectives among different companies can contribute to the improvement of data in the user dimension. This requires unified storage of data, promotion of data integration, standardization of data processing, and finally data sharing to achieve the application of data correlation.

### **3.4. Dealing with cross-cultural issues in a data-driven manner**

People in different countries and regions have different expectations and preferences for the same product and the same shopping process. Through big data we can perceive these abstract and subtle differences, allowing differentiated services to be targeted in regionalized management and marketing. In the past, CBE services, especially in B2B, reduced cross-cultural friction in the transaction process through the process of dealing with people. The B2C field, which has huge growth space today, needs to pay more attention to the new and new user groups on the computer side of the Internet and mobile terminals. Combining Internet behavior to analyze cross-cultural differences can bring more humanized process optimization for CBE processes such as browsing, product selection, payment and delivery.

## **4. CONCLUSION**

This paper takes the study of CBE innovation and entrepreneurship talent cultivation mode in the context of big data-driven era as the entry point, analyzes the problems of CBE talent cultivation mode in colleges and universities at the present stage and the deficiencies in enterprise operation, and tries to find out the ways to crack the dilemma. According to the analysis of CBE enterprise talents' demand according to big data, the top three are platform operation ability (92%), English ability (92%) and supply chain management ability (85%). It shows that in the context of the new era, if we want to encourage the training of CBE innovation and entrepreneurship talents, we must fully understand the actual growth of the current market and do a good job of school-enterprise cooperation in combination with the growth characteristics of the CBE industry. The existing talent training program is improved, the practical training



ability of college students is improved from various aspects, and the in-depth interaction with enterprises and the market should be done.

## 5. FUNDING

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# Building strategy of MIS base module based on BP neural network

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## ABSTRACT

To solve the problem of rising workload of development and maintenance caused by frequent changes in requirements during the development and operation of MIS, this paper proposes a new method for building MIS software base modules. Based on BP neural network algorithm to generate or reconstruct the database of MIS software infrastructure module, we try to combine C/S and B/S, and verify its rationality through system performance test. The results show that the response speed in the application environment of report data loading and exporting client operation is 95 times/second, the response speed of batch operation performance is 90 times/second, the paged display list is 88 times/second, and the system home page loading mode is 75 times/second, and the response speed all exceed the predicted 70 times/second. This paper better solves the problem of rapid construction or reconstruction of MIS software base modules, and can better cope with the frequent changes of MIS in the development and operation process.

## **KEYWORDS**

BP Neural Network; MIS Module; C/S mode; B/S mode

## **1. INTRODUCTION**

MIS system platform models are broadly divided into four types, namely host terminal model, file server model, client server model and Web browser server model. The host terminal mode has been phased out due to limited hardware choices and unguaranteed hardware investment. And the file server mode is only applicable to small-scale LANs, which creates network bottlenecks for a large number of users and large data volume, and cannot meet user requirements especially on the Internet [1-2]. Therefore, the main modern enterprise MIS system platform models considered are C/S and B/S models [3]. Currently, large online applications used by enterprises have shared programs that allow multiple users to access a common database simultaneously [4]. This requires simple, uniform, efficient, and secure access control of data information, especially in shared databases [5]. Large systems contain many relatively independent application subsystems used by different departments. Each subsystem uses different databases, and a large number of tables and views are built in each subsystem, which makes the authorization management of database resources very complex [6].

Generally, each application subsystem is developed in parallel by different groups of software developers, and the development progress of each subsystem is different. If each subsystem is developed separately using its own permission management system, it will lead to duplicate development of software and make the permission management scattered, which is not conducive to unified management and reduces the security of the system [7]. In order to improve the development efficiency of the whole system and realize the unified control of access rights for the whole system, the system access rights management can be considered to be extracted from each subsystem to form a security management system independent of each application subsystem. The access rights of each subsystem are centrally managed in this security management system [8]. Due to the change of personnel in the enterprise, promotions are frequent,

especially the larger the enterprise and the more departments, the more complex it is for the maintenance of enterprise users and user access to subsystem permissions [9]. Generally, the personnel management mechanism in an enterprise is managed in a top-to-bottom hierarchical manner. To ensure a high level of security, the management of user identities and permissions for each subsystem should be delegated to the head of the department using that subsystem. However, on the one hand, users are unlikely to have a deep knowledge of the application and the library tables and views used in the program and cannot directly maintain access control to specific data objects related to the database [10]. On the other hand, since no new library tables are created after the developer commits the application for this subsystem, this makes it possible to implement access control at the application level.

In this paper, we first clarify the BP neural network and its algorithm model, determine the technical means of research, and then generate the MIS database for the next stage of research. Then, we propose the strategy of combining C/S and B/S according to the algorithm model and MIS database, and verify the strategy and the rationality of the proposed algorithm through system performance testing one by one. The algorithm set in this paper helps to realize the MIS base module construction.

## 2. BP Neural Network

BP neural network is a method of artificial neural network, based on automatic learning, back propagation error using gradient descent optimization algorithm to regulate the loss of weights and subsequently adjust the output. Also BP neural network is known as a supervised learning algorithm because the goal of any supervised learning algorithm is to find a function where the best input gets the most correct output. Whereas the back propagation of BP neural network is to train a multi-level neural network so that proper learning and adjustment can be done internally so that any input can be mapped to the output and finally the minimum error is obtained.

The formula for the BP neural network weights is:

$$W_{uv}(n_0 + 1) = W_{uv}(n_0) + W_{uv} \quad (1)$$

Where the correction quantity of the weights its expression is:

$$V\omega_{jk} = \eta\delta_k^0 y_j = \eta(d_k - o_k) o_k (1 - o_k) y_j \quad (2)$$

$$V_{v_{ij}} = \eta\delta_j^y x_i = \eta\left(\sum_{k=1}^1 \delta_j^y w_{jk}\right) y_j (1 - y_j) x_j \quad (3)$$

## 2.1. MIS database generation

The database of the MIS is generated based on the above-mentioned object information. The steps of the generation algorithm of the database table corresponding to each object are as follows.

(1) Find the current object. The attributes of the current object and the association information between it and other objects, and declare the SQL for building the table in the MIS database.

(2) Generate the table name of the table building SQL based on the object identification in the object base information. In the corresponding field name, generate the type and width of the corresponding field based on the type and width of the attribute; generate the association between the foreign key of the current table and the primary key of the associated table based on the association information between the current object and other objects.

(3) Execute the table building SQL to generate the table corresponding to the current object in the MIS database.

## 3. Combination strategy of C/S mode and B/S mode

First of all, the developer can decide which sub-functions are suitable for C/S and which are suitable for B/S based on certain principles. sub-functions suitable for C/S should have high security requirements, strong interactivity, small usage scope, fixed location, and large amount of data processing. For example, the function of inputting and modifying personnel and labor data, and the function of inputting vouchers in the financial system, etc. The sub-functions suitable for B/S should have the following characteristics: wide range of use, flexible location, able to change frequently, different security requirements, etc. For example: the internal information release function, the financial analysis table query function, the query function in the decision support system, etc.

Compared with C/S and B/S alone, the advantages of this solution are: to ensure the security of important and sensitive data, especially to strengthen the control of database modification and new records; to effectively use the resources of the enterprise internal computer, not only to ensure the interactivity of complex functions, but also to ensure the ease of use and unity of general functions; system maintenance simple bureau network is more efficient.

In the coding design stage, the system developer selects different coding methods for sub-functions using different modes (e.g.; C/S can use VB programming environment, while B/S uses ASP method), and then compiles and generates different customer applications and Web service programs. In the installation and debugging phase, the specific client application will be installed on the client of the specific user, and the Web service program needs to be installed on the Web server, meanwhile, the user of the application must receive certain training. In the software maintenance phase, different maintenance methods should be adopted for different modes of sub-functions.

#### 4. System Performance Testing

System testing is the most important part of the project before going live and is a reflection of the effectiveness of the research content of this paper. In this paper, we focus on the performance testing of the system to check the high performance and robustness of the system. The list of testing environment of the system is shown in Table 1, in which Jmeter is chosen as the performance testing tool.

Table 1. Analysis of Test Environment

Operating environment	Components	Specific parameters	Number
Server	Operating system	Win2019	1
	Database	SQL Servwr2020	2
Operating environment	Linguistic environment	.Net Franme Work5.0	3
	The server	IIS7.0	4
Client running environment	Operating system	Win10	5
	Application environment	Chrom	6

This paper tests the system performance in the following aspects:

- (1) System home page loading module (including login).

(2) The pagination display list of pages with large data volume such as demographic information and project information.

(3) Batch operation performance.

(4) Report data loading and exporting.

The system performance test is shown in Figure 1. Under the algorithm of this paper, the system home page loading module, population information, paging display list, batch operation performance, report data loading and export loading response speed are maintained at 75 and above, the system running rate is good. Among them, the application environment response rate of report data loading and exporting client operation reaches 95 times/sec, and the operation response performance is the most good, which can provide users with the fastest information access service. The response speed of batch operation performance is 90 times/second, which is the second fastest response speed and can provide quick service for users' operation. The pagination display list is 88 times/second, and the system home page loading mode is 75 times/second, the response speed is more than the predicted 70 times/second, and the system performance is good.

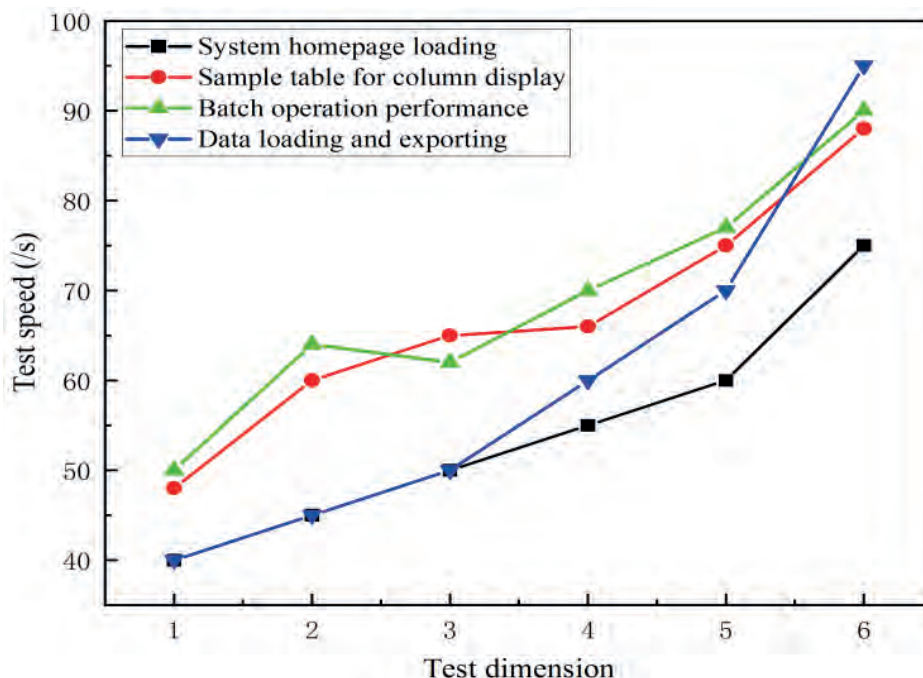


Figure 1. System Performance Test



## 5. CONCLUSION

In this paper, we construct the MIS algorithm model with BP neural network, by informatizing and managing the objects oriented by the basic information module in MIS and generating the corresponding database. At the same time, the interface layer, business logic layer and data access layer of MIS are decomposed into basic elements for management, and the corresponding software interaction interface, business logic and data access parts are generated by combining the object information. In the system performance test, the report data loading and exporting client-run application environment, the response speed reaches 95 times/second, and the batch operation performance response speed is 90 times/second, the system operation efficiency is good. The algorithm set up in this paper implements the MIS quick change database table, basic function module and software structure and version based on BP neural network.

## 6. FUNDING

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# Identification of typical movements of Chinese folk dances based on SVM model

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## ABSTRACT

In order to improve the recognition accuracy of typical dance movements, this paper designs a folk dance movement recognition system based on SVM model. In the design process, the global optimization-seeking technique of genetic algorithm is used to simplify the search process of kernel function parameters and optimal penalty factors in order to optimize the dance recognition parameters. A multi-kernel learning method is used to achieve the mutual complementation of multi-class features to improve the dance recognition capability of the SVM classifier. The simulation results show that the average recognition time of the system is 0.7s, and the recognition rate reaches more than 95%. It can be seen that the SVM model can optimize the recognition process of typical movements of Chinese folk dances.

## KEYWORDS

Dance movement recognition; SVM model; Global Optimization Techniques; Kernel function parameters

## 1. INTRODUCTION

Dance movement recognition is a specific branch in the field of movement recognition [1]. With the increasing demand for dance analysis, training and teaching, dance movement recognition is gradually gaining attention from companies and universities at home

and abroad. Dance movement recognition technology can effectively identify dance movements and evaluate them objectively to give suggestions for modification, which is an advanced training aid [2-3].

Currently, there is a growing research on related technologies in the field of movement recognition. For example, in the literature [4], the EMG signal was preprocessed using the dual-tree complex wavelet transform and time-domain features were extracted from the preprocessed data to improve the discrimination of features. The results show that the naïve Bayesian classifier has an average classification accuracy of 88.89% and a response time of 0.058 ms for the recognition of 15 different actions. A modeling and separation method for real-time SEMG signals was developed in the literature [5] based on oscillation theory. Based on this, a feature extraction method for SEMG signals was constructed and combined with an integrated learning method to achieve the recognition of real-time action intent. The literature [6] proposes a new edge analysis-assisted monitoring solution for monitoring several physical activities of people to identify physical deficiencies in their daily life and presents an application scenario to validate the idea of the proposed system in a medical setting. In summary, the developed action recognition techniques are susceptible to the constraints of the target detection results, which affect the accuracy of the pose estimation and the low efficiency of the algorithms.

Based on this, a folk dance movement recognition system based on SVM model is designed in this paper. In the design process, firstly, the global optimization-seeking technique of genetic algorithm is used to increase the number of iterations and fitness values in order to simplify the search process of kernel function parameters and optimal penalty factors to optimize the dance recognition parameters. Secondly, a multicore learning method is used to fuse the directional gradient histogram features and audio features to extract features from the denoised action data in order to improve the dance recognition capability of the SVM classifier. Finally, the actual recognition effect of the system designed in this paper is tested by experiments. The results demonstrate that the SVM model-based folk dance movement recognition system can achieve accurate and efficient recognition of dance movements.

## **2. SVM dance movement recognition system**

### **2.1. Optimize dance recognition parameters**

Support vector machine SVM is a classification algorithm based on statistical learning theory, which has unique advantages in solving small-sample, nonlinear and high-dimensional classification and recognition problems and overcomes the problem of overlearning to a large extent [7-8]. The key to dance movement recognition based on SVM models is to find the appropriate kernel function parameters and the optimal penalty factor.

In this paper, we will use the global optimization seeking technique of genetic algorithm to simplify the search process of kernel function parameters and optimal penalty factors. The steps of efficient global search for optimal search of genetic algorithm are as follows.

(1) Initialize the kernel function parameters and the optimal penalty factor, and binary encode the kernel function parameters and the penalty factor with the institution causing the initial dance action population.

(2) Decode the kernel function parameters and the optimal penalty factor and substitute them into the SVM algorithm function, use the classification recognition rate obtained from the dance action training as the fitness value, and make the genetic probability judgment by the fitness.

(3) The individuals with high fitness are selected in each generation of evolution by the fitness value of action individuals, and the crossover operation is performed on the parameters to construct new individuals according to the crossover probability.

(4) Perform mutation operation on parameters to construct new individuals by changing the genes of a locus in the string of population individuals according to the mutation probability.

(5) Perform the decoding and fitness value calculation, and perform the update of the optimal action individual by comparing the classification recognition rate between the parent and the offspring.

(6) Based on the set termination value, determine whether the number of iterations and the fitness value meet the requirements, and

if they do not meet the requirements, repeat steps (3)-(5). If the requirement is met, then step (7) is executed.

(7) The genetic end, the kernel function parameters and the optimal penalty factor are obtained.

## **2.2. Improved action recognition algorithm**

In the process of action recognition of folk dance, action feature extraction will have a large impact on the final recognition effect [9]. The original data cannot be directly put into the classifier for classification after denoising, but feature extraction is needed for the denoised action data. After extracting the feature values that can represent the dance movements, the SVM model is then used to identify the different dance movements [10-11].

The directional gradient histogram features and audio features are fused using a multicore learning method in order to achieve mutual complementation of multiple classes of features and improve the recognition ability of the SVM classifier. The most favorable attributes for classification are selected as features from the original action data, and a set of kernel functions are set for each feature separately, each with corresponding weights. Multiple kernel functions are combined together in a linear weighted manner to form a new kernel function, and the SVM classifier is used to perform multi-class classification. At this point, the empirical risk and generalization ability of the dance moves are almost unchanged.

## **3. Analysis of experimental results of motion recognition system**

In this paper, we design a folk dance movement recognition system based on SVM model and conduct experiments on folk dance movement recognition of this system to verify its recognition effect. The hardware used in this experiment is a Huawei cell phone that collects three-axis acceleration signal data under Android system, and collects and saves each dance movement data in real time during the experiment. A total of 115 samples were collected from 5 movements of 23 people respectively. The cell phone was set directly in front of the movers, and the movers were allowed to perform the data collection of 5 movements: kick back, split, lower back, split jump and big kick. The feature values are extracted for these 115 samples, which constitute a 115×40-dimensional feature matrix. The system

designed in this paper was compared and analyzed with the traditional dance movement recognition classification system, and the resulting recognition results are shown in Table 1.

**Table 1. Action Recognition Results**

Movement Classification	Average Recognition Rate/%		Identification Time/s	
	Traditional	SVM	Traditional	SVM
Kick to the Back of the Leg	81.36	96.97	2.0	0.05
Splits	90.1	98.5	3.6	0.08
Lower Back	73.6	97.5	4.6	1.9
Split Jump	85.6	92.3	4.2	0.83
Big Kicks	73.49	90.5	3.1	0.65

In terms of the correct recognition rate of dance movements, the recognition rate of the traditional dance movement recognition classification system is 80.83% on average, which only reaches the passing requirement of recognition. In contrast, the recognition rate of the SVM model-based folk dance movement recognition system is significantly improved, and the overall level reaches more than 95%, which can almost reach complete recognition. In terms of recognition time, compared with the traditional dance movement recognition classification system, the average recognition time of the SVM model-based folk dance movement recognition system is 0.7, which is nearly 5 times higher, and the recognition performance has been significantly improved.

#### 4. CONCLUSION

Based on SVM model, this paper designs a folk dance action recognition system based on SVM model from optimizing dance recognition parameters and improving action recognition algorithm, and verifies the recognition effect of the system in the process of practical application. Compared with the traditional dance action recognition classification system, the average recognition time of the folk dance action recognition system based on SVM model is 0.7, and the average recognition rate reaches more than 95%, which can almost reach the standard of complete recognition. This fully proves the correctness and operability of the method designed in this paper for Chinese folk dance movement recognition.

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# Analysis of financial management innovation strategies in the context of Internet finance

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## **ABSTRACT**

In order to study the financial management innovation strategy under Internet finance, this paper designs a financial management module for commercial banks based on Internet finance. Through the rapid development of the new form of Internet finance, the data of financial management in the operation of commercial banks are analyzed with commercial banks as the main research object of financial institutions, and corresponding innovative strategic measures are made. The simulation results show that the basic financial management parameter in this financial management module is 9.37, the comprehensive index parameter is 72.02%, and the evaluation index is increased by 5. It can be seen that the continuous innovation of financial management model is conducive to improving the management of commercial banks, reducing financial risks and promoting the continuous improvement of commercial banks' profits.

## **KEYWORDS**

Internet Finance; Innovative Strategies; Financial Management Parameters

## 1. INTRODUCTION

The development of commercial banks in the Internet financial era requires not only innovative service models, but also the improvement of their own management level and management professionalism [1-4]. First of all, traditional enterprise financial management is generally managed by financial personnel, so problems in financial management are generally the responsibility of financial managers. However, with the breakthrough of Internet technology, the connection between various departments in the enterprise has been strengthened, at which time the financial management responsibilities are apportioned to various departments. Second, the Internet has changed the specific methods of financial management, giving full play to the role of financial internal control, and after the financial management responsibilities are distributed to every corner of the enterprise, the corresponding financial management authority is also distributed to every department of the enterprise. In the previous financial management model, the output and feedback of financial information were slow, which did not bring the role of internal control of financial management into full play. Now the Internet-based financial management model has enhanced the rate of information transmission and feedback, which brings the internal control of financial management into full play. Finally, Internet technologies and devices have liberated the time and space for corporate financial management [5-8]. The development of the Internet has made the financial management of enterprises free from the constraints of time and space. Compared with the traditional way, in the Internet environment using Internet devices can work anywhere, no longer have to be limited to a certain time period and a certain area, breaking the restrictions of time and space.

The literature [9] emphasizes that the level of financial management has an important role in the enterprise, and it is an important reflection of the overall management quality of the enterprise in the development process. Among the influences on the level of financial management are also various, the main factors are: the inspection and supervision work carried out, the management system developed, and the management methods applied are imperfect. The above discussion enables to understand that the main purpose of financial management is to ensure the authenticity of the sources of

financial reporting information, the safety and profitability of funds, and the efficient and legal operation and production of the enterprise. The literature [10] suggests the key role of financial management, which is expressed as follows: first, to effectively monitor and evaluate the financial management of the enterprise, escort the enterprise to achieve the expected goals as soon as possible, and promote the healthy and rapid development of the enterprise operation. Second, to ensure that the enterprise can develop continuously and steadily in the course of operation. Absorb and increase the value of assets while carrying out daily business activities and various engineering projects. Third, to ensure the ownership of the enterprise. Accounting information should be true, complete, accurate and transparent, and financial data analysis should be objective, comprehensive and accurate.

In this paper, a financial management module for commercial banks based on the Internet context is designed. In the design process, through the new stage of rapid development of new forms of Internet finance, commercial banks as the main research object of financial institutions, analysis of financial management on the basis of the actual data of enterprises, the specific situation of financial management of banks was collected and studied. Theories of financial control, identification of financial risks, and financial management are understood in depth, respectively, and problems in financial management are studied based on the perspective of strategic development. In addition, five primary indicators and 15 secondary indicators are set to construct a judgment matrix for financial management evaluation, and the practical effect of this evaluation judgment matrix is confirmed by simulation results. It further illustrates that the financial management evaluation mechanism based on the Internet finance in the development process of commercial banks to promote the decision making business risks and financial risks in the financial operation and management, and effectively promote the scientific of commercial banks' decision making.

## **2. Financial Management Model**

### **2.1. Controlling financial management costs**

Actively change the management concept, the first need to do a good job of systematic control, both to focus on the importance of cost control, but also to strengthen the operating concept of cost control. On the basis of unified authority and responsibility, a more reliable cost control system must also be established, and the cost of material procurement and equipment maintenance must be controlled within the budget to ensure the operating objectives. Establish a financial evaluation system for major projects to prevent investment cost risks. A sound investment project evaluation system should be established, including a pre-assessment system in the early stage and an evaluation system in the later stage, so as to improve economic efficiency.

### **2.2. Innovative financial management model**

Optimize and improve the financial management model of commercial banks. The financial management of banks is related to the application of funds and the verification of assets. Banks should pay attention to financial management, change the traditional financial management concept, and optimize and improve the financial management model. Reform the traditional and backward financial management mode and discard the financial management mode that is not conducive to the development of banks. Improve the innovation ability of financial management mode, actively learn advanced financial management experience and methods, and create a new financial management model suitable for the development of banks.

Improve the organizational process system. In essence, the construction of the financial shared service center is to re-improve and adjust the organizational structure and financial processes. The repetitive and uniform operations in finance will end up in the shared center, converge to the shared center, and be handled by the shared center in a unified manner. This process requires setting up processes with unified standards and sound management systems to guarantee operation.

Construction of information system platform. The establishment of a financial shared service center and a centralized and perfect information system platform is a necessary condition. It provides a solid material guarantee for the construction of financial shared service center. To break through regional obstacles and provide more comprehensive services to its service recipients, the financial shared services realize organizational and process retransformation, and the establishment of a perfect information system is an objective requirement. Therefore, the Internet, cloud computing and other scientific technologies should be introduced into the financial management work, so as to improve the analysis and processing ability of financial data.

### **3. Financial Management Effectiveness Evaluation**

By calculating financial management control effectiveness evaluation indexes, internal management indexes, financial risk management indexes, and corporate business relationship indexes, and applying the judgment matrix of financial management evaluation, this paper designs a financial management module for commercial banks based on the Internet context. The method is deeply applied to the financial management work, as shown in Table 1.

**Table 1.** Judgment Matrix Of Financial Management Evaluation

Level Indicators	Secondary Indicators	Average
Basic Financial Management(A)	Effectiveness of post and organization setting (A1)	95.40
	Professional competence of financial personnel (A2)	86.67
	Participation of financial personnel in the enterprise decision-making process (A3)	53.33
	Accuracy and authenticity of accounting information (A4)	94.57
	Whether accounting materials are complete (A5)	96.1
Enterprise Business Relationship(B)	Relationship between enterprises and financial institutions (B6)	84.44
	Communication between enterprises and government (B7)	75.61
	Relationship between enterprises and other enterprises in the industry (B8)	79.45
Manage Financial Risk(C)	Effectiveness of managing financial risk (C9)	70
	Evaluate whether the financial risk system is scientific (C10)	71.23
Internal Management(D)	Whether the budget is reasonable and scientific (D11)	76.25
	Budget evaluation and implementation (D12)	64.62
	Implementation effect of internal control system (D13)	84.5
Effectiveness Of Financial Management(E)	Ability to manage funds (E14)	68
	Ability to allocate assets (E15)	56.17

In the above formula, Y represents the result of financial management evaluation score, which belongs to the first level of financial management evaluation indicators. n has the values of 1, 2, 3, 4, 5, b1 is the result of financial basic management indicators evaluation, b2 is the result of commercial bank business relationship indicators evaluation, b3 is the result of financial risk management indicators evaluation, b4 is the result of traditional financial control effectiveness indicators evaluation, and b5 is the result of financial control effectiveness indicators evaluation Results.

The financial management evaluation is calculated by combining the above formula. The evaluation of financial foundation management indicators is 9.37, the evaluation of commercial banking business relationship indicators is 15.64, the evaluation of financial risk

management indicators is 6.13, the evaluation of traditional financial control effectiveness indicators is 18.53, and the evaluation of financial control effectiveness indicators is 24.45. Combining the formulas, the financial management evaluation is synthesized as:  $Y=72.02$ .

From the specific scores of the above 10 indicators, we can see that the financial control effectiveness indicators in the financial management evaluation judgment matrix are 5.92% higher than the traditional financial management control effectiveness indicators. There are 5 financial control effectiveness indicators including primary indicators and 15 secondary indicators including evaluation and budget execution. Therefore, in financial management, allocation of assets is among the weakest links, and differences such as the ability to manage capital are relatively large. So they also belong to the weak links that should get attention in the financial management of commercial banks. For the above three links, commercial banks should pay more attention to them and clarify the key content of financial management work.

#### **4. CONCLUSION**

In this paper, from the perspective of financial management innovation strategy, a judgment matrix of financial management evaluation based on the background of Internet finance is designed, and the method is deeply applied to the financial management work of commercial banks. The evaluation of financial control effect index in the traditional financial management system is 18.53, and for the financial control effect index in the judgment matrix of financial management evaluation is 24.45, which improves the financial management system by 5.92%. Overall, the financial management innovation effect is still significant, indicating that the judgment matrix of financial management evaluation designed in this paper is conducive to the implementation of financial management innovation strategy in the context of Internet finance. The use of Internet technology changes the management mode of commercial banks, optimizes the management system, and further promotes the development and progress of commercial banks.

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# **Analysis of colleges and universities' discourse in students' thinking and political education based on artificial intelligence**

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## **ABSTRACT**

In order to construct the mainstream ideology of colleges and universities in students' thinking and political education, this paper combines artificial intelligence technology and designs an artificial intelligence-based thinking and political discourse analysis and evaluation system. Using artificial intelligence technology to innovate the discourse text, the discourse system of university's Civic Education is constructed, and the value judgment of the operation process of Civic Education discourse system is made, and the discourse evaluation and feedback mechanism is established. The simulation results showed that the online discourse utilization index of school A reached 92.3% and the discourse communication power reached 96.84%. It can be seen that the artificial intelligence technology has improved the spatial discourse power of college Civic Education and opened up the discourse education space.

## **KEYWORDS**

Artificial Intelligence Technology; Thinking political discourse analysis; Discourse utilization indicators

## **1. INTRODUCTION**

Ideological and political education discourse is a specific stage of historical development with the dual properties of educational attributes and ideology [1]. Under a certain ideological and political

education discourse field, educators can shape value education behaviors by means of communication and instill and persuade discourse to educated people according to certain educational laws and discourse norms. This type of discourse is a systematic generalization and theoretical enhancement of the practical discourse of ideological and political education, which has a crucial position in the discourse system of ideological and political education, stipulates the development direction of the whole discourse system, and is a form of discourse with the characteristics of advance prediction and professional rationality [2-3].

For a long time, teaching the discourse of socialist education is an activity of conducting ideological and political education by grasping the dynamics of modern political developments. For example, the literature [4] explores the role of public discourse in the changing process at a college, clarifying the importance of socialist political education. And it also analyzes the personal motivations and experiences of a foreign lecturer to improve the insight of ideological communication in educational institutions. Using the correlation method, the literature [5] identified the main features of the discourse process. The impact of ideological and political education discourse in terms of developer's ideology was determined by means of a questionnaire, which revealed the trend of time lapse. The literature [6] advanced the study of the politics of nutrition policy by analyzing political discourse. In the course of the study, the role of political discourse was emphasized, including a strong ideological discourse and the strategic deployment of economic actors. Thus, it can be seen that the current research on ideological and political education discourse is biased towards the political science perspective, and the interpretation of the discourse is not deep enough to grasp the relationship between the inheritance and development of the discourse.

Based on this, this paper designs an artificial intelligence-based discourse analysis and evaluation system for thinking and politics to enhance the discourse power of colleges and universities in students' thinking and politics education. In the process of design, firstly, the discourse text is innovatively innovated by using artificial intelligence technology, and the discourse system of college thinking and political education is constructed from exploring the laws of thinking and

political discourse, formulating the rules of thinking and political discourse, and opening up the channels of discourse. Secondly, value judgment is made on the operation process of the discourse system of Civic and Political Education, and discourse evaluation procedure and feedback mechanism are established. Finally, the feasibility of the system is verified through the analysis of simulation results, which demonstrates its superiority in the exercise of discourse and discourse rights in cyberspace. The artificial intelligence-based discourse analysis and evaluation system of thinking and politics improves the discourse regulation of universities in thinking and politics education, and can meet the needs of students' school management.

## **2. Intelligent Civic Discourse Evaluation System**

### **2.1. Innovative intelligent discourse system**

#### **2.1.1. Exploring the laws of Civic Discourse**

At present, teachers and students in the field of ideological and political education can produce discourse differences or even aphasia because students are ahead of educators in the use of the Internet, and they have mastered and are familiar with using the Internet as a medium for learning, communication and work [7]. However, educators have not yet been able to get out of the traditional language mode of civic education and cannot fully adapt to and integrate into this emerging network context. For this reason, college and university civic education educators should break the inherent discourse barriers, use artificial intelligence technology to innovate the discourse text in the discourse work of college and university civic education, further integrate the online discourse content beneficial to civic education, and realize the conversion of discourse so as to effectively disseminate the educational content.

#### **2.1.2. Developing rules for thinking and political discourse**

The original discourse rules are mostly based on the educator speaking and the educated listening to achieve the effect of education. To a certain extent, this ignores the acceptability of the educated. This kind of textual discourse rules of ideological education is not quite applicable to the interactive nature of the new era of network development, so the original discourse of ideological education

should be innovated [8-9]. Educators should grasp the interactive state of college students in terms of ideology, use intelligent information retrieval function to investigate and study various phenomena appearing in students, and integrate the information and give feedback to students. The dialogue between teachers and students on ideological and political education events is promoted and scientific and reasonable rules of discourse are formed.

### **2.1.3. Open channels of discourse**

The traditional discourse channels of college ideology education are facing the impact of information network media [10]. For this reason colleges and universities need to use natural language processing technology to promote the teaching reform of college Civic and Political Science theory courses, enhance the frequency of interaction of discourse, and carry out propaganda and education on ideological issues in class. By grasping the leadership of the discourse, it enables the teaching of ideological education discourse to form a process of repetitive transmission and gradually build a college ideological education discourse system adapted to the reality.

## **2.2. Establishing a discourse feedback mechanism**

In the context of the new era, it is obvious that only one-way communication of the discourse operation process of civic education is not enough, and it is also necessary to establish a feedback and evaluation mechanism to take care of the interaction and interaction between the two subjects of communication activities and improve the effectiveness of the discourse. The feedback mechanism of discourse evaluation based on artificial intelligence is a process in which the evaluator uses artificial intelligence technology to make value judgments on the operation process of the discourse system of civic education and its results according to certain evaluation standards and procedures, and gives feedback to the relevant subjects.

The process of establishing a feedback mechanism for evaluating the discourse of Civic Education is as follows.

(1) Unify evaluation standards. Establish discourse evaluation procedures and feedback procedures through artificial intelligence technology, and integrate the evaluation laws of Civic Education in

the process of program operation, so as to carry out objective evaluation and feedback with purpose.

(2) Construct the discourse system of Civic Education. The discourse system of Civic Education is divided into two parts: the constituent elements and the operation process, which are explored and interpreted in depth to reflect the inner mechanism of Civic Education discourse in a comprehensive manner.

(3) Establish a diversified evaluation mechanism. Through artificial intelligence technology to improve the availability of educational evaluation information, establish relevant supporting mechanisms, focus on highlighting the requirements for the expression and dissemination of the discourse of Civics and Political Science, and realize discourse evaluation. The process of establishment should follow the law of combining quantitative evaluation and qualitative evaluation to make a comprehensive evaluation of the teaching quality of Civics and Political Science teachers. Adding the feedback link of discourse evaluation in the operation of the discourse system of Civics education can promote the discourse system of Civics education to become an interlocking and circular system.

### **3. Analysis of Simulation Results of Discourse Evaluation**

Based on artificial intelligence technology, this paper combines intelligent discourse system and discourse feedback mechanism to analyze and construct the discourse power of colleges and universities in students' civic education, and designs an artificial intelligence-based civic discourse analysis and evaluation system. In order to verify the practical effect of the system, this paper conducts an experiment of analyzing the discourse power of Civic Education in School A and School B, where School A is the experimental sample and School B is the control sample. The effect of discourse power analysis of the experimental samples was tested by the indexes of discourse utilization power, students' discourse discrimination power and discourse analysis power. The test results are shown in Table 1.

**Table 1. Results of Discourse Detection**

Intelligent discourse system	School A	School B	Difference
Internet Discourse Utilization Indicators	92.3%	68.61%	+23.69%
Students' Discernment of Discourse	91.65%	73.98%	+17.67%
Discourse Analysis Power	93.44%	71.65%	+21.79%
Discourse Communication Power	96.84%	71.32%	+25.52%
Discourse Moderating Power	87.65%	64.54%	+23.11%
Discourse Impact	89.68%	59.12%	+30.56%

In terms of the discourse power in the cyberspace of university civic education, the index of online discourse utilization in School A is 92.3%, which is about 23.69% higher compared with 68.61% in School B. The discourse analysis power and discourse regulation power are 93.44% and 87.65%, respectively. It indicates that the artificial intelligence-based discourse analysis and evaluation system of Civics creates good conditions for universities to conduct ideological and political discourse education, and ensures the implementation of discourse evaluation and the overall improvement of Civics education quality.

In the exercise of discourse right, the discernment power of students in school B is 73.98%, while the discernment power of students in school A is as high as 91.65%, which can carry out effective communication dialogue of ideological discourse and is conducive to finding effective influence materials of ideological education. the discourse dissemination power of school A is 96.84% and the discourse influence is 89.68%, which indicates that the analysis and evaluation system of ideological discourse based on artificial intelligence In the process of improving the discourse communication power, the timeliness of the ideological information is preserved, which is conducive to the formation of the discourse of mainstream ideology in colleges and universities.

#### **4. CONCLUSION**

Based on artificial intelligence technology, this paper designs an artificial intelligence-based discourse analysis and evaluation system for civic discourse from the perspective of innovating an intelligent discourse system and establishing a discourse feedback mechanism. The effect of the system's discourse analysis is verified through the

analysis of simulation results. The simulation results show that: in terms of cyberspace discourse rights, the index of cyber discourse utilization in School A reached 92.3%. In terms of discourse rights exercise, the discourse communication power of School A is 96.84%, and the discourse discrimination power of students in School A is as high as 91.65%, which allows effective communication dialogues of civic discourse. The discourse analysis and evaluation system based on artificial intelligence can enrich the discourse content of Civic Education and improve the discourse occupation space of Civic Education in colleges and universities.

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# The application of frequency regulation technology in mechanical engineering transformation based on the background of big data

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## **ABSTRACT**

In order to reduce the energy consumption of mechanical engineering in the context of big data, this paper proposes a circulating water pump frequency conversion energy-saving control optimization method based on the frequency conversion regulation technology. First, according to the actual pump parameters requirements, set the energy-saving operation mode, adopted the way of pump unit consumption analysis, combined with the support of frequency conversion regulation technology to set the control parameters, and finally completed the control optimization study, and on this basis for the power consumption of the pump situation to carry out tests. The results show that: under the same flow rate, the control optimization method can make the pump frequency control save 34kw. In the mechanical engineering transformation, the energy-saving effect of frequency regulation technology is obvious and brings significant economic benefits.

## **KEYWORDS**

Big Data Background; Variable frequency regulation technology; Mechanical Engineering; Energy saving retrofit

## 1. INTRODUCTION

With the current situation of energy shortage and environmental pollution becoming more and more serious, the problem of high energy consumption and high emission of mechanical engineering is becoming more and more prominent, and the work of energy saving and emission reduction in mechanical engineering has become urgent [1-2]. At present, most of the products have generally adopted intelligent control, so that the performance of the products in terms of environmental adaptability and economy of use has been continuously improved [3-6]. Nowadays, more and more people are devoted to the energy-saving transformation of mechanical engineering, in which variable frequency regulation technology is being gradually applied to mechanical engineering transformation as an efficient mechanical drive technology [7-9].

Mechanical engineering, as the mainstay of the enterprise, has a very high daily consumption of resources, and its energy-saving renovation has been an inevitable trend of development. The literature [10] emphasizes that the amount of energy consumption generated during the operation of mechanical equipment continues to increase, exposing the enterprise to a large cost drain. From a long-term perspective, it is necessary to develop an energy-saving renovation program for mechanical engineering, and to adjust the working mode of mechanical equipment in order to drive the production efficiency. The literature [11] shows that with the rapid development of science and technology and the use of fully automated technology, the energy consumption of mechanical equipment increases greatly and the amount of wasted energy gradually increases. When machinery and equipment are in operation, only about 70% of the electrical energy is put into production, and the remaining 30% does not play a substantial role. There are still many problems related to energy saving work constraints, and the current and future development of industry cannot be targeted at mechanical engineering to transform into a new engineering discipline.

Therefore, in this paper, the circulating water pump frequency conversion method based on the background of big data is used to transform the electric motor of mechanical equipment, and the

automated frequency conversion speed regulation scheme is executed after starting the motor, which finally achieves the effect of controlling energy consumption. In order to verify that the method proposed in this paper has strong operability, simulation experiments are also designed. The results show that the speed control achieved by adding a frequency converter is more energy-efficient than the method of adjusting the flow by closing the valve. Based on the frequency conversion regulation technology can be effective for energy-saving transformation of mechanical engineering.

## **2. Energy-saving control optimization method after frequency conversion**

### **2.1. Set energy-saving operation mode**

The essence of variable frequency regulation technology is energy saving. When setting the pump frequency conversion energy-saving operation mode, a process similar to the rated value of the pump set is used to operate according to the actual pump parameter requirements. When the pump is in a lower load range, the actual operating process deviates from the rated operating value, resulting in a large amount of wasted energy. In this operation condition, the control turbine set is operated with smooth parameters in the low load interval to enhance the feed voltage of the pumps and control the pumps to divide the pressure to other parts to reduce the waste of energy. When the circulating water pump is in the high load interval, the hydraulic coupling in the pump set is linked with the motor to form a high speed operation state.

In order to ensure the operational safety of the process and maintain the normal operation of the motor, the control motor retains a certain margin, when the rated working condition within the circulating water pump is greater than the actual working condition. The coupler in the circulating water pump allocates to the motor capacity of the water pump group to become larger, driving the unused energy drive to other parts, forming a stable cycle process. Take the load rate of circulating water pump set at full load condition as the evaluation index, set a motor power factor, and reduce the power value of the pump set when the circulating water pump has a large output power margin, forming an energy-saving operation mode.

## 2.2. Control optimization in combination with frequency regulation technology

Take the obtained basic unit of single consumption as the control index and set the open-loop vector control mode to drive the pump operation mode. Turn on the control power, set the switch of the inverter bus of the pump to the side switch, set the control type of the control loop in the inverter control panel to the switch vector control. Set the speed ramp pump rotation rate to 20s, cut off the fast bypass, refer to the parameters of the motor nameplate, set the voltage value to 1.2 times of the rated voltage, and set the overspeed parameter to a fixed value. Under the control of the above parameters, combined with the theoretical support of big data, the parameters formed are shown in Table 1.

**Table 1.** Circulating water pump parameters

Serial number	Name	Set the value
1	Carrier frequency	520Hz
2	Time constant	0.024
3	Pulsation frequency	320Hz
4	Output calibration current	1.2A
5	Output calibration voltage	1.5V

Under the parameter control, for its actual optimization, after closing the power switch of the circulating water pump, set the output speed of the pump to 1/10 of the rated speed. after verifying the direction of the water circulation of the pump, check the energy consumption values of other switches, and gradually load the load to the rated, and finally complete the study of the optimization of energy-saving control.

## 3. Analysis of the effect of variable frequency regulation transformation

In order to verify the actual effect of the energy-saving control optimization method after the frequency conversion transformation of circulating water pumps based on big data, the power consumption of the 2 regulation methods of pump flow speed control and valve control were tested using frequency conversion regulation technology. The water pump uses a load specialized inverter, which is installed in the electrical control cabinet of each pump of the device transformer station and leads the control signal to the PLC control system in the central control room. The frequency regulation module of the pumps

is added to the PLC control system to realize the purpose of directly controlling and displaying the operation frequency of submersible pumps in the central control room.

The height difference from the regulating tank to the pretreatment tank is 10 m, and the height difference from the air flotation collector to the biofilter is 8 m. Considering the theoretical calculation results and the actual influencing factors, it was decided to adopt 2 energy-saving effect test programs. The 2 centrifugal pumps (P1A, P1B) in the regulating tank ensure that the sewage can be delivered to the 10m high pretreatment tank, and the speed range is set at 80%, 90% and 100% of the 3 control parameters, and the 2 pumps control parameters are the same. The speed range of 2 centrifugal pumps (P2A, P2B) in the air flotation basin was set at the 4 control parameters of 70%, 80%, 90%, and 100%, and the control parameters of the 2 pumps were the same. The test results are shown in Table 2.

**Table 2.** Pump frequency regulation test results

Test Items		Operating frequency			
		100%	90%	80%	70%
P1A	Current/A	81	69	53	-
	Power saving rate/%	0	14.8	34.6	-
P2A	Current/A	78	64	51	45
	Power saving rate/%	0	17.9	34.6	42.3
P1A+P1B	Flow/m <sup>3</sup>	996	906	750	-
P2A+P2B	Flow/m <sup>3</sup>	1015	983	830	74.2

The operation frequency of 2 circulating pumps (P1A, P1B) in the regulating tank is controlled at about 80%, and the flow rate can meet the conditions of use of the device, and the power saving rate is about 35%. Based on the full power of 42kw, the power saving is about 15kw. 2 centrifugal pumps (P2A, P2B) in the air floatation basin are controlled to run at about 70% frequency, and their flow rate can meet the conditions of use, the power saving rate is 42.3%. In the same flow rate, the frequency control saves 34kw compared with the valve control. 4 submersible circulating water pumps The four submersible circulating water pumps are more energy-saving than the previous method of adjusting the flow rate by closing the valve after adding the inverter and realizing the speed control. It can be seen that the transformation of mechanical engineering based on the

frequency conversion regulation technology in the context of big data in this paper has strong operability, which saves certain energy consumption and brings considerable economic benefits for mechanical engineering.

#### **4. CONCLUSION**

This paper proposes a circulating water pump frequency conversion energy-saving control optimization method from frequency conversion regulation technology in the context of big data, analyzes the circulating water pump energy-saving transformation effect, and compares the operation performance of multiple pumps running in parallel with different number of variable speed pumps. The results show that the frequency conversion control saves 34kw of power than the valve control, and its power saving rate is about 35%, and the energy saving effect is the most significant when all variable speed pumps are used in the full flow variation range. In the context of big data, the energy-saving control optimization method of frequency conversion proposed in this paper has a good energy-saving effect for mechanical engineering transformation, which reflects the economy of frequency regulation technology and plays a significant role in reducing energy consumption in mechanical engineering.

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# Artificial intelligence-based evaluation of the utility of the development of college curriculum thinking and political education

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## ABSTRACT

Under the background of artificial intelligence (AI) technology, the college civic education should enhance the knowledge and humanity of the curriculum, and tap the ideological value in the AI civic education curriculum from multiple perspectives. In this paper, the advantages, disadvantages, opportunities and challenges of AI integration in college students' thinking and political science education are explained in a comprehensive manner through SWOT analysis. The independent sample t-test is conducted to evaluate the AI's college course Civic Education through five dimensions. Among them, the investigational and control classes presented a difference of 0.05 ( $t=2.897$ ) in the dimension of home country sentiment, 0.05 ( $t=2.719$ ) in the dimension of scientific spirit, 0.01 ( $t=4.168$ ) in the dimension of professionalism, and 0.01 ( $t=4.168$ ) in the dimension of personal development. In the dimension of personal development, the investigational class and the control class showed a difference of 0.01 (4.109); in the dimension of thinking and political attitude, the experimental class and the control class showed a difference of 0.01 ( $t=3.749$ ), by comparing the differences, the students in the investigational class were slightly higher than the control class in reaching their thinking and political goals.



## KEYWORDS

Artificial Intelligence; Civic education for college students; SWOT Analysis; T-test

## 1. INTRODUCTION

The so-called "curriculum thinking politics" refers to the conscious, planned and purposeful design of teaching links and creation of educational scenarios in the teaching procedure of ideological and political education (IPE) subjects in various courses. In an indirect and implicit way, the moral norms, ideological understanding and political views recognized and advocated by the teaching subject are organically integrated into the teaching process [1-2]. The educational and teaching concept of transmitting IPE to the taught subject so that he or she can become a qualified person who meets the requirements of national development [3]. The teaching of professional courses provides a broad background of development and a deep disciplinary foundation for curriculum thinking and politics, and gives IPE a firm scientific force. The knowledge of ideology and political science and professional knowledge go in the similar course and form a synergistic effect is the core concept of curriculum thinking and politics [4-6].

Based on the background of AI technology, the purpose of the new era of college curriculum thinking and politics structure is to promote the operation of the essential commission of moral education, characterized by collaborative education, and the core issue is to adhere to the value leadership of college students. Literature [7] argues that improving the effectiveness of ideological and political theory courses has developed a hot issue of concern for many higher education institutions. Literature [8] proposed that practical teaching of ideological and political theory courses is a significant part of the teaching system of ideology and politics in colleges and universities, and is an effective carrier for cultivating students engaged in ideological and political work in colleges and universities. Literature [9] combined with AI technology and built an intelligent management system of IPE in colleges and universities based on AI, which supervises the classroom through intelligent identification of students' identity. In the literature [10], it is believed that the structure of

"macro-IPE" is formed by changing from "ideological and political curriculum" to "IPE of curriculum" with the whole staff as the main body, and the structure of "macro IPE" is realized. This has become an important direction of higher education teaching reform.

Based on the technical background of AI, this paper firstly applies the SWOT analysis method to the process of daily IPE of college students. The advantages and disadvantages, opportunities and challenges of integrating AI into the IPE of college students are analyzed, so as to strengthen the value guidance for the development of college students and enhance the scientific and effective integration of AI into the IPE of college students. Secondly, a system of AI ideological and political elements is constructed, which is divided into four primary indicators, namely, family sentiment, scientific spirit, professionalism and personal development, and 16 secondary indicators, such as "international vision" and "love for the Party and the country", and the meanings of each indicator are explained. Finally, the independent sample t-test was made through five dimensions of national sentiment, scientific spirit, professionalism, personal development and political thinking attitude to evaluate and analyze the political thinking education of AI college courses.

## **2. AI-based Civic Education for College Curriculum**

### **2.1. Analysis of the conditions of integrating AI into the IPE of college students**

SWOT is used to analyze the internal advantages and disadvantages, external opportunities and challenges of the current integration of AI into daily IPE of college students, and a comprehensive, systematic and accurate study is conducted. Then, combining with the examples of daily student work, targeted solutions are proposed, so as to strengthen the value guidance for college students' growth and enhance the scientific and effective integration of AI into daily IPE of college students.

#### **2.1.1. Analysis of the advantages and disadvantages of integrating AI into the IPE of college students**

##### **(1) Advantage Analysis**

AI is applied to education industry, using big data analysis and algorithms to carve out a map of college students' learning preferences and study habits, so it can realize accurate teaching and counseling. Currently, college counselors are the core members of college students' thinking and political education, and they are the organizers, implementers and instructors of students' work in higher education. However, at present, college counselors generally become "clerks" of various departments because their responsibilities are not clear. It is a common phenomenon in many colleges and universities that counselors are inefficient and repetitive in handling various daily tasks that can be changed by AI, but they do not have the energy to do a good job in student work and their own career planning and development, which is not conducive to the stable development of IPE work in colleges and universities. This is a mutual phenomenon in many colleges and universities, which is not conducive to the stable development of IPE work in colleges and universities. The AI technology can help reduce the burden of counselors and give them more energy to do the work of IPE and value leadership, which will certainly significantly expand the effectiveness of IPE work of college students.

## (2) Disadvantage Analysis

Counselors are the backbone of college students' IPE. The work responsibilities of the counselors cover nine aspects, including ideological and theoretical education and value guidance, the structure of the Party and the League and the class, the structure of the style of study, the management of students' daily affairs, mental health education and consulting work, online IPE, campus crisis response, career planning and employment and entrepreneurship guidance, and theoretical and practical research. Each work needs different models and algorithms to construct. The development of AI technology is far faster than the reform and development in the field of education, which may lead to mismatches in the process of integrating AI into college students' IPE, and there will be many technical difficulties to overcome. AI has advantages in helping college students with repetitive and simple operations of IPE. Every student is an independent individual, and each student's IPE has its own characteristics. The complexity of IPE is reflected in that it is not a simple formula input. In many cases, it requires in-depth heart to

heart talk between ideological and political educators and educatees to generate emotional resonance.

### **2.1.2. Analysis of the Opportunities and Challenges of Integrating AI into the IPE of College Students**

#### **(1) Opportunity Analysis**

The opportunity of integrating AI into the IPE of college students is reflected in the strong support of national policies. The State Council issued and implemented the Notice on the Issuance of the Development Plan of a New Generation of AI on July 8, 2017, which provides a solid policy guarantee for the integration of AI into the IPE of college students. With the increasing maturity of computer technology, AI technology has mature technical guarantee, both in terms of hardware and software. Nowadays, AI has also been widely used in various fields of life, such as the online customer service on many websites is a primary AI, i.e. an automatic responder, which meets the needs of users. These mature AI technologies also provide stable technical support for the better integration of AI into the IPE of college students.

#### **(2) Challenge Analysis**

Dialectics tells us that there are two sides to everything, and AI, as a new thing, is a "double-edged sword" with certain disadvantages. In the report "AI in Education: Challenges and Opportunities for Sustainable Development" published by UNESCO, it is mentioned that the market for AI in education will grow rapidly and AI will have a direct impact on learning styles, students' abilities and teachers' development, while also posing new challenges for educational equity, educational decision-making, educational policies, privacy and ethics. China's National Professional Committee on Governance of New Generation AI released the Code of Ethics for New Generation AI on September 25, 2021, with the aim of integrating ethics into the whole life cycle of AI and providing relevant ethical guidelines for natural persons, legal entities and other related institutions, etc. engaged in AI-related activities. While we vigorously study how to integrate AI into the IPE of college students, we should also anticipate the potential challenges, make appropriate responses, not be afraid of them, and turn them into motivation for continuous improvement. The principle of the main body of IPE refers to the fact that ideological and

political educators should fully respect the main position of the education subjects and pay attention to mobilizing their self-education in order to achieve the IPE goals when carrying out education activities. Among them, the subjective initiative of the educated is an extremely important factor that affects the effect of IPE. The technology of AI may be detrimental to the subjective initiative of college students and lead them to rely on AI.

## 2.2. AI thinking element system structure

This study analyzes the frequency of keywords of college curriculum thinking education from the Internet based on AI big data technology. The frequencies in descending order are "values", "intelligence", "personalization", "science and technology", "creativity", "humanistic", "responsibility", "active", "active", "outlook on life", "worldview", "patriotic", "work ethic", "labor", "critical", "practical", "self-confidence". It can be seen that in addition to focusing on students' mastery of scientific knowledge, the Civic Education of college curriculum under AI should also focus on ideology and morality, and the cultivation of values. In order to make the system of thinking and political elements of AI more comprehensive and objective, this study combines literature and theoretical thinking, and tries to reflect the system of thinking and political elements of AI as comprehensively as possible. From the perspective of students, the system is initially divided into four primary indicators, such as national sentiment, scientific spirit, professionalism and personal development, and 16 secondary indicators, such as "international vision" and "love for the Party and the country". As shown in Table 1.

**Table 1.** A system of thinking elements under AI

Tier 1 indicators	Secondary indicators	Indicator Meaning
The feeling of family and country	International Perspectives	To pay attention to cutting-edge knowledge in the field of AI, actively participate in international exchanges and broaden their knowledge horizons; to have a proper international perspective, understand world history and respect the diversity of world cultures
	Love of Party and Country	Embrace the leadership of the Communist Party of China, love the motherland and uphold national unity; internalise the feelings of love for the Party, love for the

		country and love for socialism; develop the concept of national interests above all else.
	National Spirit	Respect ethnic differences, maintain ethnic unity and social stability.
	Cultural Identity	Respect the excellent traditional culture of the Chinese nation, enhance cultural confidence, actively promote excellent traditional culture and establish a concept of cultural self-awareness.
Scientific spirit	Innovative thinking	Open-minded, with a sense of autonomy and social innovation, insistence on innovation and courage to innovate.
	Critical questioning	Dare to question and inquire, seek truth and authenticity, learn to look at issues dialectically, learn to think independently, not follow the crowd, and build a strong sense of questioning.
	Responsibility	Enhance the heart of responsibility and be courageous as having the spirit of dedication.
	Creativity	Good hands-on practical skills, with the ability to conduct scientific research in AI and to innovate practical works from an engineering and technical perspective.
Professionalism	Physical and mental health	A love of life, a love of sport, a cheerful personality, a correct approach to frustration and difficulties in life and good interpersonal relationships.
	Quality of Will	Develop good character and moral habits, establish a correct outlook on the three concepts, enhance personal moral qualities, cherish the life you have and be grateful.
	Academic Integrity	Respect academic achievements, respect scientific research, abide by academic norms, improve academic personality, abandon academic misconduct, and strive to become practitioners of good academic ethics.
	Professional ethics	Form a good professional ethos, maintain excellent professional style, love their work and have the quality of cultivation to serve the public and dedicate themselves to society.
Personal	Emotion	Learn to stabilise your emotions and be

Development	Management	able to face life's difficulties with a positive mindset and be able to maintain a good emotional state.
	Communication	Good at communicating with people, learning to complement each other's strengths and having strong communication and cooperation skills.
	Reflection	The ability to be reflective and self-critical, learning to identify their own problems and to develop themselves continuously.
	Lifelong Learning	Establish the concept of lifelong learning, enjoy learning, constantly update the knowledge structure and take the initiative to study the knowledge in the field of AI.

### 3. Evaluation Analysis of Civic Education of AI College Curriculum

The implementation of a blended teaching model for AI Civics courses has a beneficial effect on the improvement of students' moral education skills. An independent sample t-test was conducted on the five dimensions of family and country sentiment, scientific spirit, professionalism, personal development, and thinking and political attitudes. From Table 2, it can be seen that: the experimental and control classes showed a difference of 0.05 ( $t=2.897$ ) in the dimension of family and country sentiment. Comparing the differences, it can be seen that the post-test mean of the family sentiment dimension in the control class was 19.46, which was slightly lower than the post-test mean of the experimental class of 21.96. In the scientific spirit dimension, the experimental and control classes showed a difference of 0.05 ( $t=2.719$ ). The difference between the experimental and control classes was 0.01 ( $t=4.168$ ) for the professionalism dimension. The difference between the experimental and control classes was 0.01 ( $t=4.109$ ) for the personal development dimension. Comparing the differences, it can be seen that the posttest mean of the personal development dimension was 30.24 in the control class, which was lower than the posttest mean of 33.49 in the experimental class. in the Civic Attitude dimension, the experimental and control classes showed a difference of 0.01 ( $t=3.749$ ). Comparing the differences, it can be seen that the posttest mean of the personal development dimension was 8.98 in the control

class, which was lower than the posttest mean of 10.94 in the experimental class.

**Table 2.** Five dimensional independent sample t-test

Dimensionality	Classes	Number of people	Average value	Standard deviation	Standard error of the mean	t
The feeling of family and country	Experimental Classes	45	21.96	0.942	0.145	2.897
	Control Classes	40	19.46	1.487	0.316	
Scientific spirit	Experimental Classes	45	25.99	1.648	0.249	2.719
	Control Classes	40	23.47	2.356	0.459	
Professionalism	Experimental Classes	45	34.96	1.356	0.269	4.168
	Control Classes	40	31.94	2.647	0.459	
Personal Development	Experimental Classes	45	33.49	1.465	0.249	4.109
	Control Classes	40	30.24	2.769	0.517	
Thinking attitude	Experimental Classes	45	10.94	0.579	0.155	3.749
	Control Classes	40	8.98	1.304	0.249	

#### 4. CONCLUSION

Civic education of college courses of AI should not only pay attention to the innovation of scientific and technological activities and inspire students' scientific thinking, but also to cultivate students' professional ethical awareness and the spirit of serving the people. Civic education of college courses based on AI needs to bring into play the characteristics and advantages of professional courses from the perspective of value leadership. Through the evaluation and analysis of the Civic and Political Education of college courses based on AI, from the dimension of family sentiment, the experimental class and the control class present a difference of 0.05 ( $t=2.897$ ), and the mean value of the post-test of the control class is slightly lower than the mean value of the post-test of the experimental class 2.5; in the dimension of scientific spirit, the experimental class and the control class present a difference of 0.05 ( $t=2.719$ ), and the mean value of



the post-test of the control class is slightly lower than the mean value of the In the dimension of professionalism, the experimental class and the control class showed a difference of 0.01 ( $t=4.168$ ), and the posttest mean of the control class was slightly lower than that of the experimental class 3.02; in the dimension of personal development, the experimental class and the control class showed a difference of 0.01 (4.109), and the posttest mean of the control class was slightly lower than that of the experimental class 3.25; in the dimension of thinking and political attitude, the experimental class and the control class showed a difference of 0.01. In the dimension of thinking and political attitude, the experimental class and the control class showed a difference of 0.01 ( $t=3.749$ ), and the posttest mean of the control class was slightly lower than that of the experimental class by 1.96. The comprehensive analysis shows that the students in the experimental class were slightly higher than the control class in reaching their thinking and political goals. In particular, the dimensions of professionalism, personal development and thinking and political attitudes showed higher significant levels, probably because these three dimensions are related to students' real life, more deeply experienced and more effective.

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## The application of big data technology in the cost management of university engineering construction period

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## **ABSTRACT**

In order to make the college construction funds play the most effective role, reduce the construction cost, and minimize the consumption of human and material resources to achieve high social benefits, we must pay attention to the control of construction cost in college construction projects. In this paper, the current problems of cost management in university construction are analyzed in depth. And on this basis, based on the big data technology, the fuzzy mathematical method is used to estimate the engineering cost control in the design stage and implementation stage of college engineering construction. The experiment collects a total of 10 characteristic factors and adopts 10 groups of college plant and storm playground with similar characteristics as examples for cost estimation. According to the 10 engineering characteristic factors, the highest cost estimation is 1310 Yuan/m<sup>2</sup> for the number of floors 2, eave height 9.8 meters, column distance 6.9 meters, span 11.7 meters, floor area 3140 square meters, shear wall structure form, aluminum alloy doors and windows, face brick decoration standard, block wall material, and brick strip base surface.

## **KEYWORDS**

Big Data Technology; Higher Education; Engineering Cost Management; Cost estimate

## **1. INTRODUCTION**

Cost control of college engineering construction projects is a very important task in college infrastructure management [1]. In the whole process of implementing college construction projects, the preliminary cost control has a great influence on the overall cost [2-3]. How to determine and control the project cost in project management, use construction funds reasonably and efficiently, avoid losses and wastes, and reduce the project operation cost has become an important task of the current engineering construction work in universities [4-6]. The literature [7] analyzed the problems in cost control based on the management of university infrastructure construction, from the actual engineering cases in each stage of project, design, bidding to construction. The literature [8] argued that

cost control runs through the whole process of university infrastructure projects, which is a dynamic management process. The literature [9] discussed the improvement strategies of engineering construction cost in colleges and universities from the aspects of basic management system, internal control system of decision-making, survey and design control system, management system of budget estimate and project cost control, supervision and accountability system, etc.

This paper firstly analyzes the current situation of cost management of college engineering construction, which is mainly manifested by too much administrative intervention, unreasonable institutional configuration, insufficient professional staffing and low management level; secondly, the implementation of the pricing model of college construction projects is not transparent enough and the information management of engineering cost is relatively backward. In view of this, based on the big data technology, the fuzzy mathematical method is used to describe the known similar projects, so as to estimate the cost of college engineering construction.

## **2. Analysis of the current situation of engineering construction cost management in colleges and universities**

### **2.1. Lower management level**

(1) The competent departments of colleges and universities and school leaders have little awareness of the economic benefits of engineering construction cost investment fund management. The focus of school management is teaching and scientific research, so the leaders are more concerned about the progress of the project, completion date and whether students can enroll on time, but neglect the control of the whole process of project cost, which affects the management input of project management personnel for cost control.

(2) Lack of communication and coordination among functional departments. Due to the lack of communication and mutual cooperation among departments of infrastructure construction, national capital, finance and faculties, there are often incomplete functions of construction projects, too many process changes and cost costs far exceeding contract costs.

(3) Due to the tight schedule and heavy tasks of the capital construction projects of colleges and universities, there are phenomena of one person working in multiple posts and overload. The instability of the managerial team also causes the lack of institutional constraints on their management behavior, and it is also difficult to effectively supervise the quality of engineering projects and the effect of investment. For example, on-site construction management personnel have to inspect the site, make on-site visas for concealed works, audit the project cost, and keep the relevant information of the project. In the case of personnel overload and unclear job responsibilities, job functions cross, infrastructure project management once the problem of which link, the management personnel are prone to tug of war between each other, the phenomenon of shifting the blame to each other, so that the work of cost control is difficult to continue. In addition, the lack of knowledge of engineering cost management, the lack of professional quality and the lack of legal awareness of the managers in the actual work will also cause the defects of cost management.

## **2.2. Lack of transparency in the implementation of pricing models for university construction projects**

Although the construction of Chinese laws and regulations on regulating the behavior of all parties in the construction market is being gradually strengthened, the reform is not yet in place due to certain defects in the current pricing model, and it is not in place in the process of cost management implementation. Under the current engineering pricing model, the engineering costing personnel mainly calculate the quantity of works according to the engineering drawings and derive the unit price and other data, so as to finally find out the project cost, but this pricing model is not conducive to the transformation of government functions and the competition of micro-entities. From the above government functions, if the government pricing color is too strong, then it will inevitably cause the government to control the engineering cost and interference. These factors can be reflected as the excessive use of government power under the market economy. From the perspective of competition of micro subjects, enterprises should be the main body of market competition. If the enterprise is not the main body of product pricing, the system related to the pricing of engineering cost according to the qualification level of

the enterprise and the average labor level of the society will seriously hinder the enterprise to participate in the real market competition environment. Enterprises thus lose their creativity and vitality, and eventually limit their development in the market economy. Under this pricing model, there are sometimes illegal behaviors such as corruption of university leaders, project bid-rigging, and unqualified project quality.

### **2.3. Engineering cost information management is backward**

With the application of information technology in various industries, the reform of engineering cost management continues to deepen. The systems and businesses of engineering cost are becoming more and more complex, and the traditional manual management can no longer meet the current needs, which greatly limits the development of engineering cost. In terms of engineering cost information management, the current engineering cost coding and classification are complicated due to the process, so engineering cost personnel have to repeat the paper operation every time, which is easy to cause errors in the data and cannot be improved in efficiency. In addition, if the needs of information system developers and related personnel cannot be communicated in a timely manner, the advantages of information resource sharing cannot be achieved in this environment, not to mention the efficiency of cost management. The development of the construction of engineering cost information network is also relatively slow. The current engineering cost is mainly for professional consulting companies to investigate the use of the menu of business is very limited, mainly company introduction, bidding documents, quotations, cost management system and other superficial information, but also the lack of collation and analysis of this information.

### **3. Estimation of engineering construction cost of universities based on big data technology**

It is difficult to estimate the cost of a project accurately, especially in the early stage of construction. In the office and teaching buildings of university buildings, most of them are high-rise buildings. Generally speaking, for investors need to accurately estimate how to save cost and reduce risk for such projects with large investment and long construction period. Therefore, we are considering to choose the

buildings such as internship plants and storm playgrounds of universities for example based on big data technology. The characteristic factors considered are: number of floors, eave height, column spacing, span, total building area, structural form, door and window type, decoration standard, wall material and floor type, total 10 characteristic factors, among which the first 5 are quantitative factors and the last 5 are qualitative factors.

The basic idea of the estimation method is that the fuzzy mathematical method based on big data technology describes the known similar projects, and the fuzzy known project feature values are used as the input values of the network after information diffusion processing according to the requirements. The cost per square meter of the known project is used as the target vector of the network, and then the network is trained to estimate the cost per square meter of the estimated project by inputting the characteristic values of the estimated project into the trained network. Using the square meter cost of the characteristic factors as the network output and the rest as the network input, 10 groups of college plants and stormy playgrounds with similar characteristics are collected as examples, and the final budget cost is derived based on the 10 engineering characteristics.

From Table 1, it can be seen that the highest cost is estimated to be RMB 1,310/m<sup>2</sup> for a 2-story building with an eave height of 9.8 m, a column spacing of 6.9 m, a span of 11.7 m, a floor area of 3,140 m<sup>2</sup>, a structural form of shear wall, a door and window type with mainly wooden doors and aluminum alloy, a decorative standard of face brick, a wall material of block, and a brick strip base surface. In addition, the lowest cost is estimated to be RMB 512/sq.m. for 1-story, eave height of 5.8m, column spacing of 5.5m, span of 11.7m, floor area of 1491 sq.m., structural form of brick and concrete, door and window type mainly of security door plastic, decoration standard of clear water wall, wall material is light partition wall, and reinforced alkaline pile floor.



**Table 1.** Estimated construction costs based on big data technology for 10 characteristic factors

Group	The layer number	Eaves high (m)	Column spacing (m)	Span (m)	Surface area (m <sup>2</sup> )	Structural forms	Window and door types	Fitting standards	Wall	Ground	Cost estimate (Yuan/m <sup>2</sup> )
Group 1	1	5.4	4.1	12.1	1004	Framework	Wooden door	Brushed stone	Hollow bricks	Brick bar base	704
Group 2	1	5.3	5.8	7.1	2349	Brick	Wooden door	Face tiles	Hollow bricks	Rebar	649
Group 3	1	4.3	4.8	14.6	1967	Masonry	Aluminium	Coatings	Blocks	Sheet raft	1047
Group 4	2	9.5	6.1	13.1	1264	Brick	Wooden door	Coatings	Blocks	Rebar	597
Group 5	3	14.1	7.3	10.1	4710	Masonry	Anti-theft doors	Coatings	Hollow bricks	Sheet raft	1197
Group 6	1	4.2	5.7	8.4	2619	Shearwalls	Wooden door	Clearwater Wall	Blocks	Sheet raft	906
Group 7	2	9.3	4.9	9.4	3487	Masonry	Anti-theft doors	Coatings	Blocks	Rebar	994
Group 8	1	5.8	5.5	11.7	1491	Brick	Anti-theft doors	Clearwater Wall	Blocks	Rebar	512
Group 9	1	4.9	5.7	12.7	2850	Framework	Aluminium	Brushed stone	Hollow bricks	Brick bar base	797
Group 10	2	9.8	6.9	11.7	3140	Shearwalls	Aluminium	Face tiles	Blocks	Brick bar base	1310

#### 4. CONCLUSION

The importance of construction project cost estimation in the construction of university engineering projects has been increasingly emphasized by all parties involved in construction activities. In this paper, based on big data technology to estimate the cost of college construction, engineering characteristics are used for the idea of estimation, and the final budget cost is derived based on 10

engineering characteristics factors. Namely, the highest cost is estimated at 2 storeys, eave height of 9.8 meters, column spacing of 6.9 meters, span of 11.7 meters, floor area of 3140 square meters, shear wall structure form, wooden doors and aluminum alloy doors and windows, face brick decoration, block wall material, and brick strip base surface of 1310 yuan/square meter. In addition, the lowest cost is estimated at 1 story, eave height of 5.8 m, column spacing of 5.5 m, span of 11.7 m, floor area of 1491 m<sup>2</sup>, brick and concrete structure, security doors and windows, clear water wall decoration, lightweight partition wall material, and reinforced alkaline pile floor at RMB 512/m<sup>2</sup>. The estimation method designed in this paper finally realizes the construction cost estimation of non-deterministic projects of universities based on big data technology.

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# Research on the reform of teaching mode in diversified music environment based on big data cloud platform

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## **ABSTRACT**

Under the influence of diversified music environment, the existing music teaching mode needs to be innovated urgently. This paper creatively proposes an intelligent music operation and maintenance system based on the big data cloud platform technology. In order to clarify the reform ideas, the classroom perception of college music majors is used as a research model to analyze the reform and innovation landing point. According to the teaching records of big data music cloud platform, the average score of teachers' perception is 7, and the average score of students' perception is 5.2. In terms of the percentage of difficulty distribution, vocal courses accounted for 35%, foreign music history for 20%, introduction to art for 18%, Chinese music history for 17%, and basic music theory for 10%. This shows that music teaching reform should focus on student-level access to improve students' music appreciation and evaluation skills.

## **KEYWORDS**

Big Data Cloud Platform; Diverse musical environment; Music Cloud Platform; Music Class

## **1. INTRODUCTION**

Music, as an important part of quality education, is an important subject in compulsory education and college education, and permeates many multicultural concepts in teaching [1].

Multiculturalism started late in music teaching in Chinese colleges and universities, and although the concepts were permeated, the development of students' creativity and comprehensive literacy was neglected [2]. With the high development of society, music teaching in colleges and universities should also change its concept, carry out effective reforms, and focus on cultivating students' literacy. How to carry out music teaching in multiculturalism is a question that college teachers need to think deeply about [3]. Multiculturalism is the product of the intermingling of world cultures, and with the increasing world communication, people's national consciousness has been developed, and multiculturalism has received great attention in education [4]. From the literal interpretation, multiculturalism is the exchange and collision between different cultures. In the face of a complex and changing environment, national cultures seek development in the midst of impact, which in turn also generates new cultures. In such a social context, national cultures have proposed to build multiculturalism in order to adapt to the development of society, which is determined by national conditions and social environment. The concept of multiculturalism has promoted the development and progress of society and has become an important phenomenon in the intermingling of national cultures [5].

Music has its distinctive regular characteristics, and from this point of view music diversity education is undoubtedly smooth. Scholars and researchers concerned have conducted in-depth studies on multicultural music and have extended it to teaching with fruitful results [6]. In addition to its own regularity, music should also have a global character. Chinese music art has a long history of development and has very rich musical resources, and the continuous integration of these musical resources has enabled the formation of musical culture [7]. In the context of the current global integration development, the integration and exchange of various countries in various aspects are becoming closer and closer. One of the more important aspects is the exchange of musical cultures, which has led to the formation of a diverse and integrated musical culture [8]. In the context of the fusion of musical cultures, the musical arts can be made more colorful. It plays an important role in promoting students' understanding of their own culture, as well as maintaining respect for other cultures and a serious attitude of learning.

This paper analyzes the problems of music teaching at the present stage, and constructs a big data cloud platform music intelligent operation and maintenance system to guide teachers' music classroom education. At the same time, music students with profound music literacy in art colleges and universities are selected as the research samples, and the evaluation perceptions of teachers and students on the classroom are analyzed according to the teaching records of the Big Data Music Cloud Platform. The difficulties of music teaching in colleges and universities are further analyzed to find out the focus of reform, so as to propose strategies for music teaching innovation. This paper uses music students' teaching reform as a model to provide some reference for music and non-music teachers and students' music classroom teaching reform.

## **2. Music teaching mode reform ideas**

### **2.1. Analysis of the current situation of music teaching**

Teaching under the concept of multiculturalism provides equal opportunities to enjoy music education regardless of color, gender, or religious beliefs. In music teaching, although the progress of spiritual civilization has promoted the development of multiculturalism in colleges and universities, there are still many problems: first, neglecting multicultural teaching. In the actual music classroom, teachers focus more on teaching professional theoretical knowledge, but neglect the study of different ethnic cultures, which limits the scope of students' knowledge and creative talents [9]. Teaching under the concept of multicultural music education should be based on cultivating students' appreciation and aesthetic skills. The concept of teachers focusing only on teaching materials and taking grades as the standard will hinder the development of multicultural music teaching and is not conducive to the overall development of music. Second, the content of teaching materials needs to be improved. Throughout today's music teaching materials, there is a single system, a single teaching method, a lack of extra-curricular extension and multicultural supplementation, and no effective measures to carry out training for students [10]. China is a country composed of 56 ethnic groups, and numerous excellent works with great ethnic characteristics have emerged from ethnic development, such as Xinjiang's "By the Ili River" and Tibetan's "Dottalma". However, few

teachers really pay attention to the expression of ethnic music, which in turn inhibits the development of ethnic music. Third, the concept of global development is lacking. In the process of continuous integration of the world economy, the intermingling of cultures cannot be ignored. Music knows no boundaries, and good music can convey emotions and can resonate with people. However, the introduction of international music such as pop blues and jazz in Chinese music teaching has obvious shortcomings and cannot meet the needs of today's diversified music. In conclusion, music teaching must change the single teaching status quo and encourage the development of multicultural music in order to cultivate students' musical literacy.

## **2.2. Big data cloud platform music intelligent operation and maintenance system**

(1) Establishing a multi-source integrated data transmission mechanism

The intelligent operation and maintenance system is huge and complex, which is jointly operated by multiple systems of multiple majors (each major forms its own system to constitute independent data sources) and plays a strong supporting role for music teaching work. The intelligent operation and maintenance system is based on safe and reliable data collection and control standards and technologies, realizing the safe transmission and acquisition of multi-source data of each profession and transmitting to the big data cloud platform through the distributed data bus.

(2) Establishing an open, shared, secure and stable big data cloud platform

The platform adopts distributed computing architecture and relies on cloud storage, virtualization and big data technology to realize real-time processing and deep mining of massive data for music data collection and operation and maintenance. The platform makes comprehensive use of the existing hardware resources, which can effectively save hardware storage space and improve data processing efficiency. As the platform support of the intelligent music system operation and maintenance system, the big data cloud platform plays the role of bearing down and starting up. It receives a large amount of collected data from the equipment layer for integration and analysis, and provides computing, storage, network

resources and big data mining and analysis capability support for the upper layer, so that information resources can be fully shared and integrated.

### **2.3. Teaching content reform based on cultural diversity**

In the context of the new era, students' learning should have a new spiritual outlook. Music not only enables students to develop a healthy body and mind, but also serves as a bridge to the world of communication. Through the expression and learning of music, it can purify students' minds and form a new humanistic spirit. Music culture is attached to the whole process of students' music learning, and it not only brings students a new realm of musical thought, but also forms an important musical atmosphere in which they can feel the richness of teachers' teaching contents while conducting different musical and cultural forms and fusion learning process. The teacher's teaching mode should include the content of the world music curriculum, or the appreciation of African, classical, European and American music in the classroom, so that students can feel the difference between Chinese and foreign cultures and the different morals of musical expression.

### **2.4. Lifelike teaching model into the classroom**

Due to the regional influence of diverse music teaching, the content of Chinese teaching is infiltrated by Western culture, making students feel jumpy in their thinking when learning. In order to better adapt multicultural music education to the real development of students, music teaching should be integrated with culture according to students' actual lifestyles and habits, and incorporated into the music classroom using a lifelike teaching model. Teachers can incorporate teaching practices that allow students to learn music outdoors, for example, by taking students into natural settings to experience the comforts of the natural environment and the different contexts that music brings. Teachers can also play "Blue Sky" to allow students to experience the melodies and different musical connotations and express their own opinions to form new experiences of music learning.



### **3. Innovation of teaching mode based on big data cloud platform music intelligent operation and maintenance system**

#### **3.1. Analysis of the difficulties of teaching music in high schools**

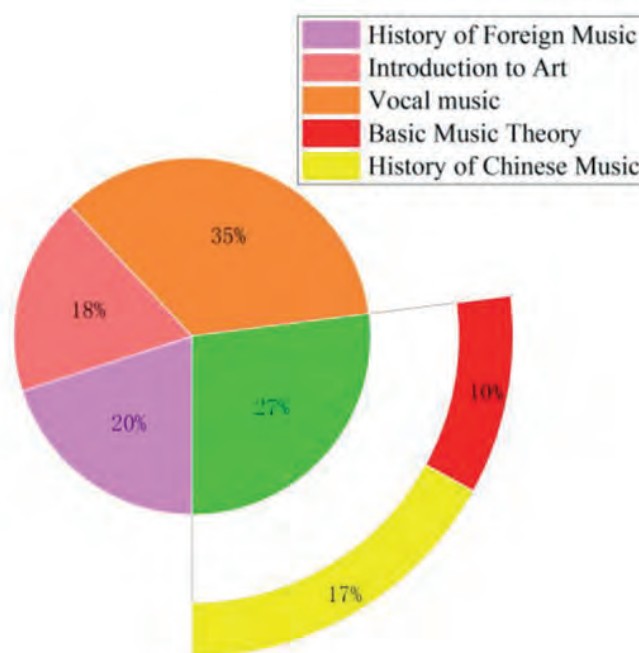
In order to study the method of music teaching reform in a diversified music environment, this section builds a big data cloud platform music intelligent operation and maintenance system. Using music majors and their teaching modes in art college institutions as a model, five college courses in basic music theory, vocal music, Chinese music history, foreign music history, and art introduction studies were retrieved in the big data music cloud platform as sub-samples, and the performance of teachers' teaching scores and teachers' and students' course evaluations were collected according to the cloud platform usage records for analysis to determine the focus of reform. The teacher and student perception level was assigned a score of 10.

The attitudes of teachers and students captured in the Big Data Music Cloud Platform are shown in Table 1. The average teacher perception score is 7 and the average student perception score is 5.2, which is in the middle of the range overall. Since art college students have already received systematic music theory training before art exams, their perception scores for courses such as basic music theory and introduction to art are 7, which are highly rated. In contrast, the perception ratings for courses such as foreign music history and vocal music courses were between 3 and 4, which were not high. This is due to the complexity of key words, large system, little practical training and insufficient training in these courses, for which the reform of music teaching mode should focus on the indicators with few ratings and optimize the teaching mode. At the teachers' level, because the academic level of college teachers is almost all at graduate and doctoral level, there is basically no difficulty for teaching contents like theory, such as basic music theory, Chinese music history and introduction to art, which have a rating range between 7 and 8, indicating that teachers have rich theoretical savings. For the more practical vocal courses, the perception rating is only 5, which indicates that the current music teaching is poor in practice, and both teachers and students are not trained in their abilities.

**Table1.** Attitude capture of teachers and students on big data music cloud platform

	Basic Music Theory	History of Chinese Music	History of Foreign Music	Introduction to Art	Vocal music
Teacher perception rating	7	8	7	8	5
Student perception rating	7	5	4	7	3
Summary of perceptual keywords	Basic and easy to understand	Complex and difficult	Complex, large system and obscure	Miscellaneous, abstract	Less practical training and insufficient training

The distribution of the perceived difficulty of music is shown in Figure 1. In basic agreement with the above table of big data music cloud platform teacher and student attitudes capture, students think that vocal music course is the most difficult to learn, accounting for 35%, foreign music history accounts for 20%, and general art theory accounts for 18%, further arguing that the current diversified music environment music teaching should focus on these three aspects, dedicated to improving students' sense of classroom access.



**Figure 1.** Distribution of difficulty in music perception

### **3.2. Innovative Strategies for Music Teaching**

Based on the background of diversified music environment, teachers should put students at the center of education in the process of changing the inherent teaching methods, and be able to apply innovative thinking to the music teaching mode and form important innovative strategies. Under the new teaching model, students' musical thinking is constructed, their musical emotions are inspired, and they are able to experience the musical expression situation, feel the charm of music and the shock brought by music in the musical atmosphere created by the teacher. Students gradually develop musical learning values and creative musical thinking under the guidance and evaluation of the teacher.

#### **(1) Contextualized teaching mode to develop students' music literacy**

Teachers can use technological equipment and information technology to gradually integrate modern teaching power into the classroom teaching model and create contextualized teaching models for students. Teachers can make music learning content and learning difficulties in the form of micro-lessons and involve students in the production of videos on their own initiative. Students should develop a process of musical and cultural exploration and appreciation of musical works, and through making videos they should constantly generate musical associations and musical creations, and be able to add their own musical and cultural connotations and understanding of musical knowledge. This process of forming innovative thinking adds more highlights to music video production, which leads to the pooling of knowledge and effective appreciation of works. Students can share and exchange learning through this multimedia context, thus developing their own musical literacy.

#### **(2) Construction of students' own musical connotations**

Reform in music is about changing students' learning habits and allowing them to actively explore the mysteries of the music field. Innovation in music is about getting students to think about diverse learning methods and improving their own practical skills and innovative thinking. Students' own understanding of music's unique perspective becomes the key to its development, and should be

combined with the innovative content of teachers' teaching models to continuously explore more ways of learning, increase the exploration of music culture, and strengthen their own musical learning initiatives so as to achieve the process of purifying the mind. Teachers should implement teaching methods for individual students while increasing the totality of learning, so that students can dare to express themselves and express music. Students can participate in music lectures and music interviews to communicate and learn about musical diversity. They can also participate in music theme exhibitions and lectures by famous musicians outside the classroom to achieve music culture penetration.

### (3) Emphasis on evaluation analysis

Popular music can be found everywhere in life, in schools, homes, and in various public places. However, we know that because of the different cultures, environments, and social contexts in which it is produced, the listenability and content of popular music varies, and some popular music may even influence the values of secondary school students. Therefore, it is important for teachers to teach students how to identify the best and worst works of popular music in the classroom, to respect each student's interest in different types of music, and to respect individual preferences while grasping overall taste. Teachers should actively encourage students to boldly analyze and evaluate new period works based on the various musical and cultural knowledge they have learned in the classroom, incorporating their own views on the works, and laying the foundation for students to enhance their music appreciation skills as a lifelong ability to learn music.

## **4. CONCLUSION**

In this paper, to investigate the reform method of music teaching mode in diversified music environment, a big data cloud platform music intelligent operation and maintenance system is built to record teachers' classroom. By selecting the classroom teaching of music majors in art colleges as the target of the study, the teacher and student evaluations of the classroom were analyzed based on the teaching use records of the big data music cloud platform, and then reform strategies were proposed. In the student-level ranking of the distribution of difficulty of different courses, the percentage of those

who considered vocal courses difficult was 35%, foreign music history was 20%, and introduction to art was 18%, and the perceived ratings of foreign music history and vocal courses, etc. were between 3 and 4. It can be seen that music teaching mode reform and innovation should be based on students' classroom acquisition, and we should continue to strengthen the depth and breadth of teaching research and focus on the combination of theory and practice. In order to effectively teach music culture in the context of diversified music environment, teachers should have rich knowledge reserve and be good at using different teaching methods to teach accurately, imaginatively and vividly in order to improve the quality and construct level of the classroom and increase the cultivation of students' music skill literacy.

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# Cultivation of students' vocational ability based on innovative teaching of e-commerce in higher education in the context of big data

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## **ABSTRACT**

In order to comprehensively improve the vocational ability of e-commerce students in higher education institutions, this paper conducts an in-depth analysis and investigation on the innovation of teaching programs for vocational ability training of e-commerce students in higher education institutions under the background of big data. At the beginning of the study, the problems in the current teaching mode are analyzed, and then the scheme of this paper is proposed based on the employment-oriented approach by obtaining the vocational ability demand of talents in e-commerce enterprises according to big data. In the enterprise recruitment description, the high-frequency words in order are operation ability accounting for 43%, online store design and laying ability accounting for 30%, stress resistance ability accounting for 22%, and sociability ability accounting for 5%. This paper starts from the enterprise demand layer, which helps to locate students' career training ability more precisely, helps to improve students' competitiveness in the workplace, and helps to improve the teaching quality of e-commerce professional courses indirectly.

## **KEYWORDS**

Big Data; E-Commerce Major; Teaching Innovation; Student Vocational Competence

## 1. INTRODUCTION

In today's era, student employment is gradually developing into student entrepreneurship, but on this basis there is a lack of vocational competencies. Although higher education institutions focus on the quality of students' innovation and entrepreneurship spirit, there is a misunderstanding of vocational ability, which requires universities to pay attention to students' vocational ability first [1]. At the same time, there are some problems in the social environment, such as the lack of high-quality innovation and entrepreneurship training atmosphere, the lack of innovation and entrepreneurship practice conditions, the lack of support for students' innovation and entrepreneurship, and the lack of institutional guarantee and resource support for innovation education on-the-job culture [2]. E-commerce is a business model that provides products or services to customers and uses the Internet to benefit from them. Although this business model does not require finding a fixed office for traditional entrepreneurship and simply using a proven third-party entrepreneurial platform, this does not mean that there is no competence threshold for e-commerce entrepreneurship [3]. E-commerce entrepreneurship mainly uses virtual network domain Internet technology, so college students in higher education institutions need to learn e-commerce skills such as online store design, computer troubleshooting, network troubleshooting and other basic computer skills first in e-commerce entrepreneurship innovation [4]. At present, e-commerce is usually divided into web port and app port, and teachers should cultivate students' skills learning according to the actual needs in their lectures, so as to promote students' e-commerce entrepreneurship to get success, shrink the possibility of failure, and reduce the difficulties of entrepreneurship or employment.

As a form of online business, e-commerce requires both offline traditional companies to cooperate with stocking, and online marketing to operate. For individual online stores to operate elements such as products, logistics, financing, partners, and team members, careful organizational measures should be taken as needed [5]. In traditional entrepreneurship, it usually requires prior planning of the business, building organizational structure, directing employees, and regulating matters in various departments within the business. In contrast, in e-commerce entrepreneurship, students in higher



education institutions need to learn extra in management qualities [6]. E-commerce is closely related to information technology, so students in higher education institutions need to have the ability to be informed of information sources, and at the same time need to filter and purify, process and handle information, and then use it successfully [7]. Students in higher education institutions need to keep abreast of the store operations and functioning in their e-commerce ventures, so that they can deal with any accidents in the store in time.

This paper firstly analyzes the current problems in the teaching of e-commerce in higher vocational institutions, and finds that the current teaching mode generally has problems such as emphasis on theory rather than practice, lack of advanced teaching content, and professional curriculum to be improved. According to the characteristics of big data data capture, the demand for e-commerce talents is used as a keyword to obtain the demand for talents of enterprises, so as to position the training program of e-commerce majors. Finally, we propose four employment-oriented talent training teaching strategies, which are to teach students according to their talents, respect students' development characteristics, strengthen students' employment guidance by following good advice, establish systematic training system for teachers, and organize innovation competition for e-commerce majors to stimulate students' learning and inquiry.

## **2. Analysis of the problems in the teaching of e-commerce in current higher vocational institutions**

### **(1) Emphasis on theory, not practice**

At present, although most higher education institutions are aware of the importance of e-commerce profession, there is still room for improvement and perfection in the specific teaching methods. From the level of teaching concept, there is a very serious problem that emphasizes theory but not practice. Many institutions of higher education do not have a good understanding of the importance of practical teaching. As a higher vocational institution, especially a private one, one of its most important teaching tasks is to improve students' practical ability, because practice is the basis of innovation and improvement [8]. However, at present, there are many higher vocational institutions that habitually weaken the importance of

practical teaching work in the process of cultivating e-commerce professionals, and the time, energy, financial and material resources invested in practical teaching are very little in many aspects. This conceptual drawback of higher vocational institutions will certainly affect the practical application ability of college students, and then affect the employment success rate of college students. With the influence of big data, today's society has very high requirements for the practical ability of e-commerce students. If higher vocational colleges and universities still do not raise the importance of practical teaching, then the reform of e-commerce teaching in higher vocational colleges and universities is bound to be difficult.

### (2) Lack of advanced teaching content for e-commerce majors

Although many higher education institutions are aware of the many needs of the rapid development of e-commerce, they still retain the traditional teaching contents in the actual teaching. Teachers only focus on the teaching of traditional knowledge, but seldom add the current hot e-commerce issues and the cutting-edge issues of the profession into the teaching content, students still learn the traditional teaching content, but they do not know anything about the new knowledge and issues. With such teaching contents, students will not be able to keep up with the standards and demands of e-commerce enterprises for high quality professionals in the future, which will affect their employment in the field [9].

### (3) Professional curriculum needs to be improved

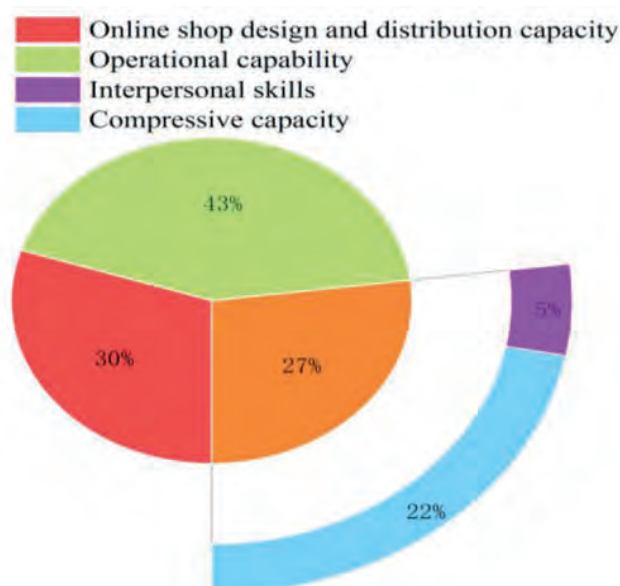
The positioning of e-commerce majors is still not accurate enough, and many higher vocational colleges and universities have great deviations from the positioning of e-commerce majors. Some colleges and universities include e-commerce majors into the College of Computer Science, some higher vocational colleges and universities include them into the College of Finance and Economics, and some higher vocational colleges and universities include them into the College of Management [10]. Therefore, in the curriculum design of e-commerce majors and the preparation of talent training programs, there are problems such as broad scope of curriculum setting and unconvincing talent training programs. Students need more skills and learn more chaotic courses, and the core skills are not exercised and compacted, which is not strong in the process of learning.

### 3. Cultivation of Vocational Ability of Higher Vocational E-Commerce Students

#### 3.1. E-commerce talent training orientation analysis

According to the characteristics of big data data acquisition, e-commerce talent demand as a keyword interception of e-commerce enterprise recruitment talent demand ability requirements, e-commerce enterprise talent demand high-frequency word distribution results are shown in Figure 1.

Under the big data screening, the high-frequency words in the recruitment description of e-commerce enterprises are 43% of operation ability, 30% of online store design and laying ability, 22% of stress resistance, and 5% of sociability in order. In detail, e-commerce enterprises seem to value the operational ability of job seekers, i.e. knowledge + practical comprehensive ability + business marketing thinking, for this reason, in the training of higher vocational talents, we should focus on the combination of theory and reality. Second is the online store design and store ability, this value is the worker aesthetic and computer operation ability, so in the training of higher-level e-commerce professionals, the students' PS, PR software training is particularly important, and also pay attention to the training of its business analysis ability. Furthermore, it is the ability to resist pressure. The e-commerce industry is fast-paced and has a large workload, so the workers' ability to resist pressure is extremely demanding. In the training of higher vocational talents, we should pay attention to the expansion of students' mental capacity.



**Figure 1.** Distribution of high-frequency words in the talent demand of e-commerce enterprises

### **3.2. Suggestions for employment-oriented teaching of e-commerce majors**

(1) Respecting students' developmental characteristics by tailoring education to their needs

Based on the learning characteristics and foundation of students in vocational colleges and universities, we focus on the comprehensive ability cultivation of students and look for teaching methods and modes that are suitable for students, and strive to achieve the overall development of students and professional specialization simultaneously.

(2) Strengthening students' career guidance by following good advice

Since the students enrolled, institutions should use multiple channels and ways to cultivate students' professional awareness and career consciousness. Students should be familiar with the future job environment and job content, cultivate their sense of professional identity and honor, guide them to fully understand the future direction of their majors, do a good job of career orientation assessment with special career guidance courses, let students establish a correct view of employment and career selection, and help them find a suitable career orientation and planning as soon as possible. At the same time, institutions should also strengthen the cultivation of non-professional quality, integrate the cultivation of non-professional quality into professional education, and make use of the actions arranged by the school such as Civic Education, cultural learning and after-school activities to cultivate students' non-professional quality.

(3) Establishing a systematic training system for teachers

Building a teacher training system featuring vocational education is an inevitable measure to ensure the continuous development and progress of vocational teachers. The construction of e-commerce teacher training system in higher vocational colleges should start from five aspects. First, pay attention to daily teaching and research activities. The teaching and research department of e-commerce

should make full use of the weekly teaching and research activities, carry out research and discussion on the problems existing in the actual teaching, and constantly optimize the teaching ability of teachers. Second, expand the channels of teacher training. The school may invite relevant education experts, entrepreneurs and e-commerce researchers to hold special lectures at the school to introduce the new trends, changes, new knowledge and new perspectives in the development of the e-commerce industry, guide teachers to update teaching ideas and methods, expand the content and form of teaching. Third, make full use of special training at all levels. Schools should mobilize the enthusiasm of teachers, create conditions for the development of teachers actively, set up e-commerce entrepreneurship workshops, and arrange for young key teachers to participate in various kinds of special training at all levels in a planned and step-by-step manner, we even support teachers to set up online stores on some e-commerce platforms and form student teams to conduct e-commerce live broadcast, short video shooting and daily operations without affecting teaching. Fourth, strengthen the intensity of teachers on-the-job training. E-commerce industry is different from the traditional industry, it develops fast, the application of new technology is rapid, knowledge update frequently. E-commerce teachers should not only go deep into the enterprise to carry out research, discussion and study, but also make greater efforts to make full use of winter and summer vacation, and even sign agreements with the enterprise during their daily work, carry out top-post exercise to improve practical skills. Fifth, through competition instead of training to improve the practical level of teachers. Teachers are encouraged to actively participate in skills competitions, skills textual research, skills spot checks and other work, in order to enhance the practical education level of the teaching staff.

(4) Organize innovation competitions for e-commerce majors to motivate students to learn and explore.

Attracting students' attention through the form of competition is an important way to stimulate students' innovation consciousness. Higher education institutions and teachers should improve the system of innovation competitions and form an assessment model with professional characteristics and innovative practical ability. Teachers should understand that the purpose of organizing innovation

competitions is to enhance students' learning motivation, promote learning through competitions, and encourage students to participate in such competitions more often to improve their comprehensive strength through the form of competitions. In addition, higher education institutions can also establish cooperative relationship with local e-commerce enterprises, and get more practical activities for students to participate in enterprises, so that students can get in touch with the operation mode and work content of actual e-commerce enterprises in advance, and lay a solid foundation for them to enter the society after graduation.

#### **4. CONCLUSION**

This paper explores the vocational ability cultivation program of e-commerce students in higher education institutions based on the background of big data development. Firstly, the current problems in e-commerce teaching in higher vocational colleges are analyzed and found to exist. The high-frequency vocabulary of talents in e-commerce enterprises is analyzed according to the big data platform to determine the general direction of enterprise talent demand, and then employment-oriented teaching suggestions for e-commerce majors are put forward. The high-frequency words in the recruitment descriptions of e-commerce enterprises are 43% for operation ability, 30% for online store design and laying ability, 22% for stress resistance and 5% for sociability. It can be seen that the current vocational ability cultivation of e-commerce students in higher vocational institutions should focus on the combination of students' workplace skills and book theory and on cultivating students' comprehensive quality.

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# Practice and Consideration of Cultivating Innovative and Entrepreneurial Talents of College Students in the Context of Big Data

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## ABSTRACT

Researching the practical path of fostering innovative and entrepreneurial talents of college students can exercise students' entrepreneurial thinking ability and encourage the enhancement of students' entrepreneurial ability. This paper firstly analyzes the cultivation mode of college students' innovation and entrepreneurship talents, and clarifies the construction method and curriculum setting principle of talent cultivation mode. Secondly, we use big data as a means to obtain the data on the entrepreneurial intention of students' parameter works in college innovation and entrepreneurship (IE) competition and the employment and entrepreneurial intention of students enrolled in and graduated from the second level of college A. We determine the general direction of college students' IE talents cultivation and put forward the talent cultivation program of this paper. College students' entrepreneurship is based on personal preference and observation of daily life, and the forms of entrepreneurship and their percentages are: 97% for milk tea store, 96% for study room of examination, 92% for rental service, 90% for idle exchange, and 89% for online print store. In the current context of big data, higher education institutions should deepen the reform of education teaching



and talent cultivation mode to stimulate the IE enthusiasm of college students.

## **KEYWORDS**

Big Data; Innovation and Entrepreneurship for University Students; Talent Development; System construction

## **1. INTRODUCTION**

The tendency of colleges and universities to focus on the cultivation of innovative and entrepreneurial talents (IET) is not only the inevitable reform of higher education, but also the need to serve the civilization, transform the economic mode and promote the upgrading of industrial construction. This has significantly contributed to the enhancement and protection of people's livelihood, the structure of an innovative country, and the enhancement of national revolution and competitiveness [1]. In the critical period of building a temperately wealthy society in China, college students' IET are the reserve strength for social development. In the cultivation of talents, colleges and universities should focus on creating a group of high-quality college students with both advanced spirit and entrepreneurial ability to serve the structure of economy and promote the development of society [2]. To this end, universities should build a complete and effective exercise system for IET to implement the strategic goal of "improving independent innovation ability, building an innovative country and encouraging employment driven by entrepreneurship" proposed by the Party Central Committee.

The concept of education in colleges and universities requests to focus on the development of social enterprises, and the IET cultivated should meet the needs of the country and the growth of social enterprises. Only by facing the growth of social enterprises and focusing on foster innovative consciousness, ability and methods of college students that meet the needs of social enterprise growth can we improve their abilities in entrepreneurship and better motivate them to give full play to their strengths, ambitions and contribute to society in the growth of social enterprises [3]. The curriculum structure of the university should focus on public welfare-oriented and market-oriented social enterprises, cultivate the skills and abilities of

college students for the growth of these enterprises, and strive to explore the structure of a curriculum system that promotes the comprehensive improvement of college students. Gradually build up a system of IET training that integrates curriculum teaching, practical practice, employment guidance, career planning, independent learning, and joint enterprise and school for the growth of social enterprises, in order to cultivate various excellent talents suitable for the growth needs of social enterprises [4]. At the same time, it is also necessary to select college students' IE projects for the growth of social enterprises, and purposefully select and raise a number of IE projects that reflect the growth needs of social enterprises, can break through the bottlenecks of social enterprise growth and have greater social benefits. Through constructing a series of cultivation mode, IE system, integrated platform of industry-university-research, and achievement transformation mechanism oriented to the growth of social enterprises, we can guide college students in the university base to operate, manage, extend and simulate the projects, and promote the projects from structure to incubation and from incubation to growth, so as to truly realize the purpose of college students' IE education [5].

This paper firstly analyzes the IE talent cultivation mode of college students, and clarifies the structure method of talent cultivation mode and the principles of internal and external curriculum setting involved in school-enterprise cooperation. Secondly, we use big data as a means to obtain the entrepreneurial intention of students' entries in the college IE competition and the employment and entrepreneurial intention data of students enrolled in and graduated from the second-level colleges and universities of A. Based on the analysis of data information, we determine the general direction of college students' IE talent cultivation and propose a talent cultivation program based on the understanding of this paper. This paper starts from the level of students' intention, which is more likely to attract the attention of college students, which has practical significance for the improvement of entrepreneurial talent cultivation program in colleges and universities.

## **2. Analysis of Innovation and Entrepreneurial Talent Cultivation Model for University Students**

### **(1) Innovative entrepreneurial talent training model structure**

At present, the domestic IE education based on the social enterprise growth perspective includes "school-enterprise cooperation", "school-enterprise joint training", "school-enterprise docking", "school-enterprise linkage", "school-enterprise joint schooling", etc. [6]. For example, through holding "School-Enterprise Fair" and "School-Enterprise Cooperation Forum", implementing the school-enterprise matching and school-enterprise publicity of "Chain Group Matching and Cloud Negotiation", and through a series of activities such as live broadcast of enterprise HR with post, work-exchange cooperation, and joint growth of teaching materials by school-enterprise to reflect the talent training mode required by the growth of social enterprises. Through a series of activities such as the live broadcast of the HR of enterprises with jobs, the experience visit of school-enterprise cooperation, the cooperation of engineering alternation, and the joint growth of teaching materials between schools and enterprises, we can reflect the talent training mode required by the growth of social enterprises. From the above description, it can be seen that the talent cultivation of college students based on the vision of social enterprise growth is in line with the growth of the times and the trend of market demand [7]. In order to better meet the IE needs of college students and comprehensively improve their IE abilities, it is necessary to build a talent cultivation model for college students based on the social enterprise growth perspective. The IET cultivation model aims to face the demand of public welfare-oriented and market-spontaneous social enterprises and give full play to the role of enterprises leading the market in order to cultivate innovative and entrepreneurial applied and skilled talents suitable for the growth needs of today's society. By integrating many elements of social enterprise growth into the IE education of college students, we carry out in-class teaching and extra-curricular practice with the help of various resources, platforms and means. It enables college students to understand the knowledge, theory, spirit and value related to IE, continuously enhances their innovation and entrepreneurial consciousness, improves their innovation and entrepreneurial ability, and shapes their innovation and entrepreneurial spirit suitable for the growth of modern

enterprises, so as to promote better entrepreneurship among college students.

(2) In and out of class curriculum involved in school-enterprise cooperation model

The talent cultivation model oriented to the growth of social enterprises and market needs emphasizes the integration of elements and many favorable conditions of social enterprises into the whole process of in-class teaching and extracurricular practice of college students. By implementing a new type of IE education through school-enterprise linkage, cooperation, docking and interaction, it can comprehensively improve the IE ability of college students and prompt them to better start their own businesses [8]. When formulating the training plan for IET, colleges and universities should build a scientific curriculum system based on the social enterprise growth vision and integrate the concept, spirit, value, innovation, model and experience of social enterprises into the in-class teaching. Starting from the curriculum of basic, specialized, elective and general courses for college students, we focus on highlighting the educational contents and forms in IE for college students and strengthen the entrepreneurship curriculum. Through systematic and purposeful IE education, the ability of IE of college students can be improved comprehensively [9]. Colleges and universities can add basic courses such as basic entrepreneurship and basic skills courses according to the status of college students to consolidate the foundation of college students' IE. By increasing students' professional courses such as entrepreneurial thinking, training, and skills, they can cultivate their professionalism of IE. Enhance college students' understanding of corporate entrepreneurship by adding elective courses in business operation, management and business models. To cultivate the humanistic and entrepreneurial literacy required by college students in entrepreneurship by adding general courses in law, talent, culture, and art in entrepreneurship.

### **3. Practice in the cultivation of college students' IET**

#### **3.1. Analysis of the training direction of college students' IET**

In this paper, we use big data technology to obtain the entrepreneurial intention presented by students' entries in the college IE competition, and try to explore the innovation and entrepreneurial

aspirations of contemporary college students through this move. The results of the survey on the intention of some projects of college students' IE are shown in Table 1.

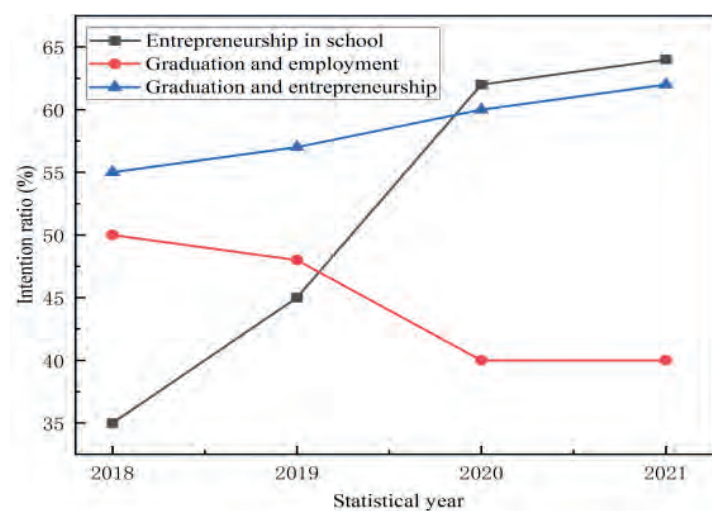
Student entries had the highest percentage of entrepreneurial intentions for milk tea stores and coffee shops, at 97%. Almost every group of 10 students had 4-5 entries in this category, which is also related to the contemporary students' preference for milk tea and coffee. It is worth noting that the percentages of entrepreneurial intentions for rental services and study rooms for examinations, idle exchange stores and online print stores are also relatively high, 92%, 96% and 89% respectively, and all three originate from the observations of college students in their daily campus life. College students will often engage in resource rental activities due to reasons such as low living expenses or simply not wanting to waste resources. For example, students with trams will consider renting their cars to fellow students for a fee when the cars are free, and students with elective courses will consider renting the textbooks of the students in their majors for a fee to attend classes. Based on the limited number of seats in the library and the difficulty for students to grab a seat, we will consider opening a paid study room for students with study needs. The intention of the print store is based on the final exams printing review materials and printing design works, found that the paper is too expensive, printing demand is large, good income and other reasons to have the idea of starting a business. This shows that the entrepreneurial direction of college students mostly comes from their personal preference needs and their observation of campus life. In the IE course, we can focus on strengthening the comprehensive training of students' business thinking and enterprise operation ability.

**Table 1.** Intention Results of College Students' IE Projects

Number	Entry name	Intention ratio
1	Hot pot shop	85%
2	Milk tea shop, coffee shop	97%
3	Barbecue shop	58%
4	Manicure shop	78%
5	Couture	60%
6	Rental services	92%
7	Online printing shop	89%
8	Idle exchange shop	90%
9	Postgraduate Examination Self study Room	96%

Based on the IE intention of college students, the data of employment and entrepreneurship of students and graduates in the second-level institutions under the jurisdiction of university A in the past four years were counted. The results of entrepreneurial intention of college students are shown in Figure 1.

The entrepreneurship rate of enrolled students and graduates shows an increasing trend, while in contrast, the employment rate of graduates shows a decreasing trend. In 2021, 65% of the students in a second-level college of university A have opened different kinds of campus specialty stores, and according to the students' feedback, their profits are quite substantial. Due to the continuous improvement of favorable policies for college students to start their own business, the number of college students' IE is increasing every year, and by 2021, more than 61% of students tend to start their own business after graduation, which leads to a certain downward trend of employment rate. Based on the emotional intention of college students' IE, it can be seen that the training direction of college students' IE talents mainly focuses on the cultivation of students' business thinking, business skills improvement and interpersonal negotiation ability.



**Figure 1.** College Students' Entrepreneurship Intention

### **3.2. Innovation of education system in the cultivation of college students' IET**

#### **3.2.1. Building a systematic curriculum system for IE education**

The training of IET requires a systematic educational curriculum and process. In terms of the socio-economic structure and its growth

situation on the requirements of IE education, IE education curriculum should be a multidisciplinary intersection and comprehensive discipline curriculum. It generally has some characteristics: first, the intersectionality and comprehensiveness of disciplines, second, the practicality and guidance of disciplines, and third, the creativity and characteristics of disciplines. First of all, the IE education curriculum needs to integrate and create design by integrating various disciplines. Based on students' professional courses, the curriculum should integrate the awareness, concepts, techniques and methods of IE, and also integrate the contents and concepts of other related courses, and form a theoretical and practical curriculum system through creative integration. Secondly, the structure of IE education curriculum should also have strong practicality and guidance. IE for college students is the process of practical application of knowledge and theories, so the education curriculum must focus on the guidance and effectiveness of specific practices, so that students have the necessary knowledge, theories, methods and skills for IE. Thirdly, the curriculum of IE education should be creative and characteristic, and should be built creatively with the advantages of university education resources and regional social and economic growth to form regional characteristic teaching materials. In this way, not only can the cultivation of IET benefit from the favorable conditions of regional growth, but also meet the actual needs of local society and add strength to the regional social and economic growth.

### **3.2.2. Establishing a correct view of entrepreneurship**

The establishment of entrepreneurship education system for college students should fully help college students establish a correct concept of entrepreneurship and focus on fostering entrepreneurial qualities. College students must change the traditional concept of employment and realize that IE is not a problem for a few college students with strong innovation ability and excellent academic performance, but everyone can start a business. Making full use of the "Internet + Entrepreneurship" application platform can accurately serve students' entrepreneurship and play a leading role in the structure of university students' entrepreneurship. The IE platform built with the efforts of all parties can provide an ideal stage for young entrepreneurs to integrate project display, capital matching, technology introduction

and marketing, and further stimulate young people's enthusiasm for entrepreneurship.

### **3.2.3. Build a perfect IE talent incubation system**

College student business incubation system is a kind of social and economic organization with special functions, and the role it plays in college students' IE is irreplaceable by any individual party of universities, enterprises or even the government. University entrepreneurship involves not only the employment of college students, but also the research and growth of science and technology and its promotion of industrial economic growth. Promoting the success of college students' entrepreneurship as much as possible and increasing the success rate of college students' entrepreneurship are the outstanding advantages of the incubation system. Due to the general lack of social practice experience of college students, the lack of the path of independent entrepreneurship, the lack of corresponding financial and material support, not to mention the strategy of physical operation, not to mention the difficulty of entrepreneurial success, it is also more difficult to find the ideal starting point for entrepreneurial start-up. Therefore, it is necessary to build a platform for college students to start their own business by constructing a perfect IE incubation system, and provide necessary business conditions, such as equipment places, business training, technical guidance, operation mechanism, legal consultation, management services, etc., in order to help startups avoid business risks and improve the survival rate. The entrepreneurship incubation system for college students includes entrepreneurship bases at provincial, municipal and county levels, community or school-run entrepreneurship incubation bases, etc. It can promote college students' IE by integrating resources from various industries, provide effective guidance and services for them, and enable college students' IE education to gain considerable social and economic benefits.

## **4. CONCLUSION**

This paper obtains the IE intention of college students based on the background of big data, and explores the practical path of college students' IE talents cultivation. Through the analysis of the cultivation mode of college students' IET, the principles of cultivation mode



structure and curriculum setting under enterprise mode are clarified. The big data technology is used to obtain the changes of college students' entrepreneurial intention and job-seeking intention, to determine the general direction of college students' IET cultivation, and then the scheme of this paper is proposed. College students' entrepreneurship is based on personal preference and observation of daily life, and the percentage of those who take milk tea store as their entrepreneurial intention is 97%, study room for examinations is 96%, rental service is 92%, idle exchange is 90%, and online printing store is 89%. Based on such characteristics, the cultivation of innovative entrepreneurial talents for college students should focus on the cultivation of students' business insight, and at the same time, for students who have already opened stores on campus should focus on the cultivation of their business operation and financial management skills.

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# Artificial intelligence based sensor multi-point control robot interaction method research

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## ABSTRACT

In order to further improve the accuracy of robot interaction recognition results and shorten the operation time, this paper proposes an interaction method of sensor multi-point control robot based on artificial intelligence technology. Firstly, five parts of the display layer are constructed, and then the speech recognition layer module is built. The system designed in this paper is compared with artificial neural network technology and inverse kinematic model, and the completion time and error accuracy of its interaction operation are tested. The test results show that the method designed in this paper saves 293 seconds than the artificial neural network technique and 340 seconds than the inverse kinematic model. The average accuracy of sensor automation was 94.3%, compared with 84.7% for the artificial neural network technique and 72.3% for the inverse kinematic model approach. The research in this paper improves the accuracy of robot interaction recognition and increases the efficiency of robot execution.

## KEYWORDS

Artificial Intelligence Technology; Robot interaction; Sensor; Multi-point control

## 1. INTRODUCTION

As a rapidly developing discipline, artificial intelligence has been widely applied in the field of sensors. The combination of artificial intelligence and sensor technology constitutes a new type of intelligent sensor, which improves the intelligence of sensors [1]. The importance of sensors in information systems cannot be overstated; its good or bad characteristics and reliability of output information are crucial for the quality of the whole system [2]. Nowadays, the rapid increase in automation in various industries, especially the increase in automation in industrial production, has put higher requirements on the performance of sensors. The traditional sensor technology is no longer able to meet the needs of the rapid development of automation technology due to the shortcomings of unstable performance, poor reliability, and low accuracy [3]. The progress made by human in artificial intelligence provides an opportunity for the combination of artificial intelligence and sensor technology, i.e., the emergence of new intelligent sensors [4]. The output characteristics of sensors are not only nonlinear and subject to various environmental factors, it is difficult to make comprehensive corrections for static sensor errors using traditional methods [5]. The literature [6] used artificial neural network technique to deal with the sensor static errors and the feasibility of this method was verified by experiments.

Human-computer interaction techniques have received a lot of attention from various research fields as well as experts. With the increasing improvement of HCI technology, various problems started to appear, such as redundant codes [7]. In order to better solve the above problems, some better research results are given by related experts. For example, a four-wheeled omnidirectional mobile robot is designed and Lyapunov function is constructed by deviating the position of the car body to obtain the inverse control law that conforms to the linear flight velocity of the car body. Using the traction wheel with directional velocity constraint, an inverse kinematic model was designed to obtain the optimal trajectory duration during tracking [8]. Some scholars have researched a wireless network-based automated control system for picking robots, where the Exyoos441 microprocessor was chosen for the hardware part and the DS3710 high-performance drive controller was used for the motion control module [9].

In this paper, we combine the sensed pose sensors and design a multi-point operating system for robot interaction based on artificial intelligence technology. The constructed torso candidate point detector includes five parts: multidimensional sensing posture recognition model in display layer, 3D video display module, 3D video acquisition module, virtual robot arm display module and robot arm control module. In the constructed built voice recognition layer module, the precise multi-point robot operation is realized by sensor and voice control. The system designed in this paper is compared with artificial neural network technology and inverse kinematic model to test its interactive operation completion time and error accuracy.

## **2. Artificial intelligence based sensor robot interaction operation method design**

### **2.1. Display layer module build preparation**

#### (1) Multidimensional sensing pose recognition model

Step 1: Using two types of sensors: posture sensors and acceleration sensors, the arm information of the human body is collected, while the angular velocity and acceleration information of the arm is obtained in real time.

Step 2: Solve the information obtained in step (1) to obtain the posture angle information.

Step 3: Combine the relevant theories to fuse all the information, then study the change law of each coordinate, and finally realize the human posture recognition.

(2) 3D video display module: through the virtual display of the main interface at the same time to display the movement of the two robotic arms, the operator can watch the theme interface to eventually achieve the purpose of robot interaction multi-point operation.

(3) 3D video acquisition module: read the mechanical and human posture change information in real time through the posture sensor, obtain the posture of the robot arm and object and the surrounding environment information, and transfer the acquired information to the system for processing in time.

(4) Virtual robotic arm display module: In order to further improve the accuracy and safety of remote operation, it is necessary to minimize

the transmission time delay of the system, while also being able to fully reflect the motion of the remote robot at any angle. The following is mainly to display the system interface by superimposing the virtual robot arm No. 1 and virtual robot arm No. 2, and to feedback the results to the server.

(5) Robotic arm control module: The robotic arm control module is mainly composed of three parts: control package, attitude recognition and robotic arm attitude calculation. It is responsible for calculating all the received attitude data to achieve the purpose of driving and controlling the robotic arm operation.

## **2.2. Speech recognition layer module building**

When the system automatically determines whether the action made by the virtual arm No.1 is the correct action, the completed "action command" is saved through the "control command" in the system and downloaded to the remote arm. If a person's posture changes, the system will automatically identify the posture information of the human body according to the posture recognition module. At the same time, the final posture information is transferred to the virtual arm No.1. If the "control commands" in the system are still transmitted autonomously by the human posture recognition module, the system may recognize the commands as wrong, which may lead to the wrong operation of the system. In order to avoid these problems, a speech recognition module is designed to send signals and instructions to each robot in various languages.

In order to better complete the interaction with both the virtual machine robot arm No.1, the speech recognition module in the system was designed mainly using the MFC degree. This is more convenient to call the isolated language recognition system in the system, and at the same time, the recognition result will be transmitted as a command to the API interface of the robot interactive multipoint operating system for voice recognition and result communication.

## **3. Experiment and Analysis**

To verify the interactive performance of the method designed in this paper, the artificial neural network technique, inverse kinematic model and the system designed in this paper are compared.

The results of the comparison of the completion time of the interactive multi-point operation robot of different systems are shown in Table 1. The completion time of the system designed in this paper is less than that of the artificial neural network technique and the inverse kinematic model.

The main reason why the system designed in this paper can complete the robot interaction multi-point operation in a shorter time is that the designed system incorporates the human posture recognition method in the practical application process, which effectively reduces the overall operation completion time.

**Table 1.** Comparison of completion time of interactive multi-point operation robots in different systems

Experiment No	Completion time of multi-point sensor robot interactive operation/(S)		
	Artificial Neural Network Technology	Inverse kinematics model	The system designed in this paper
1	164	160	150
2	170	172	148
3	180	184	134
4	171	177	150
5	168	169	141
6	176	185	137
7	186	190	144
8	178	185	142
9	154	164	138
10	160	168	130

The artificial neural network technique and inverse kinematic modeling method of this paper were used to implement 10 experiments on 100 data of sensors respectively to analyze the accuracy of artificial intelligence sensor multi-point automatic control.

The comparison results of the 3 types of HMI multi-point control are shown in Figure 1. The method in this paper has significant advantages over the other 2 methods. The average accuracy of automatic sensor control using this paper's method is 94.3%, which is higher than the control accuracy of artificial neural network technique (84.7%) and inverse kinematic model method (72.3%). This indicates that the design system in this paper effectively reduces the sensor multi-point human-computer interaction automatic control error, and this method obtains the ideal sensor human-computer interaction control effect.

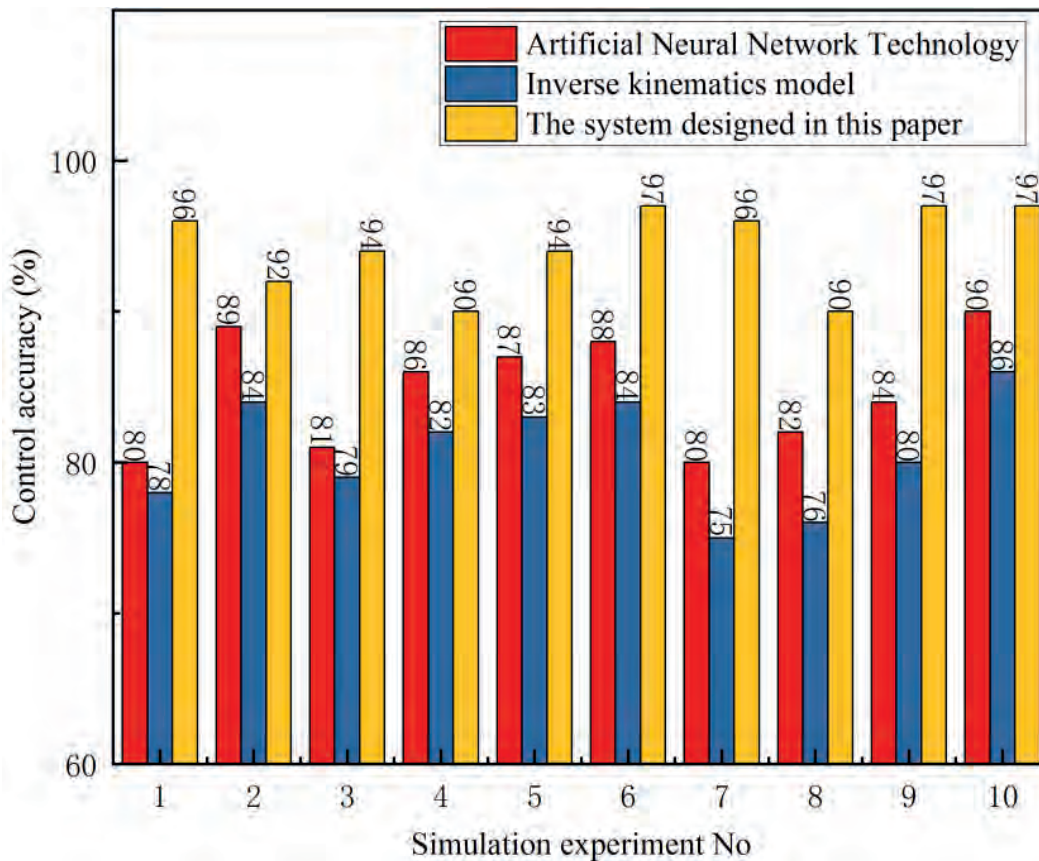


Figure 1. Comparison of three human-computer interaction systems for multi-point control

#### 4. CONCLUSION

In this paper, a multi-point control system for robot interaction based on artificial intelligence is designed by combining the sense posture sensors. The constructed torso is divided into a display layer module and a speech recognition layer. The system designed in this paper is compared with artificial neural network technique and inverse kinematic model to test its interaction operation completion time and error accuracy. The test results show that the method designed in this paper saves 293 seconds compared with the artificial neural network technique and 340 seconds compared with the inverse kinematic model, and the average accuracy of automatic control of sensors is 94.3%, while the average accuracy of the artificial neural network technique is 84.7% and the inverse kinematic model method is 72.3%. This shows that this design system can accurately recognize robot interaction commands with high recognition rate, and also can reduce the completion time and error of multi-point operation of robot interaction.



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# **.The Application of Big Data in the Evaluation of Development Level of Rural Revitalization**

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## **ABSTRACT**

Using big data to evaluate the development level of rural revitalization can identify the shortcomings in the implementation of policies in a timely manner. Based on the research needs, this paper proposes to use the assignment method and entropy value method to determine the index weights and measure the development level of rural revitalization through a comprehensive multi-index evaluation method. By constructing a method to obtain data for the evaluation of rural revitalization development level, five first-level indicators for the study were determined, and two rural villages were selected for algorithm verification. In villages A and B, the effective scores of governance in the two villages were 0.201 and 0.197, the scores of affluence in life were 0.196 and 0.166, and the scores of prosperous industry were 0.126 and 0.102, respectively, with an overall score of 0.800 in village A and 0.733 in village B. The algorithm results of this paper do not differ from the actual economic strength of the two villages. It can be seen that this paper has practical significance to

study the development level of rural revitalization based on big data technology.

## **KEYWORDS**

Big Data; Rural revitalization; Development Evaluation; Assignment method and entropy value method

## **1. INTRODUCTION**

The 19th National Congress of the Communist Party of China (CPC) put forward the strategy of rural revitalization, clearly defining the twenty-word policy of "prosperous industry, ecological livability, civilized countryside, effective governance, and prosperous living" [1]. In this context, how to measure and evaluate the development level of rural revitalization in different regions, discover the advantages and make up for the shortcomings, and then promote rural development according to the situation is the key to realize rural revitalization in China [2]. Currently, some studies have measured the development level of China's rural revitalization by constructing relevant index systems, and have used statistical yearbooks, agricultural census data, survey databases and research data for empirical analysis [3]. However, although statistical data have the advantage of high reliability, there is a lag period, and research data are rarely tracked. Due to the difficulty in obtaining more effective data, it is difficult for the government and academic institutions to comprehensively and scientifically evaluate the development level of China's rural revitalization.

With the promotion of national big data strategy, big data technology has become more mature and is accelerating to become a driving force for creating value and exploring potential, and its application is gradually penetrating into various micro units of economy and society [4]. In the field of agriculture and rural areas, big data technology is widely used in the fields of price monitoring of agricultural products, circulation of agricultural products, and early warning of agricultural disasters. However, there is no systematic research on the application of big data in rural development evaluation in both theory and practice. In fact, big data has great potential in the evaluation of rural revitalization development level, which is mainly due to the

precipitation of rural big data [5]. Big data technology can not only be used for data collection, but also play a unique advantage in analyzing, processing and presenting data, which can provide technical support for portraying rural development in an all-round, multi-dimensional and three-dimensional manner and evaluating the development level of rural revitalization, as well as providing new solutions for solving agricultural and rural problems [6].

This paper first clarifies the logic of rural revitalization development level evaluation under the whole life cycle perspective of big data technology, and then clarifies the theoretical basis of the whole paper. At the same time, it proposes the operation method of data acquisition for rural revitalization development level evaluation to carry out the model construction, and determines the construction of five index systems and labeling model construction. The study selects the assignment method and entropy value method to determine the index weights, and then measures the strength of rural revitalization development level through the comprehensive evaluation method of multiple indicators. Two villages A and B were taken as samples for the measurement and verification of the research algorithm of this paper, and finally, suggestions for the improvement of rural revitalization development level based on the understanding of this paper were proposed.

## **2. The Application of Big Data in the Evaluation of Development Level of Rural Revitalization**

### **2.1. Evaluation of the development level of rural revitalization from the perspective of the whole life cycle of big data technology**

Big data has the characteristics of "5 V", i.e., massive, high speed, diverse, real and low value density. In terms of the life cycle of big data, it is divided into four stages: acquisition, pre-processing, storage and analysis [7]. First, in the acquisition stage, big data technology can collect rural data from different sources, including administrative records, business records, Internet data, and electronic device sensing data. These data can be collectively referred to as nontraditional data, which are different from the traditional data collected by statistical departments. The use of non-traditional data for analysis can increase the data level and hierarchy, expand the

data dimension, enrich the data type, reduce the data lag and increase the data frequency [8]. Secondly, in the pre-processing stage, firstly, the missing data and abnormal data need to be processed, and they will be completed or eliminated according to certain methods. Then, we need to organize the multi-source heterogeneous countryside big data into a unified format data, and do quantitative processing for some text-based data, and convert them into numerical data. Thirdly, in the storage stage, the massive rural data should be stored in the database, and the storage must be safe, fast and efficient [9]. Fourth, in the analysis stage, the data are processed with the help of machine learning, deep learning and other big data analysis methods, and the data are displayed using visualization techniques.

## **2.2. Operation method of obtaining data for evaluation of rural revitalization development level**

### **(1) Model Construction**

At present, the main method of evaluating rural revitalization is to construct an indicator system. The indicator system is the most classic evaluation method, and this paper also uses the indicator system to evaluate the development level of rural revitalization [10]. Since the labeling model has the advantages of more freedom in framing and setting, and more diverse types of labeled data, this paper considers using the labeling technology of "data portrait" in the information field to expand the indicator system into a labeling system to visualize the development of rural revitalization.

### **(2) Indicator system construction**

In this paper, the year 2020 is selected as the evaluation year, and five index systems are constructed according to the research needs. According to the requirements of "twenty words" of rural revitalization strategy, the primary indicators are industrial prosperity, ecological livability, civilized countryside, effective governance and affluent living.

### **(3) Label model construction**

Tagging is a flexible, multidimensional and suitable model system for big data systems. In the field of information technology, tagging technology is usually used in the field of "user profiling", i.e., describing and portraying user characteristics by tagging things with

different labels. This paper innovatively applies the core of portrait technology, i.e. labeling technology, to the evaluation of rural revitalization, providing more technical tools and display methods for evaluating the development level of rural revitalization.

#### (4) Multi-indicator integrated measurement method

In this study, the relatively objective assignment method and entropy value method are selected to determine the index weights, and then the development level of rural revitalization is measured by the multi-indicator comprehensive evaluation method. In order to make the data of different dimensions comparable with each other, they need to be standardized. The formula is:

$$U = \sum_{j=1}^q W_j C_{ij} \quad (1)$$

$U$  represents the development level of rural revitalization.

### **3. Analysis of the evaluation results of the level of rural revitalization**

In order to verify the validity of the algorithm proposed in this paper, two villages of the same level in the same province, A and B, with almost no obvious differences, were randomly selected for the evaluation of five indicators to be measured. the comprehensive scores of the development level of rural revitalization of A and B are shown in Table 1.

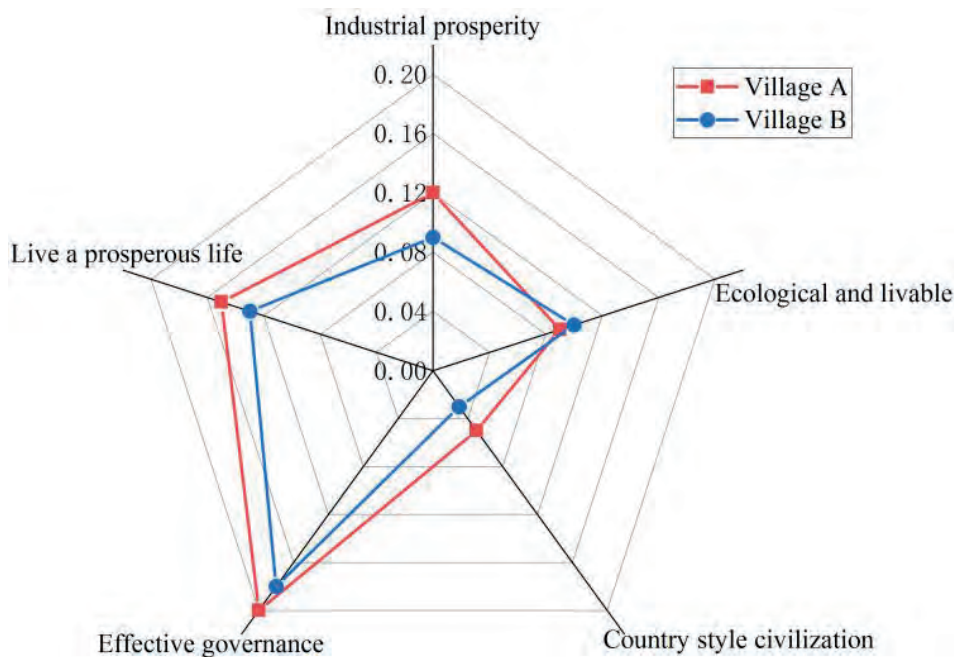
Village A has an overall score of 0.800, while Village B has an overall score of 0.733. In terms of the overall score, Village A has a higher level of rural revitalization development than Village B. In terms of the five indicators, the scores of effective governance and affluent living are higher in both villages A and B, while the scores of ecological livability are in the middle, and the scores of prosperous industry and civilized countryside are lower. In the effective governance, village A scored 0.201 and village B scored 0.197, which means that the infrastructure of the two villages is more perfect and the residents are more satisfied with the rural governance. The industrial prosperity scores were 0.126 and 0.102 respectively, with a difference of 0.24 points. Comparing the measurement results with the actual economic development level of the two villages, the results show that the

measurement method of this paper is almost the same as the actual statistics, and the algorithm of this paper is valid.

**Table 1.** Comprehensive score of rural revitalization and development level of A and B

Indicator Dimension	Index name	Index score	
		Village A	Village B
Level I indicators	Industrial prosperity	0.126	0.102
	Ecological and livable	0.145	0.159
	Country style civilization	0.132	0.109
	Effective governance	0.201	0.197
	Live a prosperous life	0.196	0.166
Comprehensive score		0.800	0.733

The scores of the five indicators in villages A and B are shown in Figure 1. The highest scores are still effective governance and affluent living, and the scores of village A and B are 0.2 and 0.18 respectively.



**Figure 1.** Scores of 5 Indicators in Villages A and B

#### 4. Suggestions for enhancing the development of rural revitalization

(1) Formulate village development planning based on its own endowment. Explore suitable development models based on their own endowments and reasonably formulate development plans for villages. In this process, the principles of sustainability and comprehensiveness should be emphasized. Sustainability requires

that future development needs be fully considered and that current development should not seriously affect the space and resources needed for future development. Comprehensiveness requires development planning from multiple dimensions such as industry, culture, environment and spatial layout.

(2) Based on sustainable development, take the green development path. Establish and improve the centralized treatment mechanism and comprehensive utilization mechanism of domestic production waste according to local conditions, and store domestic waste at fixed points and collect and treat it in a unified manner. Establish a centralized collection system for domestic sewage, and adopt biological treatment method and physical treatment method for terminal treatment of domestic sewage. Actively realize the sustainable development of rural ecological tourism, make reasonable use of natural resources and protect the ecological environment in order to maximize the environmental, social and economic benefits.

(3) In terms of industrial development, promote the comprehensive development of various industries. The industrial prosperity required by rural revitalization is not the prosperity of a certain industry, but the overall prosperity of industries. Therefore, the government should comprehensively layout and integrate the development of one, two and three industries in the countryside.

(4) In the construction of rural civilization, the cultural construction of villages should be strengthened and the cultural infrastructure should be improved. The convenience of infrastructure largely determines whether residents are willing to participate in various cultural activities. Focus on promoting excellent traditional culture and enhancing the vitality and attractiveness of excellent traditional culture. We should also actively protect the local culture, preserve the original appearance, and reasonably develop and utilize the limited resources without destroying the original original appearance.

## **5. CONCLUSION**

This paper explores the credibility of the application of big data in the development level of rural revitalization, and constructs a method to obtain data for the evaluation of the development level of rural revitalization. The relatively objective assignment method and entropy



value method are used to determine the index weights, and then the multi-index comprehensive evaluation method is used to measure the development level of rural revitalization, and two rural villages A and B with almost no difference in economic development level are selected respectively for algorithm verification. Among them, the comprehensive score of village A is 0.800 and that of village B is 0.733. The results were compared with the actual economic development level of the two villages, and the results showed that the measurement method of this paper was almost the same as the actual statistics. Thus, it can be seen that the application of big data to the measurement of rural revitalization development level is error-free and the evaluation is real and meaningful.

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# Design of basketball players' passing action decomposition in the context of deep learning

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## **ABSTRACT**

The level of basketball players' passing directly affects the overall level of the whole team and the performance of the game. This paper firstly explores the importance of basketball passing technique and passing awareness and the requirements of basketball passing technique quality. The deep learning target tracking algorithm is used to measure the accuracy of action capture, and the action decomposition system is built under the BP neural network algorithm, and then the two are verified separately. The combined value of BP neural network decomposition was verified as 2.282 and the combined value of basketball expert evaluation was 2.87. The accuracy of deep learning target tracking algorithm was 90% in chest passing action, 90% in ground passing and 98% in low hand passing. The design solution of this paper has high accuracy and is suitable for basketball movement breakdown design training and teaching.

## **KEYWORDS**

Deep Learning; Basketball; Passing action breakdown; BP Neural Network

## **1. INTRODUCTION**

In modern basketball, the use of passing and catching techniques in a basketball game reaches thousands of times. And in the game technical statistics, the successes and errors of passing and catching

have been used as an important factor in analyzing the winners and losers of the game [1]. It is also an important indicator for evaluating a good athlete for the merit of his passing assist ability [2]. In basketball, the passer's passing is the main method to organize the offense, achieve tactical cooperation and obtain shooting opportunities [3]. Currently, with the increasingly fierce confrontation between offense and defense and the increasing defensive ability, the requirements for the passing skillfulness and tacticality of the passer are getting higher and higher. In basketball teaching and training, only by comprehensively improving the quality and passing and catching ability of each player can the implementation of the team's tactical use be comprehensively improved, thus improving the overall strength of the team [4].

As a good passing player, one must master such a passing principle: from defense to attack. When making a full-court pass, observe and judge the ball from far and near; when entering the front court to pass the ball, one should first pass inside and then outside, and observe and judge the ball from near and far [5]. When passing the ball, the following three points should be achieved: First, according to the position of one's defender, choose a reasonable way to pass the ball, so that the ball is wide, hidden and versatile, and adaptable [6]. The more flexible the way of passing the ball, the more active it is. Second, master the flight speed of the ball according to the speed of the companion. If the ball is too fast, the player will not be in place to cause the ball to be lost, and if the ball is too slow, it will affect the movement of the companion and miss the opportunity [7]. Third, according to the defensive position of the companion to determine the ball's landing point, the general requirement is that the ball to the man, the ball's landing point is always on the far side of the defender. In the game, the reasonable use of different directions of the ball point, not subject to the restrictions of people, position and area conditions, fully embodies the concealment, versatility, flexibility and initiative of passing, reduce the blindness of passing, further improve the threat of passing, and enhance the efficiency of assisted passing [8].

This paper firstly explores the importance of basketball passing technique and passing awareness and basketball passing technique quality requirements to clarify the necessity of the study. By

constructing a basketball passing action decomposition design, we determine the use of deep learning target tracking algorithm to measure the accuracy of action capture. The BP neural network algorithm is used to build the motion decomposition system, and then the two are verified to prove the superiority of the design scheme of this paper. Finally, the design of basketball passing motion decomposition based on deep learning is proposed.

## **2. Basketball Passing Technique and Passing Awareness Development**

### **2.1. The importance of basketball passing technique and passing awareness**

(1) Passing is the main way to achieve the coaches' tactical intention and cooperation between players

The offensive tactics and cooperation laid out by coaches are essential in the process of passing implementation, and of course, the cooperation of players' blocking and running without the ball is also needed in this link [9]. In most of the play systems, most of the coordination is first through the cover without the ball, then run out of favorable position, and finally the player with the ball will pass the ball to the most favorable teammate's hands. Or maybe it's through one player's dribble break and then distribute the ball to a teammate in a favorable position. It is easy to see that only when the players have good passing awareness can they effectively complete the whole cooperation, so as to achieve the goal of scoring.

(2) Passing is an effective means for team offense and defense

In a basketball game, the players control the ball by dribbling, passing, holding and shooting. Passing has an active role in both offense and defense. In the team's offense by passing the ball can move and even disrupt the defender's position, making the defender lose effective position, thus creating favorable offensive opportunities for our team. In the fast break by passing the ball, the ball quickly gets into the frontcourt, creating the opportunity to score directly with more than one player or players on the basket. On defense, especially when the game is about to end and our team is leading, effective passing can prevent the opponent from making tactical fouls.

## **2.2. The basic quality requirements of basketball passing technique**

### **(1) Solid basic skills**

The passing fundamentals of the player must be quite solid and mature. In a high intensity confrontation with strong players, you can only pass with the strong side hand and not with the weak side hand, but such problems are common among basketball players in general. This not only lacks the line variation of passing, but also reduces the attacking surface of passing, and at the same time gives the defender half of the defensive pressure, making the attack less threatening and the chance of success less. Therefore, in basketball technical training, should strengthen the special practice of the weak side of the hand, pay attention to the equal number of strong and weak hand practice, balanced development of the ability of both sides of the hand. In the training can be used only the weak side of the hand to pass, catch the ball reinforcement exercises and special rules of the rivalry game or games. In this way to improve the weak-side hand's ability to pass and control the ball, and enhance the game fighting ability.

### **(2) Ability to pass the ball well while moving quickly**

Adopting a fast-moving style of play requires large and substantial frequent transfers of men and balls, striving to find attacking opportunities in the cover of peers and getting rid of defenders. In the game, even if an attacking opportunity is created, it is instantaneous. In order to pass the ball well in a tight defense that is fast, high and strong, it is necessary to strengthen the confrontation practice in the usual training, to exercise various passing abilities in a confrontation with fast movement, to improve the rhythm of movement and body coordination, to improve the accuracy of the sense of time and space position, and to improve the ability of tacit cooperation between players of the same team.

## **3. Design of basketball players' passing action decomposition in the context of deep learning**

### **3.1. Deep learning target detection algorithm**

Deep learning is a class of multilayer neural network algorithms capable of automatically learning and training the hidden internal structure in data through supervised, semi-supervised or

unsupervised training methods. Compared to manual extraction of low-level features, deep learning is able to transform the pixel data in the input image into higher-order, more abstracted layer-level features. Therefore, the features extracted by deep learning have stronger representational power and robustness than traditional methods. This advantage makes deep learning irreplaceably superior in research and applications in computer vision.

### 3.2. BP neural network basic steps

Step 1: Collect the initial sample data, determine the number of nodes in the input and output layers and the expected values.

Step 2: Set the parameters. The number of nodes in the input and output layers are determined by the actual problem, and there is no hard requirement for the selection of the implicit

There is no rigid requirement for the selection of the hidden layer. The number of nodes in the implicit layer is calculated using the empirical formula (1) and expressed as:

$$l = \sqrt{m + n} + a \quad (1)$$

Where  $m$  is the number of nodes in the input layer,  $n$  is the number of nodes in the output layer, and  $a$  is a regulation constant between 1 and 10. The activation function is selected as the default activation function used by the newff function in MATLAB, i.e., tansig (double S) type. The learning rate, the number of samples in the training set and the test set can determine the result by iterative attempts.

MATLAB software is applied to conduct simulation experiments, and the steps are as follows.

Step 1: Forward normalization of the data using Equation (2).

$$x'_{ij} = \frac{x_{ij} - x_{\min}}{x_{\max} - x_{\min}} \quad (2)$$

Step 2: Perform forward normalization on the data.

Step 3: Output the final prediction result.

### **3.3. Construction of basketball passing action breakdown system**

#### **(1) Basketball action index system determination**

Before constructing the basketball action decomposition model, it is necessary to clarify the decomposition action index system. Combining the principles of scientificity, precision, comprehensiveness and operability, the detailed analysis is carried out and fully considered according to the clear requirements of quality assurance for evaluation of higher education institutions.

#### **(2) Implementation of BP neural network structural model in basketball passing action decomposition**

The implementation of the BP neural network model requires the selection of numerical computing visualization MATLAB simulation software with very high performance. By constructing a 3-layer BP neural network, which contains 12 input layer neurons, 1 output layer neuron, and 8 hidden neurons, the number of training sessions must not be less than 1600, and the allowable error is 0.001, five test data with sample data are selected.

### **4. Simulation results of basketball passing breakdown action system**

#### **4.1. Results of basketball action decomposition under BP neural algorithm**

In order to verify the validity of the basketball passing action decomposition results, the basketball action decomposition results were compared and analyzed with the basketball expert evaluation results, and the results obtained by the simulation software were compared with the expert results.

The comparison status of basketball action decomposition results and basketball expert evaluation results is shown in Table 1. From the table, we can know that the integrated value of BP neural network decomposition is 2.282, and the integrated result of basketball expert evaluation value is 2.87, and the difference between them is 0.588. But the BP neural network decomposition result is close to the result of basketball expert evaluation, and there is almost no difference between the two equal.



**Table 1.** Comparison between basketball action decomposition results and expert evaluation results

Serial No	BP neural network decomposition value	Decomposition results of BP neural network	Basketball expert evaluation value	Basketball expert evaluation value
1	0.401	excellent	0.51	excellent
2	0.403	pass	0.51	pass
3	0.561	poor	0.72	poor
4	0.313	good	0.42	good
5	0.604	secondary	0.71	secondary

In addition, to confirm the experimental effect, five sets of data prepared in advance were compared with the results obtained using the simulation software and the results of basketball experts.

The comparison between the simulation software and the expert evaluation results is shown in Table 2. The total value of the evaluation by the simulation software was 3.2495 and the total value of the evaluation by the basketball expert was 3.38, with a difference of 0.1305. but in terms of the evaluation results, the simulation results were close to the evaluation results provided by the basketball expert. This indicates that BP neural network has high application value in basketball passing action decomposition evaluation, can replace manual evaluation, and achieves good basketball action analysis effect.

**Table 2.** Comparison of simulation software and expert evaluation results

Serial No	Evaluation value of simulation software	Simulation software evaluation results	Basketball expert evaluation value	Basketball expert evaluation results
1	0.5613	poor	0.72	poor
2	0.6524	pass	0.64	pass
3	0.6401	excellent	0.63	excellent
4	0.7240	good	0.76	good
5	0.6702	secondary	0.63	secondary

#### 4.2. Basketball motion capture results with deep learning

To verify the accuracy of the deep learning target detection algorithm for basketball passing action capture, the three actions of chest pass, ground pass and low hand pass in the basketball game video are

parameter locked and the deep learning capture results are compared with the basketball coach capture results.

The results of comparing the accuracy of deep learning algorithm with basketball coach action capture are shown in Figure 1. In the chest pass action the basketball coach capture accuracy is 70% and the deep learning target tracking algorithm capture accuracy is 90%. The ground pass basketball coach captures 80% accuracy and the deep learning target tracking algorithm captures 90% accuracy. The basketball coach captures 85% of the low-handed passes and the deep learning target tracking algorithm captures 98%. Obviously, the deep learning algorithm accuracy is higher than the basketball coach, and the method set up in this paper can provide technical support for basketball coaches to train basketball players.

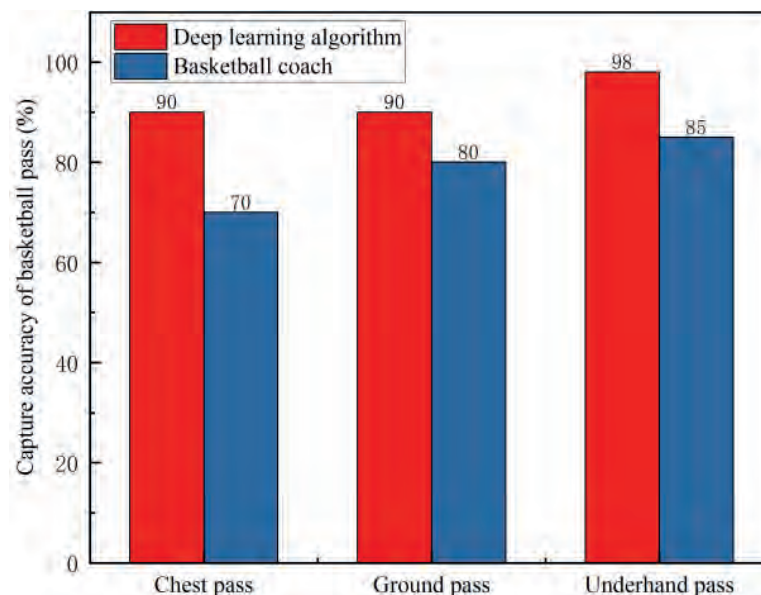


Figure 1. Comparison of depth learning algorithm and basketball coach's motion capture accuracy

### 4.3. Basketball movement breakdown design program

#### (1) Stance posture

a. Divided into parallel feet or front and back feet "small lunge" two standing method.

b. On the basis of "sitting chair", the back is slightly leaned forward into a "slope" position.

c. Align your feet to the basket as much as possible.

#### (2) In front of the chest or side of the torso, prepare to hold the ball

a. This state is for the following two situations: one is to catch the ball and shoot directly, the other is to catch the ball and then need to connect the "hidden ball" action. The common point is that the thumbs of the shooting hand and the ball protector are slightly in a "T-shape" on the basis of the stance, with the shooting hand's thumb being one of the vertical. The difference is that the chest is ready to hold the ball with the shooting hand pressed on the top of the ball, while the side of the torso "hidden ball" action, the shooting hand is directly above the ball.

b. The five fingers of both hands are separated. The shooting finger roots, finger belly are touching the ball, the palm of the hand is empty, and the ball protector touches the ball with the whole palm.

### (3) Holding the ball on the shoulder

a. On the basis of the second point of the articulation, place the ball directly above the shoulder joint and keep the throwing hand touching the ball correctly.

b. Maintain the "three right angles, two parallel" position. The back of the hand and the forearm, the forearm and the big arm, and the inside of the big arm and the front chest are the "three right angles". The big arm is parallel to the ground and both shoulders are parallel to an imaginary straight line in front from the preparation to the shot, which is "two parallel".

c. The hand protector is on the side of the ball, and the thumbs of both hands remain "T-shaped".

(4) The pitching arm is extended upward, the wrist is shaken and flexed, the fingers pluck the ball, and the ball protecting arm is fully extended at the same time

a. Pitch the ball with the palm of the hand facing upward, and then press the wrist when it is close to being fully extended, using the palm of the palm to be empty and the fingers to pluck the ball to make it rotate.

b. The arm of the ball protector follows the extension, keeping the ball on a positive flight path.

(5) Coordinate the upper and lower extremities together and press the wrist sufficiently

- a. Lower limbs stomp the ground, coherent and coordinated from bottom to top.
- b. Throw the ball with the wrist aligned to the basket, fingertips relaxed and slightly separated and pointing to the ground as much as possible.
- c. Soft rotation of the basketball, positive direction, try to enter the ball.

## **5. CONCLUSION**

In this paper, the design scheme of decomposition of basketball players' passing action is studied in the context of deep learning. Firstly, we analyze the importance of basketball passing technique and passing awareness and the quality requirements of passing technique, determine the use of deep learning target tracking algorithm and BP neural network algorithm as the technical means of the design scheme of this paper, and verify both of them respectively. In the chest passing action, the accuracy of deep learning target tracking algorithm was 90%, ground passing accuracy was 90%, and low hand passing accuracy was 98%. the integrated value of BP neural network decomposition was 2.282, the integrated result of basketball expert evaluation value was 2.87, the total value of simulation software evaluation was 3.2495, and the total value of basketball expert evaluation was 3.38, with a difference of 0.1305. The design scheme has high accuracy and is consistent with the basketball expert evaluation results, which has the value of promotion.

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# Optimization of youth sports training methods based on VAR model

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## **ABSTRACT**

In order to improve the scientific nature of youth sports training, this paper attempts to construct an optimization method for youth sports training with the help of VAR model. Firstly, the physiological basis of youth sports training is interpreted to ensure the characteristics of youth physical fitness. The common methods of youth sports training are dissected and their problematic areas are identified, the VAR prediction model and training optimization method are proposed, and the whole scheme is verified by co-integration. The ADF values for endurance duration of adolescents were -0.141520, for exercise impulse -2.55420, and for lactate concentration -1.415530, all of which were greater than the critical values of 1%, 5%, and 10%. The likelihood probability is 0.0133 for the "no cointegration" hypothesis and 0.3085 for the "at most one cointegration" hypothesis. the study protocol of this paper is smooth and cointegrating, and can be used as a reference for youth sports training.

## **KEYWORDS**

VAR model; Teenagers; Sports Training; Co-integration verification

## **1. INTRODUCTION**

Adolescents are the future of the country, and the training of adolescents should be aimed at diversified training. Along with learning textual knowledge, adolescents need to exercise a strong

body and healthy mind, sound personality development and comprehensive literacy [1]. The inclusion of humanism in sports training is the incorporation of sports training sentiments. Presenting a new perspective in shaping the value concept, emotional concept and moral literacy of adolescents can give them greater psychological satisfaction in sports and effectively promote the development of sports training [2].

The spirit of sports humanism is gradually formed in the continuous development of sports, and is the core quality of sports pursued by modern sports training, which is the requirement of national quality education [3]. Under the perspective of sports humanism, sports training is not only a requirement for physical quality, but also from the health of people themselves. Taking people as the fundamental starting point, it focuses on the physical health and psychological health of the training personnel, their adaptability in society, etc. [4]. The requirements for training personnel are not only to have a strong body and superb sports competition skills, but also to develop mentally, morally, and spiritually at the same time, which is the core of the development of sports humanism to this day [5]. Indispensable in sports training is the development and reform of sports rules, as well as the concept of sports competition, democracy and peaceful solidarity among peoples [6]. In the Olympic spirit, in addition to the pursuit of faster, higher and stronger, the Tokyo Olympics added unity. This is an advancement in the spirit of sports, an expansion of the humanistic spirit in sports training, reflecting the solidarity between people in sports and making sports competitions more humanistic. After each game, regardless of the results, there is no national boundary, and each athlete will hug and encourage each other, which is the best interpretation of the humanistic spirit of modern sports. The athletes can understand each other's hardship in training, and every sportsman deserves to be recognized.

This paper firstly deconstructs the basis of the whole sports training for adolescents one by one. The physiological basis of training is deconstructed from three aspects: motor system, cardiovascular system, and respiratory system, and the common methods used in youth training are analyzed and their current training problems are identified. Then, the VAR model prediction method and the optimized training method designed in this paper were proposed, and the male

1500m long-distance running performance of A high school physical training students was extracted to serve as a research model for unit characteristic root and co-integration tests. The research proposal of this paper is useful for youth sports training improvement.

## **2. Youth Sports Training System**

### **2.1. Physiological basis of youth sports training**

#### **(1) Movement System**

The proportion of organic and inorganic material in the bones in the human body varies at different ages. For adolescents, there is significantly more organic material than inorganic material, so the bones are tougher and more flexible. However, it is poorer in terms of hardness and strength, and requires proper exercise to promote bone growth. In addition, adolescents have more water in their muscles and have less inorganic salt and protein, and their muscles are more elastic. However, the muscles are not strong enough and are prone to fatigue.

#### **(2) Cardiovascular System**

The heart of adolescents is not well developed, and the heart is smaller in volume and total volume than that of adults, and the heart muscle fibers are thinner, but adolescents have a high metabolism, so they need to compensate by heart rate during exercise. With the onset of puberty, the heart begins to develop, although the development of blood vessels is slower, coupled with more gonadal and thyroid secretion, which can easily lead to higher blood pressure.

#### **(3) Respiratory System**

Adolescents have a small thorax and weak respiratory muscles, which usually manifest as shallow, fast breathing and low lung capacity. Compared with adult trachea and bronchi, the lumen of adolescents is narrower, the mucosa of trachea is weaker, and the cilia of ciliated epithelial cells in the trachea are less mobile, which makes them vulnerable to microorganisms and dust.

### **2.2. Main methods of youth sports training**

#### **(1) Competition training method**



The competition training method is good for motivating young people's desire to win, and it helps them to enhance their own sports in competition practice. For example, basketball, badminton and aerobics competitions can effectively motivate youth to train and maintain good training intensity, and also help to improve the actual combat effect.

## (2) Decomposition training method

The decomposition training method is to divide the whole set of movements into different links, the method can reduce the difficulty of the movement, easy for young people to master. Especially for the more difficult sports movements, it is more appropriate to take the decomposition training method, in the process can enhance the confidence of youth learning. The disadvantage is that the overall action is difficult to form in the minds of young people, so in the process of training need to be used in this training method for more complex, decomposable action training to go. Therefore, the current segmental training method, as well as the sequential decomposition training method, are more applied decomposition training methods [7].

## (3) Continuous training method

This method is to allow adolescents to train continuously and persistently over a longer period of time, which includes the following three main approaches: one, short duration training. This method does not have qualitative requirements for movements and the combination of movements, and can be adjusted with the actual training requirements. It can effectively enhance the endurance of adolescents in quality training and achieve a combination of aerobic and anaerobic exercise [8]. Second, the medium-time continuous training method. This method can play a significant role in the process of endurance training. It is mainly based on aerobic exercise to enhance the sport-specific endurance of adolescents and improve the stability of movements, which is more common in middle-distance running training. Third, the long duration training method. In addition to the above training methods, long duration training is also an effective method for endurance enhancement, and adolescents mainly use uniform speed, variable speed and Fatalek for long duration training [9].

### **2.3. Problems with youth sports training**

#### **(1) Bias in the perception of training intensity**

From the current situation of Chinese youth sports, there is a tendency for some coaches to blindly increase and decrease the intensity of training. The main purpose of increasing the intensity of training is to avoid the training quality not meeting the standard or not reaching the training level of other countries. Under this concept, high-intensity training tends to lead to high physical and mental stress among youths, while low-intensity training mainly takes into account the physical and mental characteristics of youths, although it is not effective in improving their sports skills.

#### **(2) There are differences in the physical fitness of adolescents**

Adolescents have certain requirements for their physical strength and endurance in the process of sports training. Some of the adolescents with poor physical fitness and those with better physical fitness will have significant differences in completing the same training tasks. This tends to damage the training motivation of adolescents, and the difference in physical fitness will also affect the strategy development of coaches to some extent.

#### **(3) Bias in the understanding of competition instead of practice**

The number of current sports competitions is increasing, so there are more and more opportunities for youth to participate in competitions in addition to training. Many coaches will let youth participate in different types and levels of competitions in order to improve the level of youth sports, and keep youth in competition condition by using competition as training. However, due to the lack of experience in training, it may not be possible to adjust the problems in the training, and the long-term use of the method of competition will also increase the probability of youth sports injuries.

### **2.4. Biased understanding of competition rather than practice**

VAR models are commonly used for forecasting 2 or more correlated time series. VAR models can generally be expressed as restricted vector autoregressive models by the following equation.

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots A_p y_{t-p} + Bx_t + \varepsilon_t \quad (1)$$

Where  $y_t$  is the  $n$ -dimensional endogenous vector;  $x_t$  is the  $m$ -dimensional exogenous vector;  $\varepsilon_t$  is the  $n$ -dimensional random perturbation vector;  $A_i (i=1,2,\dots,p)$  and  $B$  are the coefficient matrices. In particular, when the exogenous vector is a constant matrix  $C$ , the VAR model becomes the following equation (2), called the unrestricted vector autoregressive model.

$$y_t = C + A_1 y_{t-1} + A_2 y_{t-2} + \dots A_p y_{t-p} + \varepsilon_t \quad (2)$$

This paper applies the method to predict the indicators in youth sports training.

### **3. Optimization of youth sports training methods**

#### **3.1. Youth sports training optimization methods**

##### (1) Establishing a youth-oriented mindset

In the process of innovative youth sports training methods, coaches should take youth as the main subject. Especially in the process of sports training at the early stage of adolescents, their sports expertise is poor, so coaches should not bring too much negativity into the training or make training plans according to the changing situation. Rather, they should fully follow the physical and mental characteristics of the youth, accept their opinions, and then innovate training methods and approaches so as to steadily improve the training effect.

##### (2) Doing good training prep activities

To achieve good training results, youth need to adjust their bodies to the best condition through warm-up and preparation activities in the pre-training period. In recent years, the innovation of youth sports training pre-preparation activities has also become the focus of attention. Traditional training methods mainly include slow walking, stretching exercises, but now some of the pre-training program can be aerobics exercise or the use of small games to achieve the warm-up effect.

(3) Building a grassroots amateur training system and giving full play to the role of single associations

Increase the construction of youth associations, innovate and reform the management mode of associations, and fully mobilize the enthusiasm of single associations. Projects with a good mass base are carried out using the market model, such as the establishment of clubs. At the same time, the assessment system and funding policy of club assessment are formulated with the youth training attainment to motivate them to give full play to the characteristics of each project. Strengthen the cooperation with educational institutions to carry out sports activities in schools. Promote in schools, provide coaching training venues for schools, organize various training camps to attract more young people to participate in various sports, continuously train sports talents, and gradually form a youth training system.

### **3.2. VAR model prediction results**

The purpose of unit root test is to determine whether the series is a smooth series or not, otherwise it may easily lead to pseudo-regression. In this paper, the endurance tolerance duration, exercise impulse, lactate concentration, and heart rate variability of male long-distance running 1500m of physical training students in A high school were used as variables to verify the smooth series of the training program in this paper. The results of unit root test of male long-distance running 1500m training in A high school are shown in Table 1.

The ADF value of endurance tolerance time for long-distance running 1500m for male physical training students in high school A was -0.141520, which was greater than the critical values of 1%, 5%, and 10%. The ADF value for exercise impulse was -2.55420, which was greater than the critical values of 1%, 5%, and 10%. The ADF value for lactate concentration was -1.415530, which is greater than the 1%, 5%, and 10% thresholds. This indicates that endurance tolerance duration, exercise impulse, and lactate concentration are smooth sequences. The ADF value of heart rate variability was -3.660007, which was less than the 5% and 10% critical values, and the heart rate variability was a non-stationary time series. Thus, the youth sports training program designed in this paper basically performed smoothly, and the general direction of the program was error-free, but

there were areas that needed to be adjusted. Heart rate variability corresponds to the shallow level of exercise intensity, and students' endurance should be moderately observed during training, and the training volume should be increased gradually.

**Table 1.** A Root Test of 1500m Long distance Running Training Unit for High School Boys

variable	ADFvalue	1% critical value	5% critical value	10% critical value	conclusion
Endurance	-0.141520	-4.130886	-3.132870	-2.613752	stable
Exercise impulse	-2.55420	-4.100037	-3.182410	-2.628450	stable
Lactic Acid concentration	-1.415530	-2.760875	-1.780650	-1.60574	stable
Heart rate variability	-3.660007	-4.058750	-3.117021	-2.574103	Unsteadiness

This paper conducts a cointegration test with the level of physiological adaptation of adolescents on the basis of the youth sports training optimization program. The cointegration test is mainly to examine whether there is a long-term equilibrium relationship between the groups of variables under study, and it is only meaningful to study them jointly if there is a certain association.

The results of the cointegration test of the VAR youth sports training model constructed are shown in Table 2. For the hypothesis of "no co-integration", the likelihood probability is 0.0133, which is less than the 5% confidence level, so the original hypothesis is rejected. For the hypothesis of "at most one cointegration", the likelihood probability is 0.3085, which is greater than the 5% confidence level, so the original hypothesis is accepted. This also indicates that there is a co-integration relationship between the two, that is, there is a long-term equilibrium relationship between youth sports training program and youth physiological adaptation level. It is meaningful to study them together, and the training program designed under the VAR model in this paper is valid.

**Table 2.** Cointegration test results of VAR youth sports training model

Original hypothesis (number of co integration variables)	characteristic value	Trace statistic	5% critical value	Likelihood probability	conclusion
nothing	0.789875	19.342786	15.503768	0.0133	refuse
Up to one	0.85378	1.093840	3.841765	0.3085	accept

#### 4. CONCLUSION

In this paper, the VAR model is used as the main technical principle to study the possibility of applying the model to youth sports training and to explore the best training optimization methods applicable to youth groups. The problems are identified by analyzing the physiological basis of youth training and the main training methods one by one. A VAR prediction model for youth sports training is proposed based on the current state of the problem. In this paper, for the hypothesis of "no cointegration", the likelihood probability is 0.0133, which is less than 5% confidence level, and the original hypothesis is rejected. For the hypothesis of "at most one cointegration", the likelihood probability is 0.3085, which is greater than 5% confidence level, and the original hypothesis is accepted. It can be seen that there is a co-integration relationship and a long-term equilibrium relationship between youth sports training program and youth physiological adaptation level.

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# The application of big data technology in rural tourism enterprise marketing under the background of new media era

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## **ABSTRACT**

In order to improve the marketing effect of rural tourism enterprises and expand the awareness of rural tourism destinations, this paper uses big data technology as a means to study the ways of optimizing the marketing strategies of tourism enterprises in the context of the new media era. Taking ShakeYin APP, which currently has the largest number of user fans, as the research object, big data technology is used to obtain users' travel tendencies. Among them, 40% of users tend to be recommended by famous travel bloggers when choosing travel destinations; 25% are recommended by netizens; 15% are vegetarian tourists' experiences, 10% are recommendations of official tourism videos, and the remaining 10% are live tourism broadcasts. In the context of the new media era, the combination of integrated marketing with the self-media platform can promote the maximum marketing effect.



## KEYWORDS

New Media Age; Big Data Technology; Rural Tourism; Corporate Marketing

## 1. INTRODUCTION

The era of big data is the main trend of today's society, where abstract information will be delivered in the form of data. People use the technical means of big data to sort, analyze and process and refine the information that is really useful for them in a huge amount of information [1]. Modern tourism enterprises are industries that carry out service business based on information and face great market opportunities and challenges in the context of the big data era. The popularity of informational networks has led to convenient and fast solutions to people's travel needs, which directly affects their consumption habits [2]. Tourism enterprises should change their traditional marketing methods on the basis of big data, keep pace with the times, combine modern information technology, innovate marketing methods comprehensively, ensure scientific management and efficient operation, and continuously improve the competitiveness of tourism enterprises in the market [3].

On the one hand, in the network era, people can obtain tourism information without the limitation of time and space, and tourism-related information can be accessed through the Internet. Accommodation, transportation, and tickets can be booked in advance online, which gives travelers more choices [4]. The advent of the big data era has led to the autonomy of people's travel consciousness. People can flexibly arrange their travel itineraries according to their own preferences, and meet their personalized choices in terms of travel food, accommodation, travel, purchase and entertainment [5]. In travel forums, postings and other communication platforms, tourists can share real travel experiences, have more intuitive feelings about travel itineraries and hotel and attraction evaluations, and the information becomes more real and accurate, which makes the interactive communication among travel consumers enhanced. On the other hand, with the development of tourism, people's travel needs are no longer simply visiting, but more in the pursuit of spiritual satisfaction. Tourism demand becomes more and

more "advanced" and "deep", people are more eager to obtain intangible spiritual value in the process of tourism [6]. At the same time, tourists are more aware of their travel needs, and information technology can not only provide people with timely, convenient and up-to-date information about the tourism market, but also motivate tourists to plan and arrange with their own thematic needs. Information becomes a catalyst for tourists' tourism, and tourists' tourism consciousness shows the characteristics of overtaking [7].

This article first analyzes the current situation of rural enterprise marketing in the context of the new media era and dissects the dilemma of tourism enterprises in marketing. The article uses the travel browsing preferences of users on the Jitterbug APP as a big data correlation and investigates the travel attention of users to serve as the basis for the proposed suggestions. At the same time, it also proposes to market-oriented and new media technology as the main grasp of rural tourism enterprises marketing strategy, and according to the needs of consumers to develop a targeted marketing strategy plan. Tourism enterprises need to innovate marketing service means to accurately track tourism consumers and provide quality services, and also use information technology means to enrich marketing methods and achieve cross-platform big data sharing and interoperability.

## **2. The current situation and problems of rural tourism enterprise marketing under new media**

### **(1) Single marketing channel**

More rural tourism enterprises publicity channels, one is through the government propaganda. Government promotion is region-specific, creating a macro environment that does not target specific enterprises for marketing and promotion. Enterprises can "piggyback", but the effect is limited [8]. The second is through commercial enterprises and platform cooperation. More rural tourism enterprises cooperate with travel agencies, outdoor development companies, training companies, and conference companies. However, there is some competition between rural tourism enterprises and branded resorts and urban business hotels, resulting in limited clientele and obvious cycles.

### **(2) Weak marketing products**

Rural tourism enterprises product design and development capabilities are relatively weak. Food and beverage products of a single variety, "a chicken a few eat + play mahjong" popular for a while, "one trick" can no longer win. Accommodation products often ignore the characteristics of the times, is no longer just "bed + sleep", the comfort of the accommodation experience and functional configuration is particularly important. The natural environment of rural tourism enterprises is not left to grow naturally, and requires planning and design. In general, the current rural tourism enterprises' products are homogenized and not updated in time, failing to combine the new era of consumer characteristics and needs for product development, and failing to make full use of tourism resources for the integration of primary, secondary and tertiary industry products [9].

### (3) Lack of marketing talent

Talent is always a source of motivation for business development. Rural tourism enterprises, from owners to employees, often lack marketing professional learning experience and knowledge skills. Rural tourism enterprises have certain limitations in attracting professional talents due to the fact that they are located in areas basically in the suburbs or mountainous areas, which are relatively remote, coupled with the lack of clarity in various aspects such as the culture and values of the enterprise. In particular, professional marketing talents are scarce. Since rural tourism is a comprehensive industry, integrating one, two and three industries, the requirements for marketing talents are different from other industries, therefore, talents meeting the marketing requirements of rural tourism are even more scarce.

### (4) Backward marketing concept

Rural tourism enterprises are mostly upgraded by agricultural enterprises, farmhouses, etc.. Enterprises are mostly owner-operated and managed independently, confined to the cultural quality of the owners and other aspects, most with traditional concepts, waiting for customers to come to the door is a strong idea, there are most enterprises to the government and other departments of marketing work. If the government to promote the transformation and upgrading of agriculture, it is necessary to vigorously develop rural tourism, and constantly increase investment and publicity, increasing financial

expenditures. The enterprise initiative to promote the way is also relatively simple, "stopping the road to pull customers", "hiring people to shout", "set up a large signboard", "fake flowers and flags " and other sales methods, which lacks the understanding of marketing, moreover, the understanding of new media [10].

### **3. Marketing innovation strategy of rural tourism enterprises in the era of new media background**

#### **3.1. Market-oriented marketing strategies for rural tourism enterprises**

##### **(1) Development of differentiated special tourism products**

Rural tourism products should be based on regional characteristics, and must develop original tourism products. Only tourism products with originality and innovation can attract tourists in the long term. The aim is to further develop local tourism resources, develop tourism and cultural products, and classify different tourism products according to tourism market customers. The fast-paced and high-intensity life in the city makes many city dwellers wish to get away from the city and find an idyllic life. Rural tourism enterprises can design unique tourism and leisure products based on local tourism resources.

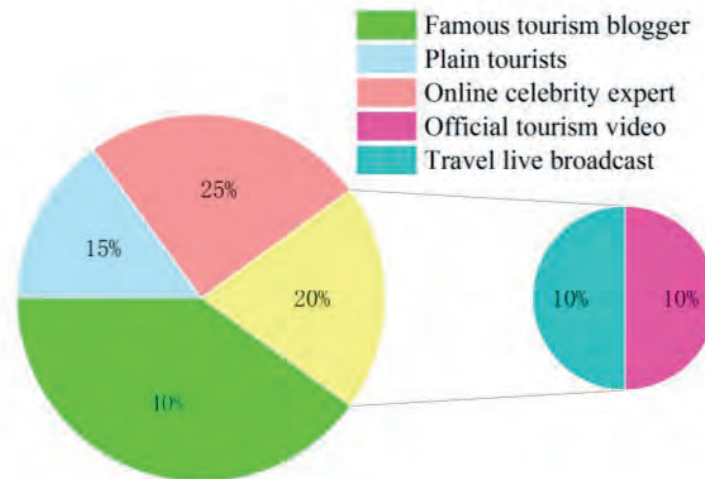
##### **(2) Reasonable pricing to increase the competitiveness of tourism products**

Adopt reasonable pricing to improve the competitiveness of tourism products and enhance the price sensitivity of rural tourism customer groups. When determining the price of rural tourism products, the consumption capacity and consumption habits of the consumer group should be fully considered. Given that rural tourism is a special product category, the prices of tourism products should be based on market supply and demand, and more flexible pricing methods should be adopted according to the differences between off-season and turbulent periods, and different pricing methods can also be adopted according to the target groups.

### **3.2. Marketing strategy of rural tourism enterprises based on new media technology**

In the era of new media, with the continuous development of self-media short videos, the mass tourism method is obviously different from traditional tourism. The tourism methods recommended by travel bloggers and "red" by net stars are impacting the traditional enterprise marketing and promotion methods. Next, we will use big data technology to obtain tourism browsing data of short video platform users, and use it to analyze the repositioning of the focus of rural tourism enterprises' publicity.

The situation of big data to obtain Jitterbug APP tourism data is shown in Figure 1. Users prefer well-known travel bloggers' recommendations when choosing tourism destinations, accounting for 40%; netizen experts' recommendations account for 25%; vegetarian tourists' experience recommendations account for 15%; official tourism video recommendations account for 10%; and live tourism recommendations account for 10%. Among them, well-known tourism bloggers such as Fan Qi, who has 21.764 million fans, has almost a stable amount of 250,000 shake video plays per release, and the fan effect is very considerable. Rural tourism as a popular tourist destination in recent years, tourism enterprises may wish to consider working with tourism bloggers together, as a way to open up corporate awareness. It is worth noting that the percentage of vegetarian tourists who recommend after experience also reached 15%, which reflects that in addition to the net red "grass", users also pursue the real sense of travel experience. Therefore, in tourism services, enterprises should first improve their own conditions, improve the comfort of tourists travel.



**Figure 1.** Big Data Obtaining Tiktok APP Tourism Data

According to the big data of travel preference and combined with the development trend of new media, this paper gives the following suggestions:

(1) Actively change the marketing concept and strengthen the application of new media research

First of all, leisure enterprise managers should change their marketing concepts and keep up with the times, and put business operation and marketing management in the current context. Secondly, compared with the four traditional media of newspaper, outdoor, radio and TV, the new media is imaginatively called the "fifth media". New media is a new technical support system for the emergence of media forms, such as digital magazines, digital newspapers, digital radio, cell phone SMS, mobile TV, live webcasting, desktop windows, digital TV, digital movies, touch media, cell phone network, etc.. Enterprises should fully study the impact of new media on the market and successful cases, find the combination of rural tourism and new media, develop new media marketing strategies and implementation steps, and use new media to help enterprises build new marketing systems.

(2) Combine various platforms of new media and build new marketing channels

Rural tourism enterprises should classify new media and different platforms to create different marketing channels. At the same time, it

is also possible to organically combine mainstream new media platform columns and boards with the characteristics of rural tourism enterprises to establish a new new new media channel system. Second, the management and maintenance of new media channels should be strengthened. The diversification of channel sources has put forward higher requirements on the management of enterprises. Tourism enterprises should carry out relative management and service according to the customers of different channels, especially those of new media channels, to form word-of-mouth and positive effects.

(3) Combine with the speed of new media communication to strengthen marketing and promotion

New media, as a new communication medium, has the characteristics of fast communication speed and wide communication range. Combining the characteristics of the new media's fast communication speed means that information is updated quickly. This requires that the speed and quality of content updates provided by rural tourism enterprises need to be synchronized with the new media platform, and the relevant information content should be maintained and updated frequently. In addition, combined with the wide range of new media communication, rural tourism enterprises are required to focus on the breadth and depth of promotional content to accommodate a wider range of communication. In particular, in the work of self-built new media publicity, it is more important to correspond to the needs of consumers and provide effective publicity information in order to improve the publicity effect in order to promote customer conversion.

#### **4. CONCLUSION**

This article studies more possibilities of marketing for rural tourism enterprises in the new media era based on the full-featured characteristics of big data technology. Starting from analyzing the current characteristics of rural tourism enterprises' marketing in the context of new media, the article analyzes the challenges faced by rural tourism enterprises in marketing and proposes marketing strategies for rural tourism enterprises that are market-oriented and based on new media technology. According to the survey data of Jitterbit APP, users are more inclined to be recommended by famous travel bloggers when choosing tourism destinations, accounting for

40%; by netizens, 25%; by vegetarian tourists' experience, 15%; by official tourism videos, 10%; and by live tourism, 10%. In the context of the new media era, cooperation with short video platforms will be more helpful to rural tourism enterprises to open their awareness.

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# Research on LSTM power load peak prediction method based on Bayesian network

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## ABSTRACT

To explore an effective method for predicting the peak electric load, this paper proposes a prediction study using LSTM based on Bayesian networks. A time series foretelling model based on long and short-term memory neural network (NN) and dynamic Bayesian network is proposed. An electric load forecasting scheme based on the leaf Bayesian network is established, and the forecasting accuracy of the leaf Bayesian network is compared with that of the BP NN. The prediction consequences confirm that the Bayesian network prediction accuracy reaches 98.81%% and 97.60%, and the BP NN reaches 95.42% and 97.41%, respectively, with a difference of 3.39 and 0.19. The peak load time prediction error is 2.82 h for the Bayesian network and 4.01 h for the BP NN. the model can improve the sequence forecast accuracy and speed while reducing the complexity of the algorithm.

## KEYWORDS

Bayesian Network; Short and long-term memory; Peak electric load; Prediction accuracy

## 1. INTRODUCTION

The basic task of electric power system is to provide uninterrupted, high-quality and stable electric energy to meet the electricity demand of various users [1]. In current years, with the quick growth of the general economy and the unceasing enhancement of the alive typical of the inhabitants, the proportion of electric energy in the end energy consumption has become higher and higher. The overall electric load shows a high growth rate, especially the growth rate of peak load is higher than the growth rate of electric load [2]. Currently, China's load peaks are constantly refreshed and the imbalance between supply and demand during peak periods is deepening [3]. Scientific and accurate load peak prediction could afford a position origin for the daily operation of power grids and the formulation of power dispatching schemes. Based on the forecast results, the power plant capacity can be reasonably arranged, and the balance of power supply and demand can be reasonably purchased to achieve safe, reliable and economic operation of the power grid [4].

Time series prediction is a hot problem in the field of pattern recognition and artificial intelligence, which has a wide range of application prospects and has received the attention of scholars and researchers [5]. At the same time, sequence prediction will encounter great challenges due to the development and popularity of computer technology. Multi-step prediction often uses some straightforward approaches, such as iterative and straight approaches. In the strategy based on the iterative method, the one-step ahead calculation is first calculated and then the other data are predicted through one-step process calculation value [6]. Another hand, in the straight method-based approach, one-step process or multi-step ahead values could be assessed based on the equal prediction model. Usually, the collective error is a significant feature disturbing the prediction accuracy in the iterative method, while the computational cost is an important factor to be considered in the direct method. Besides, some procedures such as DirRec strategy and multiple-input multiple-output method, as well as multiple-input multiple-output prediction models are proposed [7]. In the MIMO and MISMO procedures, the chief idea is to obtain higher prediction accuracy, and at the same time, all these approaches have high computational cost. In MISMO procedures, the original forecast commission is generally converted

into subtasks, which in turn use the optimal solution to compute the output, where algorithmic complexity is a key issue [8].

In the paper, a time sequence forecasting model through the principles of LSTM and Bayesian theory is proposed for recursive operational structure long and short-term memory NNs and dynamic Bayesian networks. Firstly, the theory of Bayesian network and its algorithm are elaborated, and then its parameter index prediction criteria are constructed to clarify the LSTM model and its application principle. By comparing the algorithm of this paper with BP NN, an optimal estimation theory is studied and proved, and on this basis, the optimal prediction estimate is obtained, which is used to establish that the model can decrease the intricacy of the algorithm while improving the accuracy and speed of sequence prediction.

## **2. Bayesian network-based peak power load model**

### **2.1. Bayesian Network Theory**

A Bayesian network is a focused acyclic graph whose bulges signify random variables and the variable values can be either discrete or continuous. The edges among the bulges signify straight additions between the variables, and each node has a possibility circulation attached to it [9]. The conditional probability distribution of the root protuberance is an edge possibility circulation  $P(X)$ , and the possibility circulation of the non-root node is a conditional probability distribution  $P(X|\pi(X))$ .

Bayesian network model building generally consists of two parts.

#### **(1) Network Architecture Learning**

The construction learning of Bayesian networks is mainly through learning the network construction that turns greatest with the data according to some quantity, and the approaches are chiefly confidential as a hybrid search algorithm through dependent arithmetical study, scoring search methods, and a combination of both. In this paper, the scoring-based search method is used to select the forbidden search algorithm, and the Bayesian information criterion (BIC) is selected for the scoring function. The BIC is quantified as follows:

The variables  $X$  and  $Y$  that obey the Gaussian circulation, then the

Gaussian probability density function of  $X$  conditional on the variable  $Y$  is:

$$f(X|Y) = \frac{1}{(2\pi)^{N/2} |S|^{1/2}} \exp\left\{-\frac{1}{2}(X - WY - U)\right\} \quad (1)$$

$$W = S_{XY} S_{XX}^{-1}, S = \begin{bmatrix} S_{XX} & S_{XY} \\ S_{XY} & S_{YY} \end{bmatrix}, U = [U_X - WU_Y] \quad (2)$$

Suppose there are  $m$  independent identically distributed exercise trials  $D$  and the log-likelihood function  $L$  is:

$$L = \log \prod_{i=1}^m f(X|Y, D) \quad (3)$$

Then the formula for calculating the BIC score  $S$  is:

$$S = L - M \ln(P) / 2 \quad (4)$$

Where:  $M$  is the number of bulges related to the probability density function;  $P$  is the number of bulges of the created Bayesian network.

## 2.2. Parameter Learning

Parameter learning of Bayesian networks is the problematic of decisive the limits of the possibility circulation of the network bulges, given the recognized network. Parameter learning approaches include the great likelihood estimation approach and Bayesian estimation approach. In this paper, the excessive likelihood valuation approach is used to guess the network parameters. It is known that  $p$  meta-normally distributed overall  $X \sim N_p(\mu, \Sigma)$ , let  $X_{(i)} = (x_{i1}, \dots, x_{ip})', i = 1, 2, \dots, n$ , is a  $n$  simple accidental model strained from  $p$  meta-normally distributed overall  $X$ , i.e.,  $X(i), \dots, X(n)$  is autonomously and identically dispersed with general  $X$ , and the unkind  $X$  covariance  $A$  and likelihood occupation  $L(\mu, \Sigma)$  are respectively:

$$\left\{ \begin{array}{l} \bar{X} = \frac{1}{n} \sum_{i=1}^n X_{(i)} \\ A = \frac{1}{2} \sum_{i=1}^n (X_{(i)} - \bar{X})(X_{(i)} - \bar{X})' \\ L(\mu, \Sigma) = \prod_{i=1}^n \frac{1}{(2\pi)^{\frac{p}{2}} |\Sigma|^{\frac{1}{2}}} \exp \left[ -\frac{1}{2} (x_{(i)} - \mu) \Sigma^{-1} (x_{(i)} - \mu)' \right] \end{array} \right. \quad (5)$$

### 2.3. Construction of peak power load forecasting model

The specific steps of model structure are as follows:

- (1) Input data and do processing.
- (2) Through the two-stage approach, select the greatest mixture of conforming model features from the different model variables.
- (3) Association the consequences of model factor assortment to construct a Bayesian network load peak forecast model by:
  - 1) Setting the parameters of the search procedure and the original network solution.
  - 2) Calculating the current network construction score according to the Bayesian scoring criterion.
  - 3) determining whether the conjunction standard is pleased, and if so, outputting the present optimal network construction, and vice versa, continuing to the next step.
  - 4) Determining the current network construction neighborhood.
  - 5) Regulate whether the searched applicant network construction solution pleases the contempt criterion.
  - 6) Repeat steps 3), 4) and 5) until the convergence criterion is satisfied, then end the search.
- (4) Perform peak load prediction using the constructed Bayesian network model.
- (5) Output the peak load forecast value and the corresponding peak time.

### 2.4. LSTM model

Long and short-term memory NN is a special kind of convolutional NN that can perform well in sequential information processing and is

broadly used in fields such as handwriting recognition and music classification [10]. LSTM models are specifically used in recognition or retrieval fields to deal with long term dependency problems. Remembering long-time information is the inherent behavior of LSTM. When the LSTM model works, the first step is to decide which information desires to be dropped from the cell. This conclusion is done using a component in the model called the "forgetting gate", which is an S-shaped layer. The "forget gate" first receives the input signal and then calculates a number between 0 and 1, where 1 means "keep all previous information" and 0 means "drop all previous information ". Through the traditional LSTM model, some scholars have planned a number of enhanced models, such as the gated cyclic unit. This model combines forgetting gates and input gates to form a new update gate, and also mixes cell states and hidden states to finally obtain a simpler and improved LSTM model called GRU.

### **3. Results of LSTM through Bayesian network for power load peak prediction**

Through the historical 98-point load data from February 15, 2020 to December 30, 2021 in City B of City A, the historical load peaks from the 42nd moment point to the 80th moment point of each day were extracted, and a load peak prediction model was constructed for each category for classification and prediction. Applying the above Bayesian network load peak prediction approach, modeling prediction for each category of load and comparing with BP NN, the load prediction accuracy comparison results are shown in Table 1.

The highest grid load magnitudes are for category 2 and category 5 loads. The Bayesian network has very high prediction accuracy, reaching 98.81%% and 97.60%, respectively, while the corresponding BP NN is 95.42% and 97.41%, with a difference value of 3.39 and 0.19, respectively. the rest of the peak predictions also have high accuracy. The average prediction accuracy of Bayesian network is 95.645%, while the BP NN maintains a relatively stable prediction accuracy, with an average prediction accuracy of 95.28%. Thus, the feasibility of Bayesian in power load peak prediction is further verified.

**Table 1.** Load Peak Prediction Accuracy

Load category		Category 1	Category 2	Category 3	Category 4	Category 5	Category 6
forecat Precision (%)	Bayesian network	94.50	98.81	96.62	95.80	97.60	90.54
	BP NN	94.79	95.42	95.14	95.95	97.41	92.97

Through the above Bayesian network model, the peak load is predicted and compared with the BP NN for analysis. The prediction pairs of peak load magnitude and occurrence moment are shown in Figure 1. The lowest point of peak load prediction of Bayesian network is 3024.65 MW and the highest point is 5480.98 MW, and the prediction accuracy is 94.40%. The lowest point of peak load prediction of BP NN is 2168.31 MW and the highest point is 5618.29 MW, and the prediction accuracy is 94.12%. The peak load time prediction error of Bayesian network is 2.82 h; the peak load time prediction error of BP NN is 4.01 h. The peak load prediction through Bayesian network has higher magnitude prediction accuracy compared with BP NN prediction, but the peak time prediction error of Bayesian network is smaller. This indicates that the peak load prediction through Bayesian network has high credibility and feasibility, and the prediction approach in this paper is effective.

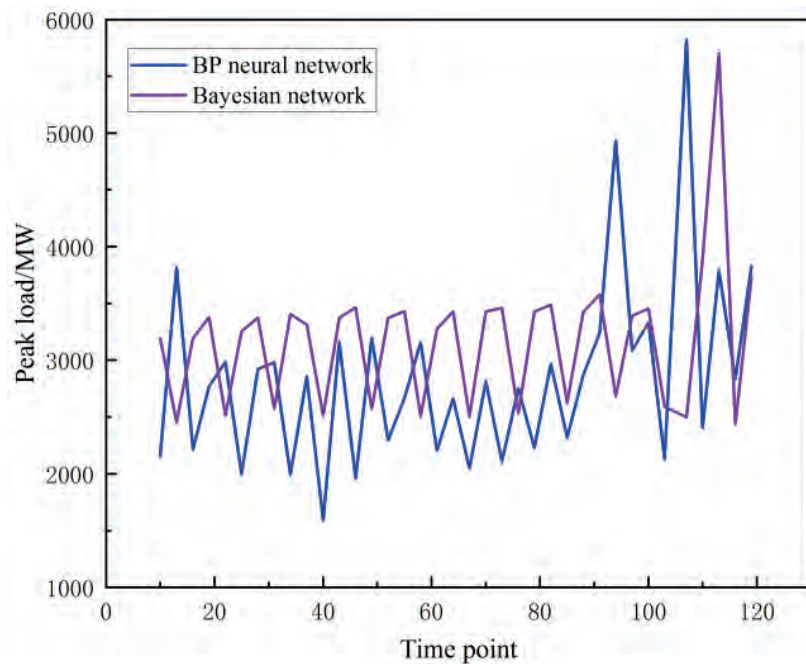


Figure 1. Prediction of peak amplitude of power load



## 4. CONCLUSION

In this paper, recursive operation construction is proposed through the principles of LSTM and Bayesian theory to obtain better prediction performance. The prediction progress of Bayesian network and BP NN is compared and verified, according to the prediction results, the average prediction accuracy of Bayesian network is 95.645%, and the average prediction accuracy of BP NN reaches 95.28%. The time prediction error of peak load of Bayesian network is 2.82 h, and the time prediction error of peak load of BP NN is 4.01 h. Thus, it can be seen that the construction of this paper has good prediction performance and verifies that the LSTM time series prediction of Bayesian network is effective, and the algorithm is scalable and popular in related fields.

## 5. FUNDING

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## Construction of modern hybrid instrument analysis experimental teaching mode based on artificial intelligence

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### **ABSTRACT**

In order to overcome the realistic difficulties of dangerous experiments without facilitating practical operation and deepen the practical application degree of instrument analysis experiments, this paper analyzes experimental teaching resources based on virtual simulation of modern hybrid instruments with artificial intelligence system. From the current realistic dilemma of instrument analysis experimental teaching, breaking the realistic operation barrier with artificial intelligence technology, specific conceptual ideas and implementation plan are proposed, and the lesson plan is submitted to the expert group for preliminary estimation to carry out the acceptance of students' operation results. Out of 100 points, the final score of the lesson plan proposed in this paper was 79 points. Among them, 20% of the students thought that the experiment had a strong sense of learning acquisition and 19% of both simulation as well as knowledge acquisition. The scheme constructed in this paper has a high degree of reproduction and is suitable for the promotion of instrumental analysis experimental teaching.

## KEYWORDS

Artificial Intelligence; Instrumental analysis experiments; Teaching Model; Expert Assessment

## 1. INTRODUCTION

Modern instrumental analysis involves the intersection of many disciplines and has been progressing and improving with the continuous development of science and technology, becoming a powerful tool for solving key problems in the field of natural sciences and is widely used in various fields such as pharmaceuticals, life sciences, environmental sciences, agricultural sciences, animal sciences and food sciences. Therefore, instrumental analysis theory and laboratory courses are considered as one of the important basic courses for both undergraduate and graduate students of chemistry and non-chemistry majors in higher education institutions [1]. Specifically in the field of chemistry, laboratory courses serve the function of bridging classroom theory and production practice, and are an indispensable part of the process of integrating theory with practice. However, the content of the theory and experimental courses of instrumental analysis is numerous and abstract, and the correlation between the knowledge points of each chapter is small, which causes students to have difficulties in learning and gradually become intimidated in the learning process until they eventually lose interest, which greatly reduces the teaching effect [2]. In recent years, with the continuous innovation of teaching methods, advanced teaching modes such as virtual simulation and online and offline hybrid teaching have emerged, and the application value of virtual simulation experiments in the field of teaching and research has been gradually recognized by education and research workers, and rapidly accepted by major universities, while welcomed by the majority of teachers and students [3]. Many domestic universities have established virtual simulation laboratories according to their own needs. However, how to effectively combine the above-mentioned model with modern instrumentation analysis experimental courses and break the teaching bottleneck of traditional modern instrumentation analysis experiments is an urgent problem for every worker engaged in teaching this course [4].

In this paper, a virtual simulation experimental teaching mode based on artificial intelligence system is constructed based on the existing problems of the current hybrid instrumental analysis experimental teaching. The main research idea is to comprehensively collect students' experimental process data, analyze the state of the experimental process and the behavioral data of the experimental group, etc. The virtual simulation software exercises and offline experimental operations are carried out as the main program implementation methods. Finally, the practical performance of the program is fully evaluated through the evaluation of the teaching program by a 4-member expert group and the first batch of students' experimental operation experience.

## **2. Modern hybrid instrumental analysis laboratory teaching dilemma**

(1) Instrumental analysis experimental content is numerous and abstract and difficult to understand

The experimental content of instrumental analysis mainly includes optics, electricity, chromatography and mass spectrometry, etc. The contents of each chapter are many and little correlated with each other, which undoubtedly increases the difficulty of students' learning [5]. Traditionally, the teaching methods of modern instrumental analysis laboratory classes are generally board books, PPT and instrument operation, which make it difficult for teachers to explain the principles of various analytical methods to students in an in-depth, clear and thorough manner. Students with weak foundation usually only have a preliminary understanding of some basic concepts, and cannot really grasp the structure and working principle of the instruments, and students gradually lose interest in the learning process, which makes it difficult to ensure the teaching effect.

(2) Insufficient sets of instruments and equipment

With the popularization of higher education, the scale of laboratory construction often lags behind the actual needs of the rapidly growing number of students, which is mainly manifested in the insufficient number of modern instruments and equipment per capita. In addition, large instruments are expensive, so it is not possible to achieve one per capita, so experiments are generally conducted in groups. In group experiments, usually only the students who are better learners

operate the experiments, and those who are weak and do not know the relevant knowledge points are automatically turned into spectators due to lack of confidence. The latter need to think and understand in the process of experimental operation to improve their ability.

### (3) High-risk experiments are difficult to offer

Due to the concern of experimental safety, universities usually do not offer experiments with high risk, which makes the teaching content incomplete, restricts the construction of students' complete knowledge system and restricts the teaching effect [6].

### (4) Late update of instruments

With the continuous development of science and technology, the development of modern instruments is also changing rapidly. Colleges and universities are often limited by the site, funding, the slow update of large instruments, high-end instruments can not afford to buy. In the actual teaching can only offer content related to the existing instruments in the laboratory, which causes the teaching content to be obsolete, and students cannot understand and master the latest cutting-edge science and technology [7].

### (5) Some large modern instruments and equipment cannot be opened to undergraduate students

Some large precision instruments and equipment used in modern instrumentation and analysis experimental courses are often very costly to maintain, and the operators need to have professional knowledge and experience in using them [8]. Due to the limitation of course hours, such experiments cannot be offered to undergraduate students.

### (6) Students have different foundations and should be taught according to their abilities

With the expansion of colleges and universities, some students with weak foundation have the opportunity to enter colleges and universities. The theoretical content of modern instrumental analysis experiments is boring and difficult, so that the above-mentioned students are unable to learn and eventually lose confidence or even give up, leading to an unpromising teaching effect.

### **3. Construction of virtual simulation experimental teaching mode based on artificial intelligence**

#### **3.1. Building Ideas**

(1) Comprehensive collection of student experimental process data and analysis of experimental process status. Based on the online experimental platform, real-time collection and storage of student experimental process data is realized for analyzing students' circuit design, experimental operation, and circuit status monitoring, which provides original information for behavioral analysis system and teaching feedback mechanism [9].

(2) Research on hierarchical guidance and experimental circuit fault analysis methods for online experiments using artificial intelligence-related technologies. Based on the behavioral data and circuit states in student experiments, intelligent techniques are used to analyze the correctness of student experimental states and experimental circuits. Selectively and conditionally provide from simple and detailed hierarchical experimental task analysis, problem guidance and operation guidance according to student behavior to personalize online help for students.

(3) Study the connotation of teaching evaluation and design personalized experimental assessment programs. According to different experimental tasks, determine the experimental objectives and develop experimental assessment criteria. Schools should combine the analysis of students' experimental behavior and the use of online help to comprehensively evaluate the completeness, completion, standardization, accuracy, autonomy and other indicators of students' experiments, and study a reasonable teaching evaluation system.

(4) Analyze the behavioral data of experimental groups and give feedback on teaching results. Using artificial intelligence-related technology, we analyze the teaching methods and teaching effects as a whole, provide the effectiveness analysis data of online experimental teaching, and provide the reference basis for improvement for teaching designers.

#### **3.2. Program Implementation Methodology**

(1) Multimedia classroom to explain the theory

Classroom theoretical lectures are an important part of traditional instrumental analysis experiments. Teachers explain the theoretical parts of the involved instrumental analysis experiments according to the requirements of teaching objectives, focusing on instrument construction, operation principles, usage, data processing, etc. The original classroom is textbook-based and PPT-based, which is abstract and difficult for students to understand. At this stage, we have to combine the characteristics of multimedia classroom and network video resources to make the theoretical knowledge vivid, fully mobilize students' learning enthusiasm and actively integrate into the lecture process. Cultivate students' active learning ability, strengthen teacher-student interaction, and improve the overall effect of classroom theory teaching of instrumental analysis experiments.

### (2) Virtual simulation software exercises

Large precision instruments with high technical content and complex structure, it is difficult to observe the inside of the instrument, and students cannot clearly understand the instrument structure and working principle. The virtual simulation experiment can solve these problems well. The simulation animation experiment of instrument disassembly can show the working principle graphically, with the virtual simulation software operation video, and the key links to strengthen the practice, improve the students' learning interest and teaching effect. Students' ability to analyze and solve problems can be improved comprehensively, which is conducive to the cultivation of highly skilled and innovative talents.

### (3) Offline experimental operation

Through multimedia classroom theory lectures, students have a clearer understanding of the experimental projects to be carried out. After that, students enter the virtual simulation experiment platform by themselves, they can repeatedly rehearse and simulate the experiment operation process to fully digest the classroom knowledge. After the virtual simulation platform rehearsal, students have a clear and complete understanding of the experiments to be carried out. After entering the lab, the teacher will give a live lecture for the instruments, after which the students will conduct experiments in groups.



### **3.3. Acceptance of experimental teaching results of mixed instrument analysis**

In the evaluation of teaching mode, it first needs to be accepted and evaluated by the expert group to determine its teaching value before it can be initially tried out. In this paper, the construction of teaching resources and the sharing of teaching resources are the two secondary indicators, and the virtual simulation instrument analysis experimental teaching program is submitted to the 4-member expert group for evaluation, and the results of the expert evaluation of the virtual simulation experimental teaching mode are shown in Table 1.

In the teaching assessment with a score out of 100, the final score of the lesson plan proposed in this paper is 79. In the assessment of the construction of experimental teaching resources where real experiments cannot be carried out or are highly dangerous and polluted, it scored 19 points out of a total score of 20 points or was highly supported by the expert group. The necessity, applicability, innovation and richness of experimental items of teaching resources scored 18 points and ranked second. The rest of the indicators were also close to full scores. It can be seen that educational research, due to its strong specialization, itself contains a large amount of domain knowledge, and the behavioral data generated in the teaching process has become diverse and complex in the era of artificial intelligence. Comprehensive analysis of the above, the combination of knowledge reasoning and AI machine learning is bound to be an effective way of teaching behavioral research problems.

**Table 1.** Expert Evaluation Results of Virtual Simulation Experiment Teaching Mode

Evaluation indicators		Observation index	Score	Expert rating	
Level I indicators	Secondary indicators				
Virtual Simulation Experiment Teaching Resources	Construction of teaching resources	Starting time of experimental project	10	6	
		Necessity, applicability, innovation of teaching resources and richness of experimental projects	20	18	
		Experimental teaching resources that can not be carried out or are highly dangerous, and seriously polluted	20	19	
		It is feasible to configure, connect, adjust and use virtual experimental instruments and equipment for experiments, and open and share teaching resources	20	15	
	Sharing of teaching resources	At present, the opening and sharing of the teaching resources of virtual simulation instrument analysis experiment	10	7	
		The operability of ideas and methods for sustainable development of virtual simulation laboratory teaching	10	8	
		Plans and arrangements to further realize open sharing	10	6	
	Total score			100	79

According to the expert evaluation opinions, the program of this paper carried out the actual measurement of students' experimental session, in which we should focus on collecting students' gaining sense as a reference of teaching program and improving the preliminary program. The distribution of the first batch of experimental students' gaining sense is shown in Figure 1. Students were most positive in the outcome evaluation, with 30% believing that the experimental system could obtain good learning outcomes in

conducting the experiments. Student efficacy evaluations were the next most positive, with 20% believing that the pilot system was conducting experimental learning with a strong sense of acquisition. The simulation degree and knowledge gaining feeling were 19%, which proved that the experiment system simulated realistic and the experiment was highly reproduced. 12% thought that the experiment system was not strong in operation and the subsequent modification in this area should be focused.

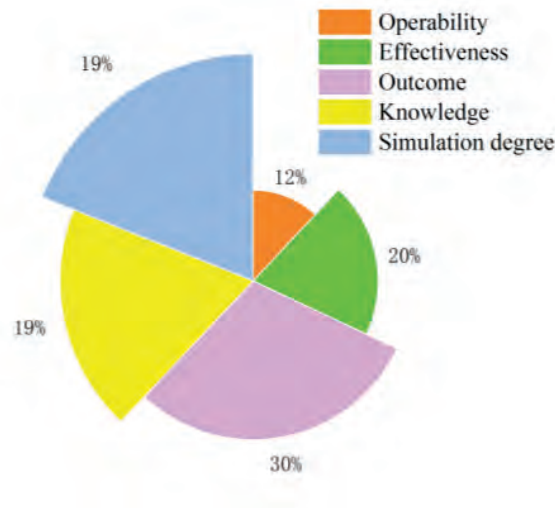


Figure 1. Distribution of sense of gain of the first batch of experimental students

#### 4. CONCLUSION

This paper proposes the construction of virtual simulation instrument analysis laboratory based on artificial intelligence from the teaching dilemma of modern hybrid instrument analysis laboratory teaching, and clarifies the construction ideas and program implementation methods one by one, and finally the program results are accepted through the initial evaluation of the teaching expert group program and the first batch of students' practical operation learning acquisition. The final score of the proposed lesson plan in this paper is 79. In the evaluation of the construction of experimental teaching resources that cannot be carried out by real experiments or are highly dangerous and polluted, it scored 19 points, which was highly supported by the expert group. In addition, 30% of the students thought that the experimental system could obtain good learning results by conducting experiments, and 20% of the students thought that the experimental system had a strong sense of gaining experimental learning. The

teaching model constructed in this paper has practical promotion value.

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# Research on the application of piano work appreciation in students' quality education under the perspective of big data

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## ABSTRACT

In order to improve the overall quality of students, this paper tries to propose an analysis of the feasibility of enhancing students' quality education with the ability to appreciate piano works in the context of big data. By discussing the current situation of piano appreciation and students' quality education and evaluating the significance of this project, this paper proposes a teaching plan for piano appreciation and students' quality education based on big data analysis. In order to verify the scientificity of the lesson plan, it was handed over to the expert group for evaluation, and the final evaluation result was obtained as 21 points, and in the teaching test session, the students' satisfaction reached 90%. The program of this paper was unanimously approved by the expert group and the students, and has important educational and teaching value.

## KEYWORDS

Big Data; Piano Appreciation; Quality education for students; Satisfaction

## 1. INTRODUCTION

The Ministry of Education of the People's Republic of China advocates the development of cultural quality education for students in China, proposes to emphasize and strengthen aesthetic education

and art education in schools, and takes art education as one of the important contents of "quality education", placing art education in a rather important position [1]. This is undoubtedly a very wise and far-reaching initiative. Secondary vocational education has become an important part of education, and the quality and ability of secondary school students are directly related to the healthy development of China's socialist modernization [2]. Quality education is a purposeful and planned activity to develop, shape and improve people's body and mind by using different educational means. In the quality education which requires the all-round development of morality, intellect, physique, aesthetics and labor, the role played by music education as one of the basic contents of quality education has gradually gained recognition and attention. Sukhomlinsky once said: "There is no education without aesthetic education". Aesthetic education plays an important role in cultivating students' healthy aesthetic concepts and aesthetic abilities, and cultivating noble moral sentiments [3]. However, how to teach a good music appreciation class is still confusing to many teachers. Currently, there are many problems in music appreciation teaching, which are highlighted by the fact that music appreciation teaching is too specialized or non-musical. How to change the status quo of music appreciation teaching? According to Aldrich, a contemporary American philosopher, "The content of a musical work is both audible and visible. To be precise, both the audible and the visible are not mutually exclusive in musical works [4]." Musical aesthetics also affirms Aldrich's view from an aesthetic point of view that the content of music consists of two types of expression; one is the intuitive, non-imaginative musical content, i.e., the audible content, which is the objective content element in music. The other is non-intuitive, imaginative, and can be called non-musical content, i.e., visual and thinkable content [5].

In this paper, we analyze the problems of the current music appreciation curriculum in colleges and universities through big data to find out the current situation of music appreciation training in colleges and universities and to figure out the research trends. And then the significance of piano music appreciation and students' quality education is linked to form the theoretical basis of this paper. Based on the theoretical definition, the implementation plan of piano

music appreciation in students' quality education is proposed in this paper, and the plan is handed over to a group of experts for teaching quality assessment. After the evaluation was approved, a semester-long teaching test was conducted for this purpose, which finally verified the scientific validity of the lesson plan designed in this paper.

## **2. Students' ability to appreciate piano works in the perspective of big data**

### **2.1. The current situation of cultivating music appreciation in colleges and universities**

At present, the importance of cultivating music appreciation in college piano education is not high, and the following problems mainly exist. First, the importance of theoretical teaching of piano is not high, and some teachers only pay attention to the exercise of students' playing skills in teaching, ignoring the actual needs of students, which leads to the phenomenon of mechanical and rigid playing of students. Secondly, the infectious power of piano teaching is not high enough to stimulate students' strong interest in piano. Teachers' piano teaching is slightly boring and dull in content and manner, which eventually makes it difficult to improve the quality of teaching. Third, the teacher's ability to cultivate music appreciation needs to be improved. With the development and progress of society and the changing needs of people, teachers need to keep up with the times and improve their own ability to play a model role for their students.

### **2.2. The significance of piano music appreciation in students' quality education**

#### **(1) Develop students' perceptual and imaginative skills**

In the process of music appreciation, people may have different understanding of the works even if they have the same feelings about the rhythm and timbre of the music due to the differences in life experiences, cultural qualities, and stylistic interests. Therefore, secondary institutions should cultivate students' music appreciation ability, reflect the aesthetic value, and cultivate their perception and imagination so as to break the shackles of thinking [6]. The cultivation of perceptive ability can start from classical music, for example, when enjoying "High Mountain Flowing Water", the teacher guides students to feel the scene of high mountain flowing water simulated by the

sound of guqin and the sympathetic feelings contained in it, so that students can experience the aesthetics in the ancient piece and touch the heartstrings. The cultivation of students' imagination can spill over into any excellent piece; imagination itself is what connects the hazy sense of music to life experience. The imagery in excellent works is in turn derived from the reality of life. When appreciating the music, it is only necessary to follow the free thinking of the music to trace the imagery in the melody. For example, when appreciating "The Tempest", the teacher can ask students to imagine the natural landscape of muffled thunder rolling and lightning flashing according to the change of strength, so as to achieve the aesthetic expectation. This experience accumulated to a certain extent can help students soon also understand the mood of the music and resonate with the author in their appreciation.

### (2) Feel the aesthetics of music through emotional experience

The emotional experience in the aesthetic process is an important basis for integrating into the aesthetic world of music, and only with the ability to experience deeply the connotations of music can one touch the world of emotions in the work. Teachers should pay attention to cultivating students' mental emotions during teaching activities, so that they can learn to deal with different emotional factors according to different rhythms of the repertoire. At the same time, it is necessary to broaden students' knowledge, to have a deep understanding of the spirit of the times and national consciousness of each period in art history, and to be familiar with the characteristics of various musical styles, which is also a basic skill necessary for music appreciation. When studying Beethoven's Symphony of Destiny, the teacher can start from life experience, linking the triplet to the knocking sound and then to destiny, thus opening the chapter of this piece, allowing students to understand the idea of struggle in the work, to experience the spirit of fearlessness, and to achieve the desired effect of emotional experience. Cultivating a higher level of music appreciation from practice is conducive to enhancing the aesthetic meaning of students [7].

### (3) Develop interest in learning and enhance thinking skills

Music appreciation is the process of developing students' awareness of a work from cognition to understanding to internalization. Guiding



students in piano education begins with an understanding of the context in which the work was composed and the author's life background, which helps students to understand the motivation of the piece from an emotional point of view. Compared to teaching students piano skills in a rigid way, cultivating students' music appreciation is more likely to stimulate students' interest in learning piano, and it also exercises students' thinking skills, prompting them to think in learning, improve in thinking, and internalize in improving. Interest is an important prerequisite for learning an instrument and should motivate students to actively explore and practice relentlessly. In conclusion, the cultivation of music appreciation is of profound significance for piano education [8].

### **3. Appreciation of piano works in the quality education of students' initiatives and effectiveness**

#### **3.1. Music Appreciation Method**

Music appreciation is divided into three ways: perceptual appreciation, emotional appreciation and rational appreciation. The famous music educator Huang Zi once said, "In terms of perceptual appreciation, we should be able to discern the rhythm, tune, harmony and timbre of beauty [9]. In terms of emotional appreciation, we should first know the method of these musical expressions and the life and character of the composer, and then use our meditation to experience the emotions it expresses. In terms of rational appreciation, we should first know the differences between the various schools of these music and the characteristics of each school, and be able to examine the precise structure resulting from the various variations of 'gladness' tracing this 'gladness'." This quote from Huang Zi shows that when appreciating music, we should not only grasp the musical content, but also the non-musical content. In music appreciation teaching, we should handle the relationship between musical and non-musical contents according to the students' knowledge structure, learning ability and psychological characteristics. Only by grasping the musical and non-musical contents at the same time can we fully mobilize students' enthusiasm and make the classroom "alive". For example, when students enjoy "Yellow River Cantata", in order to let students understand the musical characteristics of the Yellow River and shorten the distance from the music, we can use multimedia to show

the majestic picture of the Yellow River. With the changing speed, intensity and mood of the music, the students' emotions are naturally integrated into the music.

### **3.2. Music appreciation skills development**

(1) Pay attention to the actual situation of students, scientific classification teaching

Each student has different levels of music appreciation ability, and teachers in colleges and universities should fully understand the actual situation of each student when conducting education guidance, and teach differently according to students' different comprehension and appreciation of music, i.e. teaching at different levels. Both high and low level students should be taught in a gradual manner, respecting the law of student development. For students with weaker foundations, it is important to start with basic music appreciation material and gradually move to more difficult pieces. For the more capable students, teachers should recommend relevant books to students on the one hand, and at the same time, they should make sure that these students should not be overly ambitious and should strengthen their training in general, and should carry out deep and connotative studies to gradually improve their music appreciation ability and piano level. Piano teachers in higher education should play a leading role, pay attention to grasp the actual situation of students, timely understand the needs of students, carry out scientific classification teaching, enrich themselves, and constantly meet the piano learning needs of students.

(2) Create a warm atmosphere and increase the difficulty appropriately

A harmonious and warm teaching atmosphere is helpful for students to learn piano, which can both stimulate students' interest in learning and promote teachers' piano teaching progress. In the piano teaching, the difficulty of learning is increased appropriately, and the music is appreciated from a higher level, which is very beneficial to the cultivation and improvement of students' music appreciation ability. Therefore, the piano teaching in colleges and universities can encourage students to study actively by organizing some piano concerts and recitals. The piano teaching facilities in schools can be further improved to cultivate students' interest in piano learning, so

that students can have sufficient time to appreciate, perceive and compose music. In terms of teaching difficulty, a progressive approach can be adopted, from easy to difficult, from shallow to deep, from the content of the work to the background of the author, to the era of composition and emotional thrust, step by step, to enhance students' music appreciation ability and improve the quality of piano teaching.

### **3.3. Expert evaluation results and student satisfaction**

To explore the scientific nature of the lesson plan designed in this paper, the lesson plan was first submitted to a panel of experts for evaluation where it was implemented. The evaluation items were divided into two parts: teacher quality and students' aesthetic emotion, and the sum of the two parts was added up to 30 points, with more than 15 considered as passing and 15 and above as good. The results of the expert evaluation are shown in Table 1.

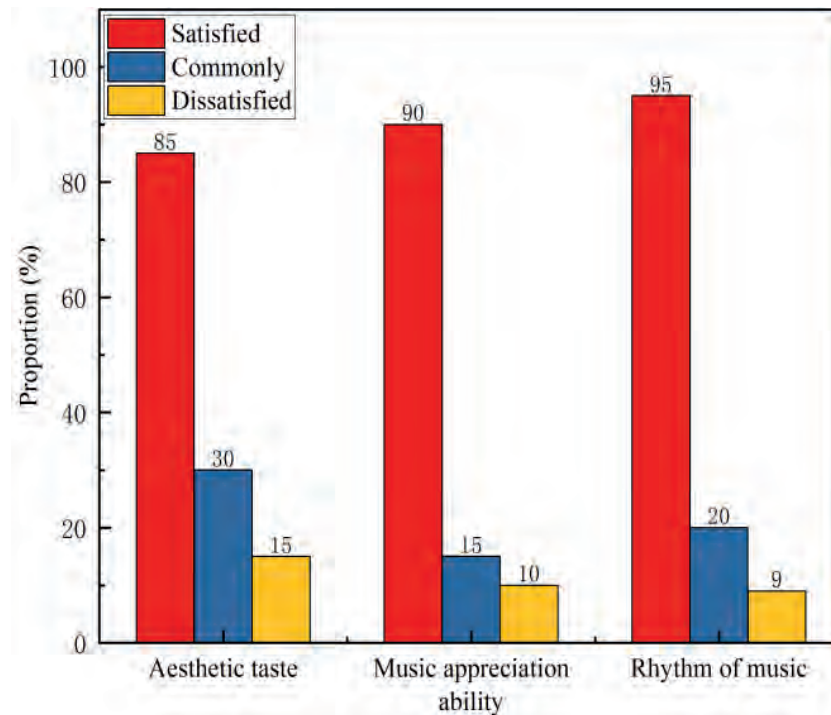
The total sum of teacher literacy and students' aesthetic emotion of the proposed program was 21, and the program was rated as excellent, which proved that the program set up in this paper was unanimously approved by the expert group, and had pedagogical scientificity and scalability.

**Table 1. Expert Evaluation Results**

Evaluation items	Evaluation content	score	Evaluation grade
Teacher basic accomplishment (16 points)	1. Prepare to use audio resources and teaching tools (piano, electronic organ, percussion instrument, etc.) in teaching. (4 points)	4	Excellent
	2. Professional skills are proficient and standardized, and basic teaching skills can be used organically in classroom teaching. (4 points)		
	3. The creation of a situation is aesthetic. He can devote himself to the music he hears, and has the power to tap the inner appeal of the music. (4 points)	3	Excellent
	4. Proper use of evaluation, effective methods, can stimulate emotional concern about students' personality development. (4 points)	4	Excellent
Students' aesthetic feelings (14 points)	1. He has a strong interest in learning music, obtaining the ability to feel, create and appreciate beauty and healthy aesthetic taste. (6 points)	5	Excellent
	2. Actively participate in various music practice activities, and have independent feelings and opinions on the music you listen to. (8 points)	5	Excellent

After the expert group assessment and approval, the program will be subjected to a preliminary test of student-teaching level instruction. The experimental time setting was based on one semester, and two administrative classes were used as experimental subjects. The student satisfaction survey is shown in Figure 1.

The overall satisfaction of students with the format and content of piano appreciation lectures was 90%, and the content of the lectures was liked by students. Among them, students' satisfaction reached the highest value, i.e. 95%, in the belief that music rhythm has a good cultivation effect. This was followed by the improvement of music appreciation with a satisfaction level of 90%. Students believe that piano appreciation lessons can improve their music appreciation intuition and appreciation skills, which are beneficial to their daily lives.



**Figure 1.** Survey of students' satisfaction with teaching

#### 4. CONCLUSION

Music appreciation skills are far-reaching in stimulating students' interest in learning piano, deepening their understanding of piano knowledge, and refining their musicianship. This paper attempts to combine piano with the cultivation of students' quality by proposing a piano appreciation curriculum program based on the perspective of big data, and submitting the designed program to a panel of experts for evaluation, followed by a student-level teaching quality test. The results of the test showed that the students were 90% satisfied with the format and content of the piano appreciation lessons, 95% satisfied with the rhythm of the music, and 90% satisfied with the music appreciation ability. Thus, the program of this paper was not only approved by the expert group, but also loved by the students. In the actual teaching, it is still necessary to focus on the combination of piano music theoretical knowledge and specific practice, to understand the actual situation of each student, to improve the teaching methods, and to strive to create a warm and harmonious teaching atmosphere to achieve the common progress of teachers and students.

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# Effective planning of town development boundary based on linear regression model

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## **ABSTRACT**

The study of town boundary planning helps to improve the science of urban planning and development. In this paper, a linear regression model-based town development boundary planning scheme is proposed. The framework of town development boundary delineation method is clarified first, and a linear regression model of town development boundary is proposed based on the research foundation. The VIF values of the three independent variables of land intensity, boundary elasticity and indicator rigidity are less than 5. The regression results of the multiple linear regression model of town development boundary designed in this paper are satisfactory and can improve the effectiveness of town boundary development.

## **KEYWORDS**

Linear regression; Urban Development Boundary; Town Planning; Significance

## **1. INTRODUCTION**

The current research on urban development boundary delineation focuses too much on innovative technical methods, but fails to propose ways to determine the spatial scale at the institutional level. In fact, the key to the application of relevant spatial models is to determine the relationship between the urban development boundary and the scale of construction land. China's administrative

establishment is a multi-level management model, which cannot implement all the contents of spatial planning through planning at one level, but can only implement and deepen spatial planning at each level by corresponding to the planning authority at each level [1]. With the preparation of territorial spatial planning, the delineation and management of urban development boundaries, which is the core content of planning preparation and implementation, is in urgent need of more in-depth research and exploration. Urbanization is an important source of power and result of China's economic and social development since the reform and opening up, which is mainly manifested in geographic space as the rapid expansion of urban and rural construction land, especially the growth of urban built-up area [2]. As an organic organizer of various production and living factors, the spatial demand generated by the development of cities will lead to the growth and spread of urban geographical space [3]. However, urban growth also brings consequences such as encroachment of agricultural land, environmental damage, traffic congestion, growth of commuting distance and time, air pollution, and more rapid spread of diseases. There is a relatively sloppy urban construction land in China, and the growth rate has been faster than the urban population growth rate for a long time [4]. Therefore, urban growth management policies and tools have been conceived in the scientific and effective planning and management of urban spatial expansion. Concepts such as urban development boundaries have been more researched and practically applied, resulting in various approaches to boundary delineation including geographic simulation methods [5]. The delineation of three control lines, such as urban development boundary, is a key task of current territorial spatial planning work, but the current delineation practice lacks consideration from the perspective of process evolution and spatial optimization, and its scientificity and systematization still have more deficiencies [6]. In the context of national ecological civilization and spatial planning system construction, a systematic scientific and automated delineation method should be proposed for towns. The spatial pattern of intensive and compact towns and cities should be delineated on the basis of ecological and agricultural bottom-line constraints to assist planning managers in using town boundary growth management tools to make it an effective measure to promote new town development and an important tool to modernize the national spatial governance capacity.



Based on the background of urban planning and town development boundary validity, this study proposes a set of fine delineation methods of town development boundary based on linear regression with the principle of bottom-line control thinking and town development boundary delineation methods. The linear regression model constructed in this paper is divided into three parts. The first part is to analyze the correlation and clarify the significance range values of the explanatory variables and the explained variables. The second part is to determine the regression model, based on the coefficient of determination to measure the linear regression effect and the fit of the model. The third part is the regression test, which is mainly to conduct the significance test of the regression coefficients of the multiple linear regression equations to prove whether the regression model prediction results are satisfactory and can provide effective reference for the natural resources department to promote the urban development boundary delineation and control of similar cities in the future.

## **2. Principles of urban development boundary delineation methods**

The methods of town development boundary delineation are mainly divided into "positive planning" method, "anti-planning" method and comprehensive method according to the planning concept. The "anti-planning" method first analyzes the constraints of town development in the planning area, such as ecological sensitivity or ecological suitability, and delineates the future boundaries of town development on the basis of clearly prohibited development areas [7]. The "positive planning" method is based on the law of town development, and the future development pattern of the city is determined by the suitability method or predicted by the model. The forecasting method mainly uses town growth models, especially the meta-automata CA model, which uses geographic simulation methods to simulate and predict the spatial pattern of town growth in the future planning period and to assist in the delineation of development boundaries [8]. The integrated method combines the characteristics of the above two methods, firstly, the "inverse planning" method is used to obtain the constraints of town development, and then the "positive planning" method is used to predict the future urban pattern in order to obtain more accurate delineation results. This is the ideal method of

development boundary delineation at present. There have been many studies on urban development boundary delineation based on geographic simulation methods. For example, the CA-based CLUE model, CA-Markov model and SA-Patch-CA model have been introduced for boundary delineation. The FLUS-UGB, based on the FLUS land use change simulation model, has applied the results of "dual evaluation" to the planning practice in Chongqing and other places. Some researchers have also adopted spatial optimization and multi-intelligence system modeling approaches for delineation.

In general, the subjective judgment of the planning decision makers may lead to a lack of scientificity in the current delineation practice, and it is difficult to obtain an optimal spatial pattern for ecology, agriculture and towns. At the same time, many delineation methods do not support refined spatial selection, which is not conducive to the formation of more accurate policy control boundaries, especially the current methods take less account of the spatial optimization of urban development boundary delineation and simulation of composite problem characteristics. These are the advantages of GeoSOS, so GeoSOS can be used to define the eco-agricultural bottom line space and forecast the future town growth, and to delineate the town development boundary.

### **3. Multiple linear regression model of urban development boundary**

#### **3.1. Correlation Analysis**

Correlation analysis is a statistical method that measures the closeness of correlation between multiple explanatory variables and the explanatory variable. Under the condition that the significance level is set at 0.01 or 0.05, if the P-value of the significance test of the correlation coefficient is less than 0.01 or 0.05, it means that the explanatory variables are significantly correlated with the explanatory variables. If the P value is greater than 0.01 or 0.05, it means that there is no significant correlation between the explanatory variables and the explained variables, and the corresponding explanatory variables should be excluded at this time.

### **3.2. Determine the regression model**

In order to further investigate the relationship and degree of influence of the respective variables on the dependent variable, the stepwise regression method is usually used to select the independent variables that have a significant influence on the dependent variable one by one. The basic idea of stepwise regression method is to introduce independent variables one by one and perform F-test for each entered independent variable. If the original introduced independent variables are no longer significant due to the later introduced independent variables, the original introduced independent variables are removed and the process is repeated until no significant independent variables are introduced and no insignificant independent variables are removed from the regression equation. After the regression equation is obtained based on the stepwise regression method, the linear regression effect of the model is usually measured based on the coefficient of determination. The coefficient of determination is the ratio of the sum of squared regressions to the sum of squared deviations. The greater the proportion of the sum of squares of the regression, the better the fit of the regression line to the sample data and the better the model regression.

### **3.3. Regression test**

Regression coefficient significance test: In order to establish a simpler regression equation and eliminate a certain independent variable that does not contribute significantly to the dependent variable, the regression coefficient significance test of the multiple linear regression equation is required. Under the null hypothesis, the t-test is applied. If the observed value of the calculated t-statistic is greater than the given significance level, the null hypothesis should be accepted, i.e., the independent variable has no significant contribution to the dependent variable and should be eliminated. Multicollinearity test: the variance inflation factor VIF is used to test for multicollinearity. When  $VIF < 5$ , it means that there is no multicollinearity between the respective variables. Analysis of residuals: The analysis of normality with the mean value of residuals being 0 can be performed by drawing a residual plot. If the mean value of residuals is 0, the points in the residual plot should be scattered randomly above and below the horizontal line with the

vertical coordinate being 0, indicating that the model basically conforms to the assumptions.

#### 4. Analysis of results

The t-test significant levels are shown in Table 1. The corresponding t-test significance levels in the table are all greater than 0.05, indicating that the boxed total and limited capacity cannot have a significant effect on the town development boundary complex variable function, indicating that there is no significant linear relationship and cannot be introduced into the linear regression equation, which needs to be eliminated. The main factors affecting the complex variable function are the construction land intensity, boundary elasticity and index rigidity.

**Table 1.** Significant level of t test

Model		Sum of squares	Freedom	Mean square	F	Significance
1	Regression	6250.098	1	6352.097	60.432	Remarkable
	Residual	10457.841	107	104.307		
	Total	18720.910	110			
2	Regression	7534.123	2	3760.541	38.421	Remarkable
	Residual	10279.123	104	94.420		
	Total	18720.910	110			
3	Regression	8029.754	3	2809.942	28.945	Remarkable
	Residual	9687.078	105	90.510		
	Total	18720.910	110			

Based on the significance test results, the regression coefficients of the boundary development were then tested. The regression coefficients are shown in Table 2. The VIF values of all three independent variables are less than 5, so there is no multicollinearity among the variables. The regression standardized residuals fluctuate randomly around  $e=0$  within a certain range of variation, indicating that the residuals of this regression model obey a normal distribution, and the model conforms to the basic assumption that there is no autocorrelation. The regression of the boundary development effectiveness model in this paper is relatively ideal.

**Table 2.** Regression coefficient estimation table

Coefficient a							
Model	Non standardized coefficient		Standardization coefficient	t	Significance tolerance	Collinearity statistics	
	standard error	Beta				VIF	
constant	-16.523	9.437		-1.654	0.074		
Constant micro equation	0.450	0.127	0.315	3.416	0.002	0.483	1.761
Intensive degree of construction land	0.330	0.106	0.246	3.045	0.004	0.642	1.542
Boundary elasticity	0.352	0.138	0.212	2.615	0.21	0.651	1.496

## 5. CONCLUSION

This paper predicts the effectiveness of town boundary development based on linear regression models. By first determining the town boundary delineation method to qualify the scheme of this paper, and then constructing a multiple linear regression model based on the framework of town boundary delineation scheme, and carrying out algorithm and process validation one by one, finally locking the regression algorithm model of this paper. The results of the significance t-test showed that the t-level of significance was greater than 0.05, and was significantly correlated with construction land intensity, boundary elasticity and index rigidity, and the VIF values of the three independent variables were less than 5. The regression model set up in this paper obeyed normal distribution, and there was no autocorrelation, which proved the validity of the town boundary development model.

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# Design of College Business English Teaching Platform Based on Artificial Intelligence in the Context of Big Data

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## ABSTRACT

The current requirements of business English majors are increasing, and the diversification of teaching resources is conducive to the all-round expansion of students' English ability. Based on this, this paper designs a WeChat-based business English online teaching platform by integrating WeChat platform with artificial intelligence technology, and compares the platform with traditional teaching platforms, so as to discover the teaching advantages of the platform designed. Students' satisfaction with the learning effect of the designed platform reached 84% on average. The remaining satisfaction percentages from high to low are: 92% for interactive communication, 88% for learning content, 86% for independent learning, 84% for learning atmosphere, 82% for knowledge expansion, and 73% for ease of use. The design platform of this paper is highly recognized by students that the online business English education platform based on artificial intelligence technology is valuable for teaching use.

## KEYWORDS

Artificial Intelligence; Online Education Platform; College Business English; Big Data

## 1. INTRODUCTION

In recent years, China's import and export trade, foreign investment and other international business activities have become more and more frequent, and the demand for business English talents has been

expanding as a result of economic and social development. In addition, the Action Plan for Study Abroad 2015-2017 calls for increasing the cultivation of cutting-edge talents, talents for international organizations, and talents for regional country studies, etc., which puts forward higher requirements for colleges and universities to cultivate high-level internationalized foreign language professionals [1]. Cultivating qualified senior professionals in business English to meet the needs of China's economic internationalization is an important mission of higher education, and the cultivation of business English talents is urgent. The British Standard for Business English sets out clear objectives for the training of business English majors: Business English aims to cultivate students with solid basic skills in English, international perspective and humanistic culture, mastery of linguistics, economics, management, law (international business law) and other related basic theories and knowledge, familiar with the common rules and practices of international business, with the ability to apply English, business practice, cross-cultural communication, thinking and they are able to apply English, business practice, cross-cultural communication, thinking and innovation, and independent learning ability, and are able to engage in international business. The above training objectives highlight the three characteristics of internationalization, compound and application of business English talents [2-3]. The quality of training business English majors will become one of the important factors affecting and restricting China's economic development, and to cultivate high-quality international composite talents that meet the needs of the country, it is necessary to have a team of teachers who are proficient in foreign languages and well versed in professional knowledge [4].

Teachers can record relevant courses with the help of online teaching platform, and students can ask questions about AI application technology through the online Q&A platform, and teachers can answer one-on-one, which improves the teaching effect of the course [5]. Artificial intelligence technology is a comprehensive technology that is developing more rapidly and involves more fields [6]. The proper use of artificial intelligence application technology can solve many difficult problems that people cannot solve and has an important impact on improving work efficiency. Artificial intelligence



application technology can integrate various resources, analyze and decompose complex information so as to transform it into several simple information, and can also train talents in combination with curriculum teaching [7].

In this paper, a new online teaching platform for business English in colleges and universities is designed based on artificial intelligence technology. Firstly, the hardware equipment of the online teaching platform is constructed to lay a good foundation for the platform creation. Secondly, the online teaching platform software is created from three aspects: online teaching platform operation mode, online teaching course database, and platform encryption calculation based on OBE concept. Thirdly, integrate business English teaching with WeChat and build the interface design of WeChat online platform in order to complete the preparation of teaching platform in this paper. Finally, the platform was tested experimentally with the traditional education platform, and the results of the correct rate and students' satisfaction evaluation of the platform designed in this paper were obtained.

## **2. Design of an online business English teaching platform based on artificial intelligence technology**

### **2.1. Business English Online Teaching Platform Hardware Design**

The online teaching platform is developed based on the OBE concept of the AI applied technology course and uses Symfony2 Web Framework as the framework [8]. The online teaching platform uses Symfony2 Web Framework template tags to implement PHP code functions, converts templates into platform hardware modules through Symfony2 Web Framework's template engine, and improves access efficiency through a caching mechanism. The access control layer is implemented by loading filters, and the dispatch controller that distinguishes different modules through the module mechanism and namespace. The data access layer is implemented using Symfony2 Web Framework's ORM mechanism, which enhances development efficiency. When the server receives a request from each module, it loads the global configuration file and initializes the loading filter. According to the route dispatch controller and action configured by yml, the business logic layer and data layer are requested to load

data and render the data to html page, so that the whole process of request operation is completed, and finally the data is rendered and output to the web server.

## **2.2. Business English Online Teaching Platform Software Design**

### **(1) Online teaching platform operation mode**

The operational functions of teaching mainly include four functional modes: course participant management, teaching material management, online assignment process management, and teaching progress management [9]. The participants of course participant management are mainly teaching administrators, and firstly, it is determined that the course opening audit has been passed and the course space has been generated, which indicates that the teaching administrator has logged in. After the course space is generated, the instructional manager selects to import course participants according to the course teaching object. Teachers upload corresponding teaching videos according to the directory structure of teaching materials, edit the description text corresponding to the materials, and submit them for uploading. The teachers and course leaders are the core of teaching progress management. After the course leader logs into the course management page, he or she clicks the link of teaching operation control to enter the progress control page, and teachers can click teaching material access control, assignment access control and online test control to enter the corresponding pages respectively. The online test control can control whether the test can be initiated or not.

### **(2) Generate online teaching course database**

The database design mainly includes 3 parts: conceptual model design, logical model design and physical implementation scheme design. Firstly, the conceptual model of the system database is constructed using E-R model as a graphical tool. Secondly, some kind of logical model is selected according to the conceptual model, and the conceptual model is transformed. Finally, the database design is implemented using database management system. The platform design uses Power Designer CASE to construct the database model, and the knowledge system of the online teaching platform can be obtained according to the constructed database,

which has a great influence on the design of the realized online teaching platform.

### (3) Platform encryption computing based on OBE concept

In the MD5 algorithm calculation, the message is firstly refined so that the length of the message is an integer multiple of 461 and the differences between different messages are ensured. After a series of processing, the length of the message is compressed to a 103-bit value, and this process is called message dispersion. The password entered during login also needs to be encrypted by MD5. If the result is the same as that of the registered encryption, the verification is successful and the user enters the verification code input link, and after completing the matching, the user successfully logs into the corresponding function page. If the verification fails, the user has to re-enter the password. The MD5 algorithm solves the transmission and storage problems in the form of common codes and other security issues in traditional passwords.

### **2.3. Business English WeChat Teaching Platform WeChat Interface Design**

This paper integrates the teaching platform with social media and uses the WeChat platform as an entry point for business English in colleges and universities. The information interaction process of WeChat platform is divided into four modules. Terminal layer users send messages to the official WeChat server through the Http transfer protocol, and the information is processed by the server and then sent to other WeChat terminal users to complete a message interaction. The interface layer is the adapter for information interaction between terminals, which is used to receive, read, analyze and process data, and then respond to ensure the security of data transmission. The third-party messaging interface needs to be equipped with a server to program and process the interacting messages. Common technologies used to implement third-party messaging interfaces include PHP, J2EE technologies, NET technologies, and other network programming technologies, while tomcat, nginx, apache, and iis can be used as common servers. Through the third-party messaging interface, different functional components between the terminal layer and the application layer can interact with each other in real-time information. Users can fully utilize

the various functions of WeChat to develop a variety of applications to adapt to changing teaching needs, achieve aggregation of network resources, and maximize the role of mobile technology in teaching.

### 3. Teaching platform test experiment analysis

The test in this chapter uses the backup system of DELLR852 server and Quark Stor server. the configuration of DELLR852 server is as follows: Intel(R) octa-core M5531 Xeon(R) CPU, 3.92GHz, 8MB cache, QPI up to 6.40GT/s, 10GB of memory, and 800GB of hard disk capacity. in order to ensure the teaching platform's stability, the functions of the running platform are now tested, and the above test control factors are compared and analyzed with the traditional online teaching platform and the online teaching platform designed in this paper, respectively. The experimental results of the two platforms are shown in Table 1. The online education platform designed in this paper all executes the commands correctly, while the traditional platform has error commands in both viewing courses and homework submission, so the online teaching platform designed in this paper is better than the traditional platform.

**Table 1.** Experimental results of the two platforms

input	conditions for execution	Traditional platform	This article platform
View course	Whether the course is displayed or not	Error	Correct
Video playback	Whether it can be played normally	Correct	Correct
Search courses	Whether to search correctly	Correct	Correct
Job submission	Whether to submit normally	Error	Correct

The effect of the WeChat platform-based business English model is shown in Figure 1. The online platform designed in this paper was evaluated by an expert group and then tested in a semester-long student teaching experiment based on the evaluation comments. After a semester of business English learning model reform, the WeChat platform greatly increased the learning interaction between teachers and students and between students, and obtained good feedback on the learning use effect. The average satisfaction with the learning effect reached about 84%. The remaining items in descending order are: interactive communication (92%), learning content (88%), independent learning (86%), learning atmosphere (84%), knowledge expansion (82%), and ease of operation (73%).

Most of the students think that the WeChat platform-based business English learning mode in colleges and universities is more helpful to their English proficiency and believe that this approach can create a better language learning atmosphere. WeChat online learning increases the opportunities for language practice, and students can communicate with their teachers and classmates anytime they encounter problems in the learning process, which can solve the difficult problems of teaching and learning in a timely manner.

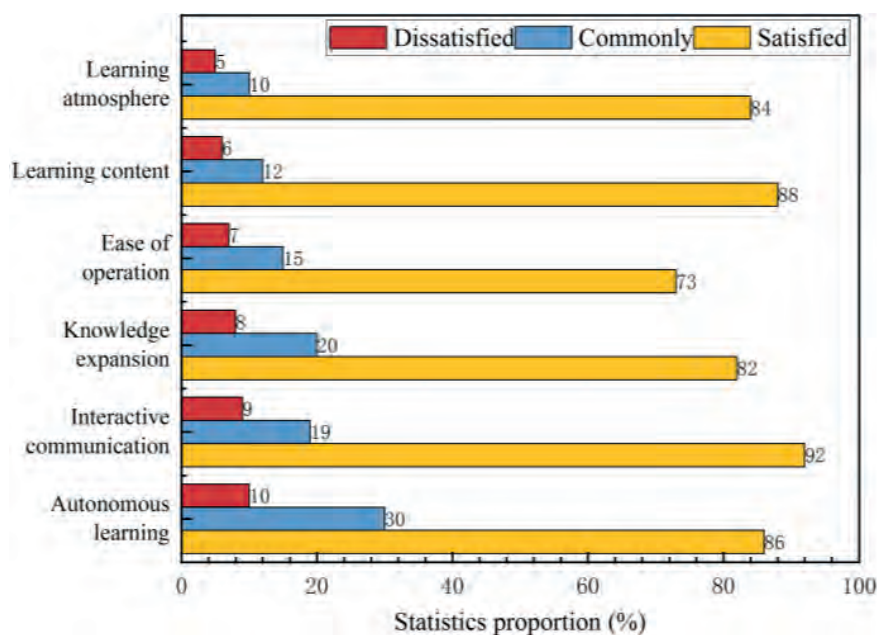


Figure 1. Effect of Business English Teaching Mode Based on WeChat Platform

#### 4. CONCLUSION

This paper designs an online teaching platform for the artificial intelligence applied technology course, and tries to integrate and apply this teaching platform with social media to create a WeChat-based online business English teaching platform for artificial intelligence. Through the experimental comparison and analysis between the online platform designed in this paper and the traditional teaching platform, the online education platform designed in this paper all executes the instructions correctly, and the students' satisfaction with the learning effect reaches about 84% on average. This proves that the online teaching platform is better than the traditional teaching platform in that it can solve students' problems in learning in a timely manner, and the security and data encryption of the platform are better.

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# Music Education Reform and Talent Cultivation Model Optimization in Universities under the Perspective of Big Data

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## ABSTRACT

The quality of talent cultivation of music majors in colleges and universities is an integral part of the quality assurance system of higher education. This study clarifies the existing dilemmas of music majors in colleges and universities through the investigation of their talent cultivation quality. The current employment direction of music majors in colleges and universities after graduation and their skill needs are analyzed by means of big data to further discuss the trial scheme to promote the reform of music education in colleges and universities and optimize the construction of talent cultivation mode. Among the employment situation of music majors, 20.6% are engaged in non-music related jobs after graduation, 6.9% are engaged behind the scenes of theater orchestras, 5.9% choose to continue their education, and only 2.9% are engaged in theater orchestra performers. The current employment mismatch of college music graduates is serious, and it is of practical significance to study the reform and optimization methods of college music talents training in this paper.

## KEYWORDS

Big Data; Music Education in High Schools; Talent Development; Teaching Reform

## 1. INTRODUCTION

Music education resources in colleges and universities are responsible for the prosperous development of music education in society, as well as an important part of the harmonious and stable development of social culture [1]. The training of music professionals in colleges and universities must be able to meet the needs of social culture in terms of quality, continuously deliver outstanding talents to society, be able to point out the direction for the future development of music education, and recreate and innovate the presentation of music resources [2]. The innovation of musical works is a powerful driving force for the development of social culture. Colleges and universities have abundant talent resources, facility resources, and information resources, and the concentration of these resource advantages is conducive to the uninterrupted development of new music programs in schools, allowing students to have more ample time to perform and demonstrate the connotation of music culture [3]. Music education has the role of leading and developing the lives and intellect of college students, and benefits students in four main ways: social success, school success, intellectual development success, and life success. The inclusion of music in the school curriculum can help students develop their physical and mental health, and such advantages can enhance their later life needs [4].

The talent development model is guided by the achievement of talent development goals as a way of behavior and activity structure of education. For the study of the model, the description and analysis in the face of complex research objects is carried out in a parsimonious, abstract and structured way, grasping the essential features of the main forms, characteristics, structures and laws of movement of the existence of things as a whole [5]. Therefore, the talent training mode covers many elements such as training objectives, contents, ways and conditions, including training objectives and specifications, professional setting and construction, curriculum system and teaching contents, teaching methods and teaching means, teaching evaluation and quality control, etc. The talent training mode of music majors mainly focuses on improving the comprehensive quality and innovative ability of music majors, systematically integrating the trinity of teaching, scientific research and artistic practice, and giving full play to the mutual roles of the three [6].



In order to provide the experience of transforming the quality of college music majors' talent cultivation to a modern governance model and to better improve and perfect the management mechanism and management style, this study explores the existing problems of the current college music majors' talent cultivation model. Using big data technology, we collected the current job market flow of college music graduates after entering the recruitment market and analyzed the reasons behind causing job market diversion, which in turn enabled us to clearly locate the direction of the current college music talent cultivation reform dilemma and propose a trial scheme to optimize talent cultivation.

## **2. Existing Problems of Music Education and Talent Cultivation Model in Universities under the Perspective of Big Data**

(1) The facilities and equipment of music education are a bit backward

At present, the music education equipment and facilities in most colleges and universities are relatively backward, not updated in time, and no longer meet the music learning needs of contemporary college students. The enrollment of art students in most colleges and universities is expanding, but the corresponding educational resources are not matched, and the teaching situation is increasingly "contradictory". This is reflected in the relative lack of music education equipment and facilities, both in terms of quality and quantity. If music teachers are unable to play a key role in the music teaching curriculum, then music education in colleges and universities is bound to be ineffective. At present, however, most colleges and universities have a shortage of professional music teachers, leading to a surge in pressure on existing music teachers. Due to the traditional education concept, some leaders of colleges and universities do not really implement the education concept of "educating people with moral character", which leads to the lack of professional music teachers' resources in schools [7]. In the actual music teaching, the phenomenon of "part-time teaching" generally exists. For example, some university music teachers are not only responsible for teaching music majors, but also for teaching hundreds of students in other majors in public music classes with basic theory. Even though the curriculum at the university level has been relatively easy compared

to the previous level, the teaching energy of music teachers is after all limited, and the large number of courses will only make music teachers feel exhausted, which will then affect the teaching of music courses and is not conducive to music education improvement and innovation.

(2) The quality of music learning among college students at the overall level has declined

On the whole, the quality of music learning among college students has declined, and even for those who are admitted to music art majors, their own interest in learning music knowledge is not high, and it is more like a kind of lumpy and copious learning. In other words, college students today lack understanding and perception of music knowledge, and their learning goals are not clear. In the context of the new curriculum reform, many universities have liberalized the enrollment ratio of art students, and the enrollment scale of music majors has been expanding. However, with the increasing number of students enrolled, the actual level of students enrolled varies, and music teaching activities are affected and the overall level gradually declines. In this way, some of the music education work in colleges and universities is affected by the traditional teaching mode, and college students cannot recognize the importance and necessity of music learning for their lifelong learning development, and they are "dispensable" to music theory learning and music practice participation, which directly increases the teaching burden of music teachers [8]. If music teachers fail to establish an effective and harmonious communication relationship with college students when conducting music teaching activities, they will feel that they have "more than enough energy". Over time, music teachers are unable to devote more time and energy to the students they teach, which seriously hinders the teaching progress.

(3) Music teachers' teaching methods are solidified and single

In the traditional teaching mode, most music teachers carry out music teaching activities by incorporating some novel teaching methods, but due to their own teaching level and limited experience, some music teachers' application of advanced teaching methods are only superficial and not effective enough. For example, some young music teachers in colleges and universities do not have the ability to control

the rhythm of classroom teaching skillfully, and they lack in using information and game-based teaching methods, resulting in poor innovation of music teaching methods and poor learning effect of students. In addition, one of the obvious teaching problems in most young music teachers' classrooms is that they are not too far removed from the age of their students because they are new to education. If the distance between themselves and their students is not reasonably well managed at the beginning of the lesson, students will have a casual, scattered attitude toward learning and lack respect for the music teacher during the formal music lesson. In order to prevent students from "making mistakes" and to inspire them to deepen their knowledge of music, to learn independently, and to use innovative learning methods to master music knowledge. Music teachers must establish a good teacher image, grasp the scale of teacher-student interaction, innovate and apply feasible music teaching methods, continuously introduce novel teaching methods, create interesting and efficient music classes, and help students improve their music learning efficiency.

### **3. The path of music education reform and talent training mode optimization in colleges and universities**

#### **3.1. The employment of college music graduates in the perspective of big data**

In this paper, we use big data technology to capture the employment situation of music students graduating from colleges and universities at the present stage, in order to understand the current employment-oriented direction of teaching improvement of music majors in colleges and universities. The summary of the graduation employment direction of music students in colleges and universities is shown in Table 1.

**Table 1.** Summary of Graduation and Employment Directions of College Musicians

Number	Project	Content involved
M1	Non music related work	New Media Editor/We Media
M2	Other work in music industry	Music Producer/Editor/Personal Music Room/Recording Studio
M3	Music industry practitioners	Performance/copyright/music platform/record company
M4	Behind the Theatre Orchestra	Administration/publicity/production
M5	Theatre Orchestra Performers	Full time/part-time
M6	Music training institutions, music teachers in primary and secondary schools	Art examination training, music interest institutions/music and dance teachers in primary and secondary schools
M7	Continue to study	Postgraduate study of music related majors at home and abroad

The employment situation of music students graduating from colleges and universities is shown in Figure 1. In terms of employment choices, for jobs related to the music industry chain, such as performance, copyright, music platform and record company, unsurprisingly became the most popular choice. The respective percentages of industry directions chosen by graduates were 21.6% for other jobs in the music industry and 28.4% for music industry practitioners. Music-related jobs were 20.6%, music training institutions and primary and secondary school music teachers were 13.7%, behind the scenes of theater orchestras were 6.9%, continuing education were 5.9%, and theater orchestra performers were 2.9%. It is worth mentioning that, during the data acquisition process, it was found that 20.3% of the 200 graduates of music majors in college A graduated from music performance majors such as voice and song, piano, orchestra and national music, but only 2% are currently working as professional actors. Even more surprising is that 21% of them are working in jobs completely unrelated to music after graduation. The employment situation of music graduates is not optimistic, and the main problem is still the mismatch between the professional knowledge learned and the skills required for music positions in the market, the inability of music students to get inside-out opportunities, the difficulty of perfect articulation between education and career, and the inability to ensure professionalism and practicality at the same time. Therefore, it is necessary to strengthen the cultivation of students' professional skills

and enhance the comprehensive quality of music students in college music education.

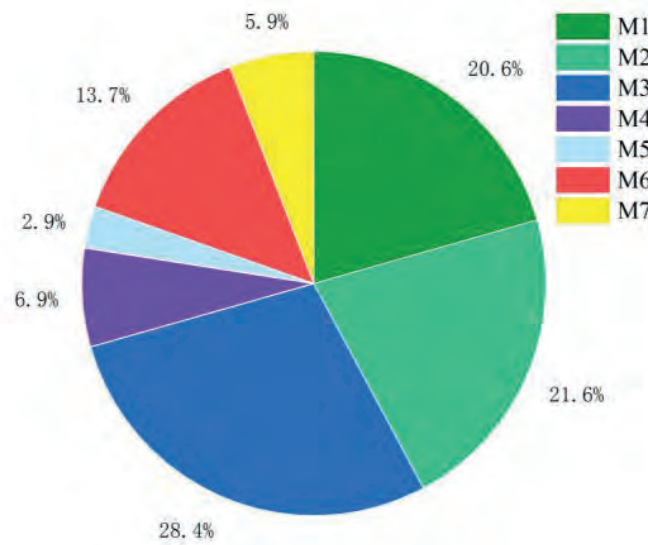


Figure 1. Graduation and employment of music majors in colleges and universities

### 3.2. Trial scheme of music education reform and talent cultivation mode in colleges and universities

#### (1) Reinforcing students' sense of professional identity

The more elegant and deeper the accumulation, the more advanced one's appreciation and creation will be. When this appreciation and creation reach a very high attainment, it is possible to become a specialized music talent in higher music education talent training mode, and it is also possible to become a top talent in science and technology or social aspects by virtue of their unique music art quality. Therefore, university music majors should constantly strengthen students' professional identity in the process of talent training, and this identity is a manifestation of inner self-confidence. It has been found that when the ideal of sameness is established between students and the profession, it is possible to jointly achieve the goals to be achieved in terms of the quality of music professional training.

#### (2) Create a good learning atmosphere

The school must be good at creating an environment that is appropriate, and the stimulation of the external environment can also mobilize students' learning motivation. To achieve the goal of talent

cultivation, higher education conservatories must be good at creating a good learning environment. In the interviews, the researcher concluded that all college music schools are actively creating a better learning environment for students, and that a good atmosphere can lead to academic progress, while a poor learning atmosphere can reduce students' professional identity.

### (3) Strengthen the teaching of music practice

The learning of music knowledge should eventually be applied to music practice activities, using the knowledge learned to analyze music works, sing songs and play instruments in order to improve students' core literacy in music subjects. The key to achieving this goal is to organize diversified music practice activities to increase students' rational understanding of theoretical knowledge and to promote a more solid foundation of music theory, so that they can truly apply what they have learned. Take the song "Alamu Khan" as an example, the song mainly praises the lively and passionate Uyghur girls, with a bright rhythm and beautiful melody, creating a scene of singing and dancing. In music teaching, teachers can show related videos, use group discussion to guide students to express their feelings, teach tambourine playing skills, and carry out practical training of song singing, so that students can deepen their experience of music emotion and ignite their enthusiasm for learning. In the long run, students' thinking ability, expression ability, comprehension ability and core literacy of music subjects will be significantly improved.

Given the wide variety of musical instruments, and the wide variation in ease of operation, it is difficult for students to understand the articulation and playing techniques of various instruments in just a few music lessons. Therefore, teachers can use new media to show the appearance, rhythm, and playing methods of musical instruments, and use virtual reality technology to create a simulation practice platform for students to practice with musical instruments on that platform. After a full understanding of the instrument, students are fully able to pick the instrument according to their own preferences and abilities. Teachers urge students to strengthen their training and test their musical instruments at the end of the semester, which not only enriches students' life after school, but also cultivates students'

elegant interests and hobbies. Music teaching based on students' interest is more attractive and affinity, students' enthusiasm to participate in practical teaching activities is higher than ever, theory and practice are developed synergistically, and the effectiveness of music education teaching reform in colleges and universities is ensured.

#### (4) Reforming the way music is evaluated

Establish a sound music teaching evaluation system, adopt diversified subject evaluation, combine process evaluation and result evaluation, and achieve objectivity and comprehensiveness, so as to provide correct guidance to music education and teaching reform, and promote the modernization, scientific and long-term development of music education in colleges and universities. On the one hand, students can evaluate each other, based on their understanding of their classmates who spend time together, students will give a more pertinent score, and usually encourage each other and grow together, students will be more harmonious and friendly with each other. Teachers evaluate students based on their pre-course prep, classroom performance, learning attitudes, values and the results of the analysis of learning information on the MU platform, which can help students understand themselves correctly, correct their shortcomings and gain continuous progress. On the other hand, college music teachers should establish student files, record detailed information of each student's learning situation, judge whether students have progressed or not, as an effective basis for process evaluation, and should adjust music teaching plans in a timely manner to strengthen teaching effects. The final exam should be designed separately for theoretical knowledge and practical operation items, such as selecting a musical instrument to play music repertoire, which can achieve accurate evaluation of students. Closely integrate music education in colleges and universities with students' professional development, which will have a positive effect on the healthy growth of college students.

## **4. CONCLUSION**

This study explores the optimization path of music education reform and talent training in colleges and universities under the perspective of big data. By capturing the employment situation of music graduates

in colleges and universities through big data and combining the existing problems of current music education and talent training mode in colleges and universities, this study proposes an optimized teaching plan for curriculum education reform and music talent training mode. The study found that in terms of employment options, only 2% of those who graduated with music performance majors are currently working as professional actors, and 21% of those who graduated are engaged in jobs completely unrelated to music. The main reason for this is the mismatch between the professional knowledge acquired and the skills required for music positions in the market. The pilot program of music education reform in colleges and universities proposed in this paper has improved the overall quality of students' music by optimizing the learning atmosphere and strengthening the practice of music majors in all aspects.

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# Innovative management of college students' thinking and politics based on big data technology

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## **ABSTRACT**

In order to optimize the current college students' thinking and teaching management, this paper tries to apply the big data technology to the college thinking and teaching innovation management. Based on this, the SWOT analysis method is incorporated into it together to explore more possibilities brought by it to the innovation of college Civics. According to the SWOT analysis table, we can get: the total weighted mean score of advantage is 4.47, the total weighted mean score of disadvantage is 3.96, the total weighted mean score of opportunity is 4.24, the total weighted mean score of opportunity is 4.33. Thus, it can be seen that the current thinking and politics innovation has good advantage support and reform and development opportunity, and the innovation optimization method proposed in this paper from the internal and external advantages and disadvantages of thinking and politics work has practical significance.

## **KEYWORDS**

Big Data Technology; SWTO Analysis; College Civics; Management Innovation

## **1. INTRODUCTION**

The development of college Civics education in the information era is facing opportunities and threats, and the construction of an

informative and intelligent Civics education model based on digital information technology has become one of the important topics in the current research of college Civics education [1]. As an important element in the teaching structure of Civics and Political Science class, the teaching power of teachers and the learning power of students directly determine the efficiency of teaching activities. Teaching power refers to the individual psychological characteristics and professionalism of teachers who organize and carry out teaching based on their own knowledge structure and professional skills to achieve teaching goals and complete teaching tasks. Learning ability refers to the comprehensive ability of students to master knowledge, improve their ability, complete learning tasks and internalize textbook knowledge into their own knowledge and literacy [2].

In the teaching of Civics in colleges and universities, education provides educational services to students with ideological concepts, political views and moral norms as educational products. At the same time, borrowing from the theory related to the balance of supply and demand in the field of economics, making a balance between the supply and demand of educational products is the basic condition to realize the efficiency of teaching and learning in both directions. Therefore, the balanced development between the two is the center of gravity of the teaching structure adjustment of Civics and Political Science class [3]. The integration of information technology helps to promote a dynamic balance between the elements of Civics education at multiple levels, such as curriculum objectives, teaching content, teaching organization, and teaching evaluation, and the spiritual value needs of students' healthy growth, easing the contradiction between teaching supply and students' needs [4]. For example, with the introduction of big data technology, teachers can understand the overall teaching situation in a more comprehensive and diversified way by data mining and analysis, so that they can reasonably allocate and integrate the elements of teaching supply according to students' actual needs to improve the adaptability and flexibility of teaching supply structure [5]. In addition, teachers can rely on the information-based learning platform to instantly follow up on students' ideological behavior, discover their intrinsic learning needs, and find the crux and center of ideological problems, so as to improve the personalization and precision of the teaching of Civics.

This paper builds a big data and thought politics innovation management method from three aspects. Firstly, the concept of big data and its data characteristics are clarified, and the ways and means of its technical support are elaborated. Finally, big data technology is integrated with SWOT analysis method to analyze the advantages, disadvantages, opportunities and threats of the current teaching and learning of Civic Education and other aspects from internal and external factors. Through the SWOT analysis table, the strategy of constructing the innovative management method of college thinking and administration is proposed in a focused and comprehensive way.

## **2. Integration of Big Data Technology and Resource Management of Civics Teaching**

### **2.1. Big Data**

Big Data refers to large, fast updating, fragmented, and valuable information that is often displayed in multiple ways. In a narrow sense, Big Data uses different processing methods to increase the space, speed, and diversity of information material with greater resolution, decisiveness, and process optimization. In general, this concept of big data should be judged by the essence of the concept [6]. Big data has four characteristics as: Volume, Variety, Velocity, and Veracity, which we generally call the 4Vs.

### **2.2. Big data provides technical support for the reform and innovation of ideological and political education in colleges and universities**

(1) Big data technology can effectively integrate educational resources

Big data in education offers educators unprecedented opportunities to reach and instruct students in new ways. It will give teachers greater insight into their students' educational experiences, which will help them assess the state of the education system. With big data in education, student behavior can be monitored. For example, monitoring how long it takes students to answer questions, what materials they use to prepare for tests, etc. These similar questions can be answered automatically and instantly, giving instant feedback to each student and providing an accurate teaching resource [7].

(2) Big data can promote ideological and political education model innovation and upgrade

First, through monitoring and analyzing students' behaviors, big data technology can find the related thoughts and behaviors, and then decompose macroscopic thoughts into microscopic behaviors, and turn "big and comprehensive" theoretical lectures into "small and precise" daily behavioral development [8]. Secondly, big data technology can explore deeper regularity issues by exploring the law of thought development and correlating data from different periods and stages with it. Finally, big data technology can accurately carry out carrier integration by monitoring online and offline teaching data. Through big data technology positioning and analysis, it makes the connection with the education object occurring becomes readily, anywhere, accurate and integrated, so that the individualized differences of the student group can truly be taught according to their needs.

### **2.3. SWOT analysis method**

SWOT analysis model is a method of situation analysis proposed by Wyrick, a professor of management at the University of San Francisco, and its most prominent features and advantages are structured and systematized. The SWOT matrix is an interactive and hierarchical analysis based on the significance of each dimension and level, which overcomes the limitations of other analysis methods that isolate one of the above aspects, and then systematically analyzes the overall situation of the analyzed object and scientifically formulates an integrated development strategy of "WT, WO, ST, SO" [9].

### **3. SWOT analysis of the innovation of college Civics teaching under the background of big data**

In order to improve the accuracy and scientificity of SWOT analysis, we determined the main influencing factors of the SWOT matrix of precise thinking and government work in colleges and universities through data research and expert interviews, and calculated the distribution data of the evaluation matrix. The evaluation matrix of internal factors and external factors of the innovation of college thinking and teaching in the context of big data is shown in Table 1. The data show that the "advantage" score, "disadvantage" score,

"opportunity" score and "threat" score of precision thinking and government work in colleges and universities are all greater than 1. "This indicates that the internal advantages of precise thinking and government work in colleges and universities are greater than the disadvantages, and the external opportunities are greater than the threats, and the overall conditions and development environment are better.

**Table 1.** Evaluation Matrix of Internal and External Factors of Ideological and Political Teaching Innovation in Colleges and Universities

Dimension	Influence factor	Importance evaluation		
		Mean value	Weight	Weighted average
Strength	Comprehensive information collection	4.40	39.04%	1.54
	Visualization of problem presentation	4.78	34.59%	1.61
	Content push customization	3.92	30.51%	1.32
	Total weighted mean score			4.47
Weakness	The concept of precise education has not been widely established	3.72	35.19%	1.24
	Lack of coordination mechanism for precise ideological and political work	4.46	34.28%	1.37
	Lack of professional talents	4.23	33.77%	1.35
	Total weighted mean score			3.96
Opportunity	Policy guarantee	4.35	30.43%	1.64
	Technology enabling	4.83	35.19%	1.53
	Capital addition	3.65	33.38%	1.07
	Total weighted mean score			4.24
Threats	The educational object's information attention is diluted	4.15	35.73%	1.50
	Educators' "digital dependence"	4.64	34.48%	1.73
	Educational information security and ethical crisis	3.58	30.38%	1.10
	Total weighted mean score			4.33
Note: The assignment range of "importance evaluation" is 1-5 points. The higher the score, the higher the priority.				

## (1) SW analysis: internal strengths and weaknesses analysis

With the support of new technologies such as big data, the precision thinking and government work in colleges and universities can be organized and carried out precisely, and its characteristics and advantages are.

One of them is the comprehensive information collection. With the educational application of big data, artificial intelligence and other cutting-edge technologies, the Civic and Political Science workers can use campus network, electronic monitoring, information detection system and multi-media capture means to realize the whole process of all-round information collection online. The data of classroom learning data, assessment data, Internet data, consumption data, book borrowing data, social practice data, campus activity data and other aspects of data are comprehensively collected, accurately identified, dynamically captured and individually analyzed, realizing the capture of data trajectories of the thoughts and behaviors of education subjects in their unconscious state and effectively improving data fidelity.

Second, visualization of problem presentation. With the support of data, educators can visualize educational problems in the form of graphics and images to present them in a multi-dimensional manner, providing an intuitive basis for problem solving.

Third, content pushing customization. Based on big data analysis, educators can accurately identify the information preferences and value orientation of education subjects based on the relevant data such as the number of visits, click rate, length of stay and bounce rate of education subjects to the network information, and place the education information that meets the personal preferences of education subjects in the priority position of information pushing in order to improve the matching degree between education information and education subjects.

In terms of disadvantages, the internal construction of accurate thinking work in colleges and universities is inevitably in need of improvement because it is in the initial stage.

One of them is the concept to be established: the concept of precise education has not been widely established. The problem of unclear

and poor understanding of "big data" and "accurate thinking work" exists among college thinking workers in general. Some of them lack big data thinking and precise thinking, and they are hesitant about the precise thinking work supported by big data, and even reject it because of "technical skills panic".

Secondly, the mechanism is lacking: the level of collaboration of accurate thinking and politics work needs to be improved. At present, the level of coordination of accurate thinking and politics work in universities is not high in terms of information flow, organization and coordination, effectiveness analysis, problem solving and program development, etc. The phenomenon of "single-armed combat" is still common, and a set of systematic and effective working mechanism has not yet been formed.

Thirdly, there is a lack of talents: the professional talents team of accurate thinking and government work needs to be cultivated. The key to promote accurate thinking and politics work in colleges and universities is to improve the ability and level of leaders and organizers of thinking and politics work in colleges and universities.

## (2) OT analysis: external opportunity and threat analysis

In terms of external opportunities, the overall precision thinking work in colleges and universities has a good development environment and opportunities.

Firstly, policy guarantee: policy incentive promotes the steady development of accurate thinking work.

Secondly, technology empowerment: technological innovation promotes the iteration and upgrading of accurate thinking and politics work. Emerging technology empowerment is the fundamental support and important opportunity for accurate thinking and government work in universities.

Thirdly, capital support: market entry injects new opportunities for accurate thinking and politics work. Along with the promotion of precise thinking and politics work in colleges and universities, its market value has deeply attracted the entry of capital in 5G, big data, information and communication, cloud computing, artificial intelligence and other fields, which provides capital support for good precise thinking and politics work in colleges and universities.



In terms of threats, the real-life issues that must be responded to strongly by the accurate thinking and government work in colleges and universities are.

First, information flooding: the fragmentation of information attention blurs the "digital portrait" of education objects. In the era of big data, in the face of a huge amount of information of different colors and flavors, college students unconsciously become "omnivores", and the unprecedented flood of information leads to the splitting and dilution of college students' information attention.

Second, the digital trap: the application of big data leads to educators suffering from "digital dependence". The main symptom is that the thinking and political science workers are lost in the advantages of the comprehensiveness, science and intuitiveness of big data, and unconsciously form a "cult of numbers". The organization of all thinking and political work is data-driven, gradually losing the ability to think and judge independently, becoming a "puppet" under the manipulation of data.

Third, the ethical dilemma: undifferentiated access to information violates the data privacy of educational subjects. This will further lead to the confrontation between data sharing and data privacy, and involves the legitimacy and legality of data acquisition and application in the precise thinking work of universities.

#### **4. The construction of strategy for the innovation of college Civics teaching in the background of big data**

Based on the SWOT analysis model in Chapter 3, this paper puts forward the development strategies of precise thinking and government work in colleges and universities. The innovation strategy matrix of college Civics teaching in the context of big data is shown in Table 2.

**Table 2.** Innovation Strategy Matrix of College Ideological and Political Education under the Background of Big Data

Internal factors	
Strength	Weakness
1.Comprehensive information collection 2.Visualization of problem presentation 3.Content Push Customization	1. The concept of precise education has not been widely established 2. Lack of coordination mechanism for precise ideological and political work 3. Lack of professional talents
SO strategy	WO strategy
Seize the opportunity of development Stimulate internal vitality	Establish rules and regulations: promote scientific and standardized precision ideological and political work
ST strategy	WT strategy
Active action: based on advantages Solve the problem with kindness	Targeted treatment: focus on outstanding problems and make efforts accurately
External factors	
Opportunity	Threats
1. Policy guarantee 2. Technology enabling 3. Capital addition	1. Educational objects' attention is diluted 2. Educators' "digital dependence" 3. Education information security and ethical crisis

Specific strategy details are as follows.

Firstly, take advantage of the situation: clarify the development goals and the direction of advancement, coordinate the advantages and opportunities, and take advantage of the situation to achieve new action. First, seize the opportunity of national policy and do a good job in the overall planning of accurate thinking and government work. Second, vigorously promote the deep integration of new technologies such as big data with the thinking and government work of colleges and universities, innovate the big data application mechanism of precise thinking and government work, strengthen the technology drive, and plant the inherent technical advantages of precise thinking and government work. Third, actively explore the cooperation mechanism and mode between universities and new technology enterprises, fully explore external market resources and absorb market financial support to create good development conditions and environment.

Secondly, we take the initiative: to break the problem based on our advantages with good planning. First, in response to the ethical crisis

of information leakage of education objects, the privacy level of information of education objects can be set. Secondly, we can make full use of the advantages of comprehensive information collection, analyze the information preferences of education subjects, and build a database of moral education information resources with rich contents, various forms, complete types and timely updates to enhance the attractiveness of education information.

Thirdly, build rules and regulations: promote the scientific and standardization of precise thinking and government work. Make good use of external opportunities, make efforts to make up for internal deficiencies, pay attention to the top-level design of precise thinking and government work in colleges and universities, work on building rules and regulations, and regulate development with the rigidity of system to guarantee the quality and level of precise thinking and government work.

Fourthly, targeting policy: focus on the outstanding problems to make precise efforts and policies. One, with system thinking as a guide, to the real problems gathered researchers, educators and managers, cohesive governance synergy. Second, seize the main contradiction, target the outstanding problems and make precise efforts. Take the main contradictions and key issues affecting the whole situation as breakthroughs to win the opening battle. Third, clarify the timetable and roadmap for promoting precise thinking and governance. Each university should make a timetable and roadmap for promoting accurate thinking and government work according to local conditions to ensure that construction initiatives and problem solutions are put in place and applied effectively.

## **5. CONCLUSION**

Based on big data technology, this paper explores the effective method of innovative management of college Civics, integrates big data technology with SWOT analysis method, analyzes the opportunities and threats of Civics innovation teaching from internal and external factors one by one, and then proposes optimized management strategies based on the analysis results. From the SWOT analysis, the total weighted mean score of advantages is 4.47 and the total weighted mean score of threats is 4.33, which means that the current management optimization of Civics and Political

Science innovation in colleges and universities has great advantages. Colleges and universities should timely seize the opportunity to innovate before it is too late, and pay attention to the threats faced by the thinking and administration work in the current big data background, and timely resolve the risks in order to help maximize the effect of thinking and administration management.

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# The information education model of college students' ideological and political e-ban based on artificial neural network

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## **ABSTRACT**

In order to improve the effect of Civic Education for college students on Eban platform, this paper proposes Civic Information Teaching Model based on artificial neural network technology. The research direction is determined by analyzing the advantages and disadvantages of Civic Education on Eban platform. The feasibility analysis of the information of Civic Education for college students based on artificial neural network is proposed, and the scientificity of the conception of this paper is comprehensively verified. The sensitivity of mining Civic and Political elements of Eban courses tested by using artificial neural value-added evaluation model is 90% in general, and the sensitivity of news material mining is up to 95%. The recognition rate of the ideological and political courses of each university on Eban APP is 94%, and the sensitivity of documentary information mining is 92%, which is a good test performance and meets the new national requirements for ideological and political education work. The research on the effectiveness of ideological and political education in this paper is of reference and practical significance.

## **KEYWORDS**

Artificial Neural Networks; College Student Civics; Easy Class; Informative Education

## **1. INTRODUCTION**

The ideological and political courses for college students must adhere to educating students and helping them to establish correct moral concepts. As a carrier of ideological and political education, Eban should focus on the needs and demands of college students in practical work, and make use of the unique functions of Eban itself for ideological and political education [1]. To a large extent, Eban is a carrier innovation for college students' ideological and political education, which can carry out targeted college students' online ideological and political education and effectively enhance the effectiveness of students' online ideological and political education [2]. At the same time, it helps college students to establish positive and healthy concepts and cultivate qualified talents for socialism with Chinese characteristics in the new era.

"Eban" is a real-name comprehensive student online interactive community integrating ideological education, teaching and learning, life services and cultural entertainment [3]. In recent years, the national "Eban" co-construction system has been deepened, which provides a convenient way to share the resources of online ideological education in colleges and universities. Each "Eban" co-constructed university gives full play to its regional characteristics and specialties, and produces high-quality online thinking and politics education courses on the "Eban" platform. Among them, the excellent course platform of Eban has gathered more than 8,000 high-quality video courses with 31.4 million contents, and opened many columns for learning the 19th National Congress of the Party, college Civic Education, situation and policy, Civic Theory Course, Party Member Education and Youth League Education. This provides a strong supply of resources for the online Civic Education of colleges and universities and greatly expands the width of online Civic Education for college students [4].

In this paper, firstly, we start from the advantages and disadvantages of Eban platform to carry out college students' civic education, comprehensively analyze the advantages and disadvantages of Eban platform, and determine its research significance. It is followed by the analysis of the feasibility of the information-based teaching of college students' Civic Education on Eban based on artificial neural network, the adaptability of artificial neural network and value-added evaluation of Civic Education to determine the feasibility of its application to the practice of value-added evaluation. The analysis of Civic Education elements based on artificial neural network yields the sensitivity of its information mining. The effect of public opinion monitoring on the Eban platform fills the research gap of previous studies on the orientation of public opinion on the platform. Based on the results of the full-text study, this paper proposes countermeasures to enhance the effectiveness of online political education for college students.

## **2. Analysis of the advantages and disadvantages of carrying out the political education of college students on Eban platform**

### **2.1. The advantages of carrying out college students' thinking and political education on Eban platform**

(1) Provincial and school co-construction, increasing the intensity of online political education for college students

Under the active promotion of the Central Internet Information Office and the Ministry of Education, up to now, "Eban" has covered 32 provinces, autonomous regions and municipalities nationwide, and more than 1,000 colleges and universities have carried out the joint construction work of "Eban", and the number of registered users of "Eban" has exceeded 10 million. "The number of registered users exceeds 10 million. The continuous promotion of the provincial-school co-construction work of "Eban" has increased the intensity of college students' online thinking and government education [5]. The perfect provincial-school co-construction mechanism enables each university to closely focus on the fundamental task of establishing moral education, unify ideas and develop their own strengths, and carry out online ideological education work in an orderly manner.

(2) Platform integration increases the depth of online ideological education of college students

Platform integration is one of the characteristics of "E-Class" co-construction system, which effectively increases the depth of online ideological education for college students [6]. The platform integration feature of "Eban" makes it possible to carry out online political thinking education work in multiple channels and directions, and it can penetrate into college students' groups. As the main position of online political thinking in colleges and universities, "Eban" provides students with a full range of campus services such as customized education and teaching, life services and cultural entertainment. At the same time, "Eban" can give full play to the advantages of its open platform, providing secondary development functions for many users and functional interfaces for other platforms. For example, the topics of "Eban" can be easily posted to friends, WeChat groups and QQ groups, and its platform can be co-constructed with popular applications such as Campus Today to achieve platform integration and data sharing.

## **2.2. The disadvantages of carrying out the Civic and Political Education of college students on Eban platform**

(1) The network literacy of education grantors and the information needs of education recipients are not synchronized

Civics teachers and counselors are the teaching body of online ideological and political education in colleges and universities, and they mainly undertake the teaching task of leading college students' online ideology. However, many teachers and counselors of Civics and Political Science courses focus on offline education and theoretical teaching, and they know less about the law of network information dissemination and cannot grasp the network behavior habits of college students, and their use of network tools only stays in the forwarding of teaching and management information, lacking the ability of secondary processing of key information such as hot events on the network [7]. On the other hand, contemporary college students, as education recipients, are more and more interested in network information under the influence of the rapid development of various network industries. It can be seen that the unsynchronized network literacy of the education grantor and the information needs of the education recipient are the difficulties faced by the current network Civic Education in colleges and universities.



(2) Inconsistency of content output form with the aesthetic demand of college students

At present, many colleges and universities still adopt traditional working methods for online ideological and political education, such as using school official microblogs, WeChat public numbers and class QQ groups to produce rigid ideological and political education articles, or simply forwarding documents and notices from higher departments, lacking two-way communication and network interaction with students. The output form of this kind of ideological education is inconsistent with the aesthetic needs of contemporary college student groups, unable to attract the attention of youth groups, and the content is poorly readable, unable to arouse the emotional resonance of college students [8]. College students who are accustomed to the free and open network information environment can no longer accept this one-way information transmission form, and even get tired of this kind of didactic education mode, thus seriously reducing the effectiveness of online political education.

### **3. Feasibility Analysis of Information Education Mode of College Students' Civics and Politics Eban Based on Artificial Neural Network**

#### **3.1. The Adaptability of Artificial Neural Network Technology and Value-Added Evaluation of Civic Education**

Value-added scores in value-added evaluation in Civics not only measure the results of student progress, but also reflect the role of the teaching system when multiple factors interact [9]. Compared with traditional evaluation, value-added evaluation poses more specific requirements in terms of philosophy, data structure, and handling of complex data. The degree of adaptation of artificial neural networks to these requirements can solve the technical problems of traditional evaluation models to most extent, which determines the feasibility of applying artificial neural networks to the practice of value-added evaluation. For ease of presentation, the various types of value-added evaluation models can be summarized as the following mathematical models:

$$y = f(x_1, x_2, \dots, x_n) \quad (1)$$

Where  $y$  denotes the value-added outcome or exit score of the assessment object,  $f(x)$  denotes the value-added evaluation function, and  $(x_1, x_2, \dots, x_n)$  denotes the correlated influencing factors of the value-added score, including indicators such as pretest scores, student background, and teacher characteristics. Therefore, the goal of the value-added evaluation model construction and comparison is to explore the evaluation function that can explain the relationship between  $y$  and  $x$  to the greatest extent.

### **3.2. Artificial Neural Network Based Civic Elements Discovery**

Based on the adaptability of artificial neural network and value-added evaluation of Civic Education, this paper uses the artificial neural data value-added evaluation model method to mine some Civic elements from the E-Class Civic Education course dataset for the sensitivity test of this paper's algorithm model.

The mined elements of ECB Civic Education are shown in Table 1. The overall sensitivity of the mined Civic and Political elements of Eban course using the artificial neural value-added evaluation model is 90%, and the test performance is good. Among them, the highest sensitivity for news material mining is 95%, and almost all the Civic and Political information is completely identified. The next one is the recognition rate of 94% for the Civics courses of each college on Eban APP, which can greatly reduce the complexity of teachers' screening of teaching contents by using it in college Civics education.

**Table 1.** The "E-Class" Civic Science and Politics Element Mining

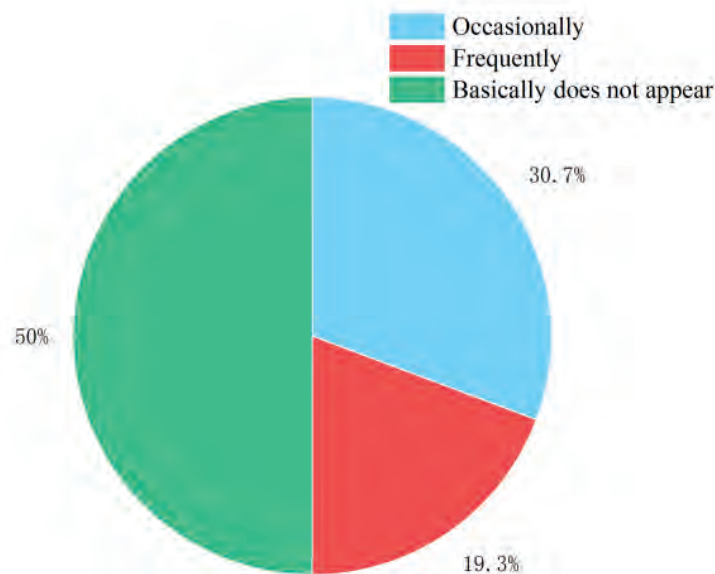
Ideological and political basis	The core values of Chinese socialism	Sensitivity
Excavation approach	1. Explore patriotism, national pride, four self-confidence, self-worth, sense of responsibility, outlook on adversity, craftsmanship, dedication culture, innovation spirit, harmony and unity between man and nature, sustainable development, etc. from electronic textbooks	80%
	2. Discover from news video materials	95%
	3. Great country style: classic Chinese classics such as "The Story of China's Reform and Opening up", "The 70 Years of New China", and current political hot spots of "National Treasure": national policies, government work reports, current affairs news at home and abroad, and other value guides: spirit of hard work, sound personality, etc	92%
	4. Digging in the ideological and political course of Yiban	94%
Material source identification	Audio and video resources (dynamic), text resources (static), pictures (static) and other multi-modal	89%

### 3.3. Public Opinion Monitoring on Eban Platform under Artificial Neural Network

Eban is an innovative product in the context of network. While the practice of online ideological and political education for college students based on Eban plays its role as a carrier of ideological and political education, it also faces the problem of network opinion safety.

The frequency of negative comments on Eban is shown in Figure 1. 19.3% of the teachers and students said that negative comments would appear frequently on Eban, 30.7% said that negative comments would appear occasionally, and 50% said that negative comments basically did not appear. Although there are fewer

negative comments on Eban compared with other online platforms, the survey results show that neither the Eban platform itself nor the universities have established a good mechanism to monitor the comments and articles made by teachers and students on Eban platform, which leads to the failure to detect students' problems in time and no way to conduct targeted education. Based on this, in the information education of Eban, special attention should be paid to the monitoring of the public opinion orientation of Eban platform, so as to timely kill the poisonous tumor of ideology such as division and wrong political tendency.



**Figure 1.** Frequency of Negative Comments in Yi's Class

#### **4. Measures to Enhance the Effectiveness of Online Ideological and Political Education for College Students Based on Eban**

(1) Enhance college students' active awareness of participating in online ideological and political education

The ideological education carried out on E-class is mainly targeted at students. Students are the main force, and they can educate themselves, strengthen self-management and discipline themselves in practical activities as the target of ideological education, and this main consciousness determines whether the development of ideological education can achieve practical effects. When using E-class to carry out the Civic Education, we must be aware of this problem and pay attention to the personalities and needs of college students, so that we can better realize the effect of Civic Education.

## (2) Improving the network literacy of education subjects

In order to enhance the effectiveness of the online Civic Education of college students based on Eban, ideological and political educators should take the initiative to open Eban, learn the features, functions and contents of Eban, be proficient in searching information, publishing articles and managing students on the platform of Eban, and play a leading role in the Eban class. Teachers can write and publish positive articles on the website that can promote students' growth, and students can find resonance in the articles. To carry out Civic Education for college students, teachers are required to have excellent quality and ability in order to be able to use E-Class to carry out Civic Education with ease and enhance the effect of education.

## (3) Strengthening guidance and developing innovation

Using the platform of Eban's excellent courses, we create online study groups such as "studying for the fourth and sixth grades" and "final exams". Relying on the "Topic Discussion" column of the class group, carry out online student exchange meetings and thematic class meetings. The "Class Curriculum" section of the classroom group is used to plant online courses on topics such as mental health education, career planning education, and college culture education. Based on the "Online Exam" section of the class group, online exams are organized to further strengthen the learning effect through tests and promote students to complete their learning tasks consciously and actively.

## **5. CONCLUSION**

This paper proposes the information education model of college students' ideological and political Eban based on artificial neural network technology, and uses artificial neural network technology to explore its adaptability to value-added evaluation of Civic and Political Education, as well as to explore its sensitivity of mining Civic and Political information and the effect of public opinion supervision, so as to evaluate the feasibility of the model. The artificial neural value-added evaluation model tested that the overall sensitivity of mining Civic and Political elements of Eban courses was 90%, and the sensitivity of mining news materials was up to 95%, and the recognition rate of Civic and Political courses of colleges and universities on Eban APP was 94%, so the test performance was

good. The purpose of carrying out online ideological and political education for college students based on Eban platform is to solve a series of practical problems such as "how to innovate ideological and political education mode" and "enhance the effectiveness of online ideological and political education", which is also an important measure to promote the innovative development of online ideological and political education for college students. This is also an important measure to promote the innovative development of college students' online ideological and political education, and play a certain role in promoting the development of ideological and political education in colleges and universities.

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# The Application of Big Data Technology in the Ideological and Political Education of Eban Network

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## **ABSTRACT**

Applying big data technology to Eban network ideological and political education is conducive to improving teaching management efficiency and enhancing the quality of network ideological and political education. This paper firstly compares the emergence and development of Eban network ideological and political education and explores its educational characteristics, and then builds a big data college network ideological and political education effectiveness assessment platform to demonstrate students' access and platform participation by means of big data technology. At the level of students' sense of acquisition, the significance level of E-ban ideological network political education ranged from -3.25 to -4.42, and the p-values were all less than 0.05. Online ideological and political education made students feel that they had learned something and had positive significance. At the level of platform activity, the average value of student activity index is 12.5 and the average value of class co-construction index is 7.5, with a high overall activity level. The big data ideological education effectiveness assessment platform built by this research has important teaching practice value.

## **KEYWORDS**

Big Data; Easy Class; Web Civics; Effectiveness Assessment



## 1. INTRODUCTION

As a new online media platform for colleges and universities, Eban can give full play to its function of online ideological and political education, which is an important response to further strengthen the work of online ideological and political education in colleges and universities and an inevitable requirement for the development of online ideological and political education in colleges and universities [1]. The periodization wave of full media and big data symbiosis has provided fresh means for the ideological and political education work in colleges and universities, and the network ideological and political education is thus advanced. The lifestyles, learning styles and thinking styles of college students in higher education have also changed as a result. Facing such an objective situation, improving timeliness and effectiveness objectively requires big data platform and technology to be fully connected with ideological and political education work [2].

Online ideological and political education is an important part of ideological and political education, an important direction for exploring ideological and political education in colleges and universities in the new media era, an important way to improve the efficiency and effectiveness of ideological and political education, and an inevitable requirement for developing and improving the ideological and political education system [3]. Under the premise of following the law of political work, the law of teaching and educating people and the law of students' growth, network ideological and political education takes network education and quality improvement as the goal, strengthens the network construction and management of colleges and universities as the main line, innovates network ideological and political education as the focus, fully uses new media and new technology, constantly innovates working ideas and methods, strives to make ideological and political work live and forms a vivid online and offline linkage education of people The situation [4]. In recent years, colleges and universities have been increasing the network ideological and political education, actively improving the management of network positions, guiding students to abide by network norms, guiding correct opinion guidance, constantly narrowing and eliminating the discourse difference between teachers and students, deeply promoting micro network education platform,

pushing students' favorite campus culture "micro products", and devoting to create a good campus network cultural atmosphere [5]. This paper explores the relationship between big data technology and e-culture.

This paper explores the effectiveness of combining big data technology with Eban's online ideological and political education, and is divided into three parts. The first part explores the current situation of the emergence and development of Eban and online ideological education and their development characteristics, and tries to sort out the future direction of Eban's development from the source. The second part studies the teaching effectiveness of combining big data technology with Eban Civic Education, builds a big data college network Civic Education effectiveness assessment platform, and verifies the teaching results from students' sense of acquiring online Civic Education and the activity of Eban platform, proving that the big data Civic Online Teaching Platform designed in this paper can improve students' passion for Civic Learning.

## **2. Easy Class and Online Civic Education**

### **2.1. The Emergence and Development of Eban**

The "Eban" student interactive community platform is a comprehensive interactive online community that provides teaching, living services and cultural entertainment for university teachers and students [6]. In August 2007, the online class "E-class" appeared in some colleges and universities in Shanghai, and in September 2009, the Shanghai Education System Network Culture Development Research Center was commissioned by the Shanghai Municipal Party Committee of Education and Health and the Municipal Education Commission to develop an upgraded version of E-class based on the "E-class" system. The upgraded E-class system is based on "E-class". The system integrated the functions of BBS, web disk and photo album, and was launched in Shanghai Jiaotong University, Donghua University, Shanghai International Studies University and Shanghai Ocean University. In September 2012, Eban achieved full coverage in public and private colleges and universities in Shanghai. at the end of 2012, colleges and universities in Fujian, Guangxi, Tianjin, Hainan, Jiangsu, Hubei, Sichuan and other provinces and cities began to gradually promote Eban on a pilot basis. in 2013, the

Ministry of Education and the State Information Office issued the "Opinions on Further Strengthening the Network Construction and Management of Higher Education Institutions In 2013, the Opinions on Further Strengthening Network Construction and Management of Higher Education Institutions issued by the Ministry of Education and the State Information Office called for the implementation of "Eban" promotion plan and the gradual construction of "Eban" into an interactive demonstration community for college students integrating ideological education, education and teaching, life services and cultural entertainment.

## **2.2. Features of the ideological and political education of Eban Network**

### **(1) Non-profit**

Under the leadership of government departments, "Eban" has broken the structure model of commercial interactive community websites, and its nonprofit nature is different from that of profitable commercial application platforms such as microblogs and weibo [7]. The advantages of non-profit nature, such as the relative simplicity of online information and the absence of advertising interference, have made "Eban" the main forum for college students to access the Internet, an important platform for students' communication, the main channel for college students to express their opinions, and an important window for the development of college students' thoughts today.

### **(2) Resource sharing**

"It has integrated mainstream Web2.0 applications such as forums, social networks, blogs, microblogs, emails, network hard disk, cell phone applications, etc., and supports various access forms such as web pages and cell phone clients. It has typical college life applications such as clubs, interests, address book, open classes, Eban College, Eban Notes and topics. The powerful resource sharing of Eban locks the user group firmly in the "class" [8].

## **3. The effectiveness of big data technology in the application of ideological and political education in Eban network**

### **3.1. Build a big data university network ideological and political education effectiveness assessment platform**

First, build a data acquisition platform. Data acquisition is the foundation of the whole effectiveness assessment platform. The main body of data collection consists of education management workers in the field of network ideological and political education in colleges and universities and professional technical team familiar with knowledge related to big data collection and management. The data collection objects mainly include workers, working objects and management departments of network ideological and political education. The data mainly comes from the input data information of network ideological and political education workers and working objects in the major network platforms inside and outside the university for network ideological and political education content dissemination, interactive communication, forwarding and sharing. The data from the network informatization office, academic affairs system, logistics security office and other related departments within the university will also be used as the support of the evaluation data sources. The step of data acquisition is to import the collected data into the database and let the database play the role of dynamic monitoring, while ensuring that the acquired data reflects both the accuracy and targeting characteristics, and is integrated with the index system of effectiveness assessment.

Second, establish a data analysis platform. Data analysis is the key to effectiveness assessment, and it is through deep data mining and analysis that we can bring the value of data use into play. This process needs to use a series of intelligent functions of big data, after intelligent screening, integration, clustering, analysis and statistical processing of the collected massive data, and through the association between data to understand the audience base, compare the audience groups, analyze the behavior trajectory, and analyze the dissemination situation and education effect of college network ideological and political education among students in real time.

Finally, the data feedback platform is formed. Through the data feedback platform, the explicit and implicit data are analyzed in depth, thus presenting the effectiveness assessment report and visual data analysis report of college network ideological and political education, which provides objective reference for the index system of

effectiveness assessment and dynamic adjustment of the implementation process, and ensures the scientific and long-term effectiveness assessment work. The platform of college network ideological and political education in the era of big data consists of data acquisition platform, data analysis platform and data feedback platform, etc., which form an interlocking structure system and will ensure that the effectiveness assessment is comprehensive, coordinated, objective and reasonable.

### **3.2. Analysis of Eban Network Civics Students' Access**

In order to investigate the students' learning acquisition sense after the application of big data technology to the online ideological and political education of Eban, students from the School of Economics and Management of University A were used as the research subjects. A total of 200 students participated in the pre-intervention test, of which 115 were in the research group and 85 in the control group, and the comparison between the control group and the research group in terms of the sense of access to online ideological and political education after the intervention is shown in Table 1.

The results of the study show that the significance level is between -3.25 and -4.42, which means that ideological and political education using the Eban platform can have a significant impact on students' sense of access to online ideological and political education and can significantly improve their learning experience. p-values are less than 0.05, indicating that after one semester of online ideological and political education learning intervention, the study group and the control group have a statistically significant difference in the sense of access to online ideological and political education. The differences in each dimension were statistically significant. The students in the study group showed significant improvement in gaining experience, environment, content, means, sharing, personal growth, and behavior, indicating that throughout the intervention process, the students' subjective experience of the content, process, and means of education was positive and positive as recipients of online ideological and political education through the Eban platform.

**Table 1.** Comparison of sense of gain in online ideological and political education

Variable	control group (n=115)	Research Group (n=85)	t	p
Get content	5.40±1.28	6.04±0.35	-4.423	0.000**
Get shared	5.41±1.30	5.90±0.30	-3.746	0.000**
Get experience	5.45±1.47	6.18±0.45	-3.756	0.000**
Behavioral acquisition	5.42±1.45	6.06±0.33	-4.412	0.001**
Sense of personal gain	5.43±1.32	5.92±0.45	-3.250	0.002**

### 3.3. Students' learning activeness under the ideological and political education of E-class network

According to the data summary of students' learning on Eban, the statistical items include active index out of 15 points and co-construction index out of 15 points. the statistics of students' Eban activity from March to June are shown in Figure 1.

The average value of student activity index is 12.5, and the average value of class co-construction index is 7.5. In general, the activity of Eban network ideological education is high, and the highest value of individual activity index in which students have active willingness to study Civics courses on Eban is 14 points, which proves that Eban has the place to attract students to stay. Schools should seize this opportunity to develop more learning categories on Eban that attract students.

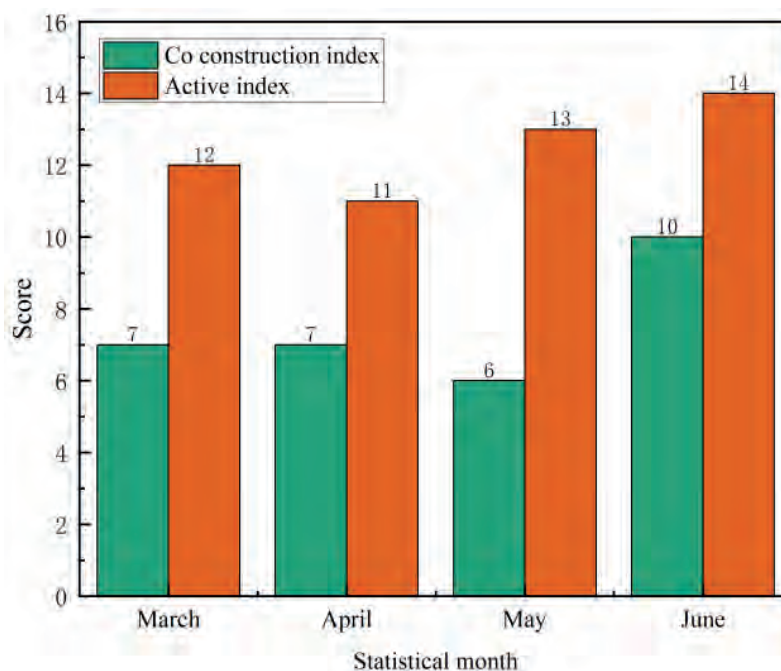


Figure 1. Statistics of students' activity in changing classes from March to June

#### **4. Exploring the construction of the path of easy class thinking and political education**

(1) Strengthen "Eban + party and group building" and open up new positions for party building and group building

In the era of new media, youth and the Internet have a natural connection, where the youth are, the Party and League should be built and work should be done. All levels of society should closely integrate with the needs of youth, constantly provide them with services and assistance in learning and success, employment and entrepreneurship, social integration, etc., and expand the coverage of the work of the Party and the League. Eban is an interactive communication platform mainly for college students and a gathering place for young students, so it should become a new position of "Internet + Party and League Construction". Party and group organizations can make full use of Eban platform to establish party branches and group branches, carry out online party and group activities such as theoretical study, thematic discussion, democratic evaluation and opinion collection, record the daily performance of branch members and grasp the dynamics of students' thoughts. At the same time, it can also carry out micro-course collection and display with the help of Eban You Class, complete the education and training assessment of party members and league members, realize the effective connection of party and league construction in Eban platform, and promote the organization construction to deepen development.

(2) Focus on the research and development of Eban's entertaining applications to enhance the fun of ideological and political education

The positioning of Eban is "a network interactive community integrating education and teaching, life services and cultural entertainment". However, in actual application, Eban is still dominated by serious notices and ideological tweets, and most of the activities are still focused on theme education, lacking in fun and entertainment, and lacking in attractiveness to students. In the process of construction, colleges and universities can add entertainment sections and enrich entertainment functions through application

design competitions and other means, and at the same time combine the ideological education with it, so that students can immerse their hearts in a relaxed and pleasant atmosphere and enhance their satisfaction with the platform.

### (3) Establishing a perfect evaluation mechanism

By incorporating the work of "E-Class" into the year-end assessment index of students' work in each second-level college, we can further promote the development of "E-Class". The student work of E-Class can be evaluated through regular reports and included in the comprehensive quality assessment of students, so as to promote the further development of each student workstation. The establishment of a perfect assessment system and the orientation of assessment can make the teachers and students of "E-Class" have a clearer direction of their work.

## **5. CONCLUSION**

The purpose of this paper is to explore the possibilities brought by the integration of big data technology and Eban platform for online ideological and political education, to sort out the current situation and development needs of Eban with the rise and development of online ideological politics, and to build an evaluation platform for the effectiveness of online ideological and political education in big data universities. The conclusions are verified in terms of students' sense of access and the activity of Eban, and the future construction path of Eban is proposed based on the conclusions, such as strengthening the construction of "Eban + party and group construction" and establishing a perfect evaluation system. The significance level of e-Ban ideological network political education ranged from -3.25 to -4.42, with p-values less than 0.05. This indicates that using the e-Ban platform for ideological education is meaningful and can enhance students' activeness in learning ideology and politics and shape positive ideological and political views.

## **6. FUNDING**

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# Exploring the innovation path of college physical education in the era of big data

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## ABSTRACT

The innovation of physical education in colleges and universities is conducive to improving students' enthusiasm for sports training and teachers' teaching quality. In this paper, under the background of big data development, big data technology is combined with the reform and innovation of college physical education mode. By analyzing the dilemma of college physical education innovation, the application strategy of combining big data technology with college physical education is proposed for the difficulties of innovation, and the program is evaluated according to the teaching results of students. The big data analysis shows that in the attendance rate of college students' physical education elective courses, the average attendance rate of freshmen is 97%, sophomores is 97.3% and juniors is 92.7%. In the distribution of grades, 35% of the grades are excellent, 40% are good, and only 5% are failing. It shows that the innovation of big data applied to college physical education teaching mode can get better feedback of students' performance.

## KEYWORDS

Big Data; College physical education; Teaching Innovation; Attendance rate

## 1. INTRODUCTION

In the university education system, physical education is used as an instrumental presence to serve other subject areas. Since entering the 21st century, the overall health level of college students has shown a decreasing trend, and most of them are on the verge of subhealth [1]. As a result, physical education in colleges and universities must be innovatively reformed with the cultivation and development of students' physical literacy as an important goal in order to motivate college students to develop physical exercise habits and healthy lifestyles. By improving the physical condition of contemporary college students, thus realizing the basic requirements for high-quality talents in the new era [2].

Since the reform and opening up, with the strong support and encouragement of the national education department, the physical education of colleges and universities has made great progress and development. At present, under the guidance of humanistic education theory, the reform and construction of the curriculum of physical education in colleges and universities have made rapid development, and the concepts of happy sports and lifelong sports have gradually played an active role in the reform and construction of school sports and become the universal value pursuit of teachers and students in colleges and universities [3]. With the professional development of physical education teachers, the updating of their ideology and the development of their education and teaching ability, college students also change from the previous passive learning state of liking sports but not liking physical education classes to gradually eliminating their resistance to physical education courses and taking the initiative to evaluate the vivid image of physical education classes and the humor of physical education teachers. This fully proves the great progress of physical education in colleges and universities [4]. In addition, physical education in colleges and universities has also accumulated valuable experience in sports competition activities inside and outside the university. In conclusion, the current college sports management

has made relatively fruitful achievements in both theory and practice, which has laid a solid foundation for the overall development of education. However, there are limitations in the management of physical education in colleges and universities in practice due to the characteristics of physical education, teachers' professional ability and level, and managers' consciousness and prejudice. Physical education needs to keep abreast of the times, be active, and take the initiative to carry out management innovation in strict accordance with the Party's policy and educational action requirements in order to properly and effectively achieve the overall development and progress of physical education in colleges and universities [5].

In this paper, starting from the current dilemma faced by the innovation and reform of college physical education, we propose an attempt of the innovation path of college physical education based on big data, starting from the difficulties in sports management methods and talent training. Chapter 3 of the paper introduces in detail the application strategies of big data technology and college physical education innovation teaching, and proposes cracking solutions to the previous dilemmas one by one from three aspects: teaching contents and methods, physical education teaching resources sharing and teaching communication and evaluation construction, and finally carries out the acceptance of teaching results to prove where the empirical value of this paper's research lies.

## **2. The dilemma facing the innovative reform of physical education in colleges and universities**

### **.1. Sports management methods are slightly outdated**

The traditional management model of physical education in higher education relies excessively on the unified orders of educational administration, and usually one model engages in a one-size-fits-all approach, where the manager, leader, and decision maker are usually served by one person, which has greater power and space to dominate the management affairs of physical education [6]. In this context, the management method is bound to be single and arbitrary, resulting in the excessive use of power by the manager to give orders and control the behavior of the affairs and related objects, which is not conducive to the healthy development of the management affairs and the performance of the work enthusiasm of the related objects,

as well as to the achievement and realization of the sports participation and the established goals of physical and mental health in the process of students' group sports activities. For this reason, universities should put the power into the prison of system, adjust the thinking consciousness and habits of leading decision makers and management executors, change the management concept from management to service and governance, and firmly establish the service consciousness of managers instead of rigidly ruling, controlling and giving orders [7]. In the actual management process, various factors should be fully mobilized and various practical management methods should be used to promote the motivation and initiative of the management objects and to promote the achievement and realization of management goals.

## **2.2. Talent training singularity, lack of short- and medium-term goals**

In the process of talent training, many colleges and universities lack effective grips for students' subject concept guidance, professional cognitive ability and learning attitude. Students start to receive a fixed single training from the beginning of their freshman year, and in reality, sometimes the best career development is instead those students who perform less well in class or even in exams. Physical education majors are supposed to cultivate talents who learn and teach at the same time, but some students cannot express the characteristics and requirements of some sports well, so they cannot design their teaching well, and finally the situation that students trained by colleges and universities have strong skills but poor culture. In addition, most of the talents training in colleges and universities are also long-term goals, lacking short and medium-term stage goals, so students may not be able to reach their training goals in 3-4 years of study life.

### **. Big Data Technology and Innovative Teaching Strategies for College Sports Applications**

First, with the help of big data, enrich the content and methods of college sports teaching. Traditional college sports teaching class

The teacher is usually the main body to teach theory and skills, and students are passive recipients. In many colleges and universities, the teaching mode is single and lacks sufficient changes and

innovations. Through big data technology, physical education teachers can obtain a large number of new teaching methods and learn from excellent teaching experience, so as to enrich teaching contents and improve teaching quality. In addition, relying on big data technology, physical education teachers can explain more physical education knowledge and teach more physical exercise methods in microclasses, catechisms and other online classes, so that students can receive diversified physical education, enhance their learning interests and acquire comprehensive physical education knowledge [8].

Secondly, with the help of big data, sharing and exchange of physical education resources among colleges and universities are realized. The data analysis function can provide timely feedback of effective information and suitable resources according to the demand. With the development of big data technology, colleges and universities can better present their educational activities while implementing information-based education, and provide information basis for cooperation as well as communication between colleges and universities. Big data technology can realize the sharing of resources among colleges and universities, promote the exchange of physical education teaching and teachers and students among colleges and universities, and create conditions for improving the quality of physical education teaching in colleges and universities.

Thirdly, "scientific and rigorous" physical education evaluation in the era of big data needs to be constructed. In the era of big data, it is possible to collect and record all kinds of data in physical education, which can effectively enhance the objectivity of evaluation, get rid of the reliance on experience and make the evaluation of physical education more diversified. Using big data technology to reconstruct the evaluation system of physical education can not only improve students' knowledge and skills, but also discrete data such as students' fitness status, sports behaviors and habits can be collected. Technical analysis is used to reflect the quality of each student in terms of thought, emotion, form and behavior, and this can be used as a standard for scientific and rigorous evaluation of students.

## **4. Acceptance of Innovative Teaching Achievements in College Physical Education under Big Data**

### **4.1. Attendance statistics of college students' physical education elective courses**

In order to investigate the results of physical education teaching in colleges and universities from the perspective of big data, the attendance information of teachers on the university's academic affairs information network was used as a specimen to verify the attendance rates of physical education elective classes for freshmen to juniors from April to June using the data analysis platform, and compared with the paper attendance sheets to check the gaps.

The attendance rates of students in physical education elective classes are shown in Figure 1. The average attendance rate of freshman students from April to June was 97%, the average attendance rate of sophomore students from April to June was 97.3%, and the average attendance rate of junior students from April to June was 92.7%, and the overall attendance rate of students in physical education elective was high. Comparing the data on paper student attendance sheets and teachers' class attendance rolls, the number of students taking leave of absence and sick leave is slowly decreasing, and the situation of students avoiding physical education classes has improved. This indicates that the innovative form of physical education has been well received by students and that students are responding well. The highest attendance rates were achieved in June in all three years: 100% in freshman year, 99% in sophomore year, and 96% in junior year. Students believe that the innovative physical education program adds more fun to physical activities, and the integration of big data technology with physical education makes it possible to detect the data in the learning process one by one and practice the weak items in a targeted way.

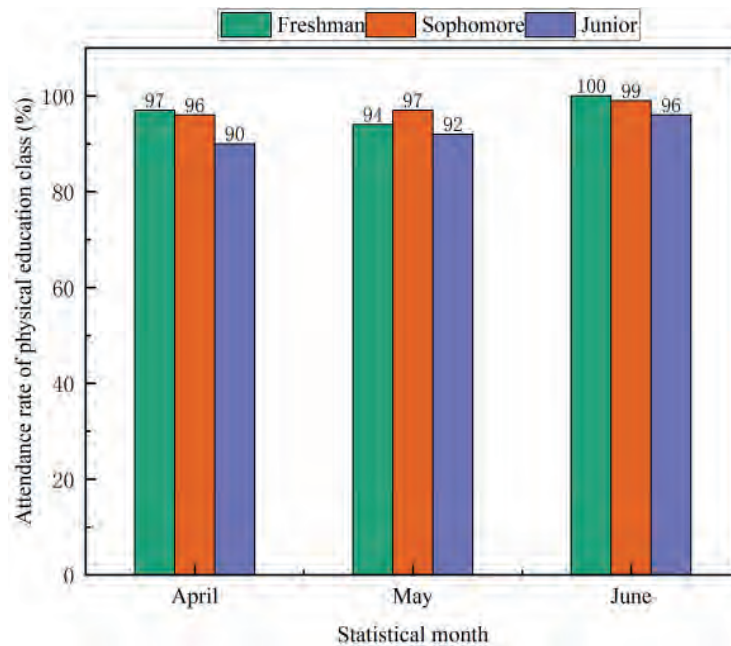


Figure 1. Attendance rate of students in sports elective courses

#### 4.2. Physical education performance acceptance

In the teaching process, college physical education teachers use big data technology to track students' sports at any time, summarize students' training data in time, develop differentiated teaching and training programs for different groups, and use the final student examination results as the final result test after a semester of student physical education course teaching. The big data differentiated teaching student training results are shown in Figure 2.

The students' training performance reached 35% excellent, 40% good, 20% passing and only 5% failing, and the students' performance was good overall. This proves that the use of big data technology for student training data tracking can differentiate training according to individual student differences, thus obtaining good teaching results. Students' excellent and good rates can be improved most quickly, helping to reduce the rate of college students failing final exams. The training data precisely locates students' vulnerable training items, while accurate teaching also helps to reduce injuries caused by improper exercise or over-exercise and protects students' personal safety in sports training.



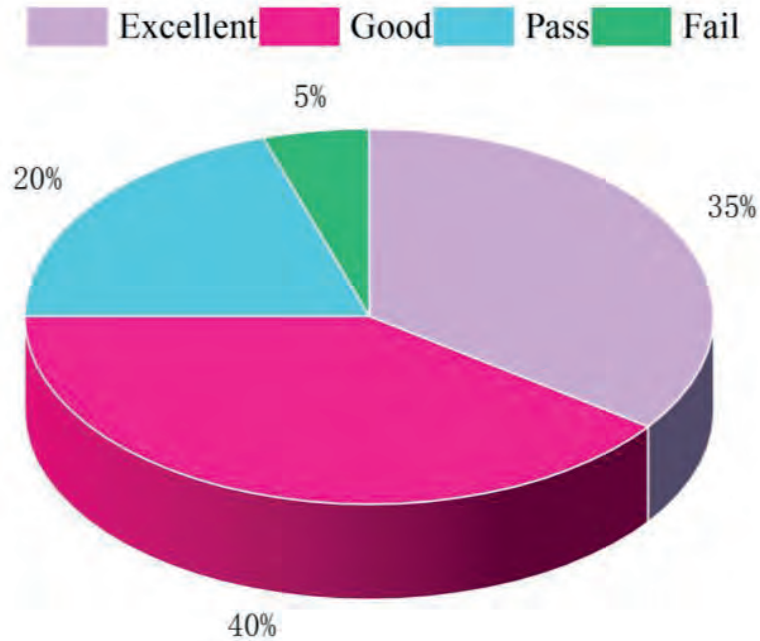


Figure 2. Student Training Results of Big Data Differentiation Teaching

## 5. CONCLUSION

Big data permeates all aspects of life, and combining big data with physical education courses for physical education teaching innovation is one of the highlights of this paper. By analyzing the current challenges of physical education innovation reform in colleges and universities, this paper investigates the data screening of physical education elective courses from freshmen to juniors in colleges and universities under the integration of big data technology and physical education, using the efficient and accurate characteristics of big data information acquisition, mainly examining the student performance in colleges and universities after the application of innovative teaching methods, student attendance and differentiated teaching. According to the results of big data analysis, the average attendance rate of freshman students is 97%, the average attendance rate of sophomore students is 97.3%, and the average attendance rate of junior students is 92.7%, and the overall attendance rate of students in physical education classes is high. In terms of the distribution of students' grades, excellent rate accounts for 35%, good rate accounts for 40%, passing rate accounts for 20%, and failing rate accounts for 5%, which is maintained at a high level overall. Thus, it can be seen that college physical education innovation is conducive to stimulating

students' enthusiasm for physical education, and actively using cutting-edge technology in teaching can help students improve their performance.

## 6. FUNDING

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# Analysis of the Expression Path of Internet Music Culture in College Music Education under the Perspective of Big Data

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## ABSTRACT

Studying the expression path of Internet music culture in college music education is beneficial to the expansion of college music teaching resources. In this paper, the integration of college music teaching and Internet music is studied under the perspective of big data. Firstly, the reasons for the development of college music education are analyzed, and then the main paths of Internet music culture dissemination in college music education are studied, and the reasons at the teacher and student levels are analyzed through big data. The results show that based on the college student level, the main sources of Internet music dissemination are: music platforms accounted for 38%, short video dissemination accounted for 32%, and the use of the Internet is an important path for Internet music culture to be fully expressed. Based on the college music teacher level, the frequency of college teachers using Internet music teaching reached 60% in 2018 and increased to 80% by 2021, thus, Internet music penetrated all aspects of college music in a large scale.

## KEYWORDS

Big Data; Music Teaching in High Schools; Internet Music; Expression path

## 1. INTRODUCTION

Internet music is an important part of Chinese music culture, and the emergence of Internet music has gradually changed the concept of

music education, causing people's musical aesthetic orientation to change and having a deep impact on the pursuit of musical values [1]. Internet music not only enriches the content of music education, but also promotes its diversified development, and is also influencing the intrinsic relationship of music education, giving it new vitality [2].

The intrinsic value of Internet music is unlimited, but the prerequisite for Internet music to become an educational resource is that it needs to reflect the educational value of Internet music, so colleges and universities need to give full play to and tap the value of Internet music educational resources [3]. Teachers in colleges and universities need to correctly understand the essential value of Internet music, develop its true educational value, and use Internet music scientifically and rationally for music education, so as to effectively improve the quality of music education [4]. The use of Internet music for music education can be understood, to some extent, as the establishment of a music education aid mechanism through the Internet. Internet music is an educational medium in the process of conducting music education, which requires music educators and learners to correctly see the advantages and disadvantages of Internet music. Teachers should combine the inherent needs of current music education and attributes, reasonably develop the advantages of Internet music resources, and use it as the main teaching object to give full play to its music education function [5].

Based on the development status of college music education under the perspective of big data, this paper analyzes the reasons for the emergence of college music education in order to clarify the needs of college music education. The whole paper is divided into three parts; the first part explores the reasons for the development of music in colleges and universities and clarifies its development prospects from the development of big data and the Internet and the favorable national policies on music education. The second part analyzes the main paths of music dissemination in colleges and universities at the student level and teacher level, and explores the reasons why Internet music has been able to spread widely in colleges and universities. The third part redefines the application value of Internet music in college music education based on the full-text study, and

explains the necessity of integrating college music education with Internet music culture.

## **2. Reasons for the Emergence of Music Education in Universities in the Perspective of Big Data**

### **2.1. The continuous progress of big data and Internet technology**

With the continuous development of information technology, we have stepped into the era of big data, the rapid development of the Internet and the rapid popularization of mobile terminal devices such as cell phones and tablet computers, which make it increasingly convenient for people to receive knowledge. The effective use of technologies such as big data and artificial intelligence for teaching innovation is the trend of the times and has shown a more significant impact on the educational work of Chinese universities [6]. The supporting audio and video capture and transmission technologies, artificial intelligence and big data technologies in online music education in colleges and universities have also been further developed, with the emergence of large-scale online open courses that truly teach, learn, do, and evaluate through online. During the epidemic, live classes have also become the main mode of music learning in colleges and universities, where both sides of teaching can interact instantly online, without the restriction of time and geography, effectively promoting the development of music education in colleges and universities.

### **2.2. The continuous favorable national policies**

In order to comprehensively strengthen and cooperate with the aesthetic education of colleges and universities in the new era and improve the artistic literacy of college students, according to the "Opinions of the Ministry of Education on Effectively Strengthening the Aesthetic Education of Higher Education in the New Era Mutual" requirements, colleges and universities should incorporate public art courses and art practice into their teaching plans, and each student must take the public art courses specified by the school and complete the credits before graduating. The opinion requirements also mentioned that the Ministry of Education should revise the National Public Art Curriculum Guidance Program for General Higher Education Schools in the next step, and continuously strengthen the standardization, institutionalization and scientificization of higher public art curriculum construction in the new era [7]. With the

formulation and introduction of a series of educational policies such as the Opinions on Popularizing Art Education in General Higher Education Schools, music education in general colleges and universities has been standardized to some extent. The policy of online education in the era of "Internet+" has also received more attention, as eleven departments, including the Ministry of Education, jointly issued the "Guidance on Promoting the Healthy Development of Online Education", striving to build a learning society in which "everyone can learn, everywhere can learn, and all the time can learn". Online music education in colleges and universities is also more suitable to use modern information technology such as the Internet and artificial intelligence to teach and learn, so that modern information technology and education can achieve deep integration and continuously improve the quality of online music teaching in colleges and universities [8].

### **3. The path of expression of Internet music culture in music education in colleges and universities**

#### **3.1. Internet Music Culture**

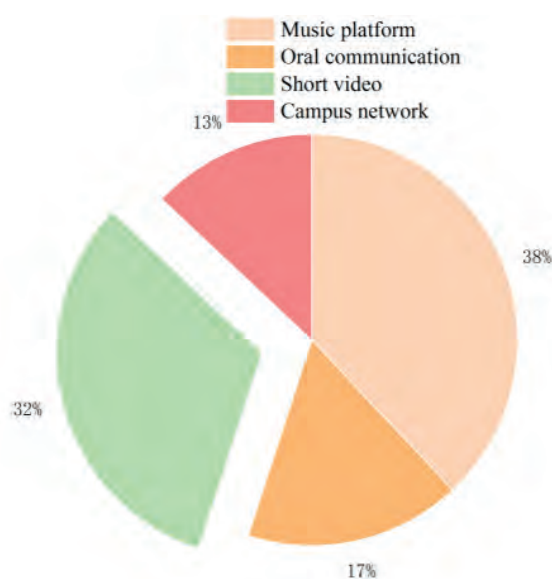
Internet music is, as the name implies, popular music that is distributed on the Internet, and these musical works are closer to life and easily accepted by listeners. Simple, easy to understand and widely circulated, Internet music is mainly based on songs. The Internet is a convenient and fast medium, spreading quite fast, as long as the songs are uploaded on the Internet, within a short time, people in the north and south of the world can hear the songs. With the advanced Internet technology and the latest music content, Internet music has attracted many Internet users, especially the majority of teenagers. Internet music is a new form of music produced and disseminated through the Internet, an extension of popular music culture in the digital era, an important way for people to entertain themselves and send their emotions, with a strong sense of life and personal color [9].

## 3.2. The path of conveying Internet music culture in music education in colleges and universities

### 3.2.1. How Internet music is distributed among college students

In this study, we mainly use big data to analyze the Internet music culture in the current college music education, in order to figure out the dissemination path of Internet music. The main paths of Internet music dissemination are shown in Figure 1.

The distribution of the main sources of Internet music from high to low is 38% for music platforms, 32% for short videos, 17% for oral communication among classmates, and 13% for campus network, which shows that the spread of Internet music is mainly the daily recommendation of music platforms to form the exposure rate, and then to obtain the fan base to expand the music audience one by one. The spread of short videos is mainly based on Jieyin and Xiaohongshu, which often become the wind vane of popular music. The characteristics of contemporary college students are heavy Internet users, and their life association is highly related to Internet use, so it is practical to identify the expression of Internet music culture in college music based on Internet use data. In the college music classroom, teachers communicate with students about Internet music, and Internet music is presented in various ways in students' assignments. College music and Internet music intermingle with each other to form college music education with the characteristics of the new era of the Internet.



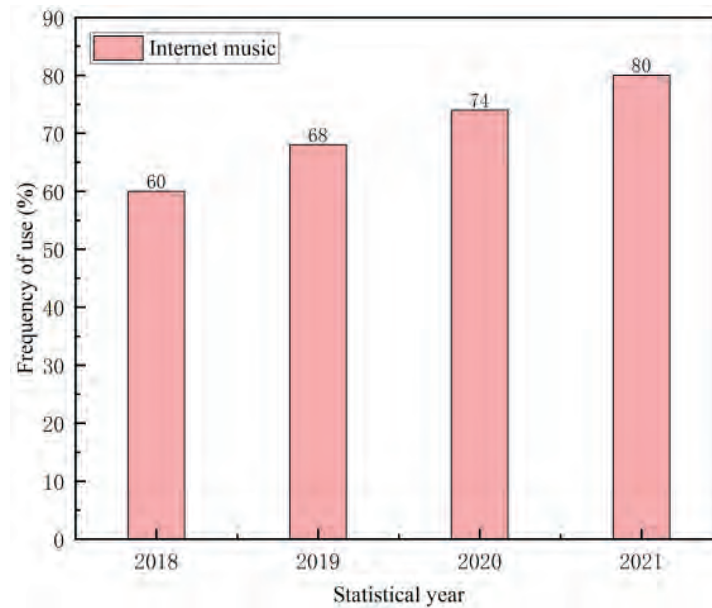
**Figure 1.** Main Path of Internet Music Transmission

### **3.2.2. Application of Internet music teaching frequency by teachers in higher education**

Internet music has shown its own characteristics in its unique form since its creation. With the rapid development and continuous popularity of the Internet, Internet music culture has broken the inherited system, and its inheritance and innovation on traditional music have begun to develop towards diversification. In terms of music creation, Internet music has the characteristics of openness, freedom and democracy, and its creation subjects are no longer limited to music professionals, showing a popular trend of mass. In terms of music dissemination, Internet music is not restricted by time, space, or geography, making it possible for different groups to share it anytime and anywhere. In terms of genres of music, Internet music shows diverse characteristics and reveals different themes and styles.

After the study based on the student level, a survey was then conducted to investigate the frequency of actual application of Internet music in the teaching cases of college teachers. Statistics on the application of Internet music case teaching by college teachers are shown in Figure 2. In the new era, teachers' teaching materials are expanding and music teaching resources are not only limited to classical music, but Internet music is also slowly integrated into college music teaching. the frequency of college teachers using Internet music teaching cases is 60% in 2018 and increases to 80% by 2021, which is sufficient to prove that college teachers are sure about Internet music. Excellent Internet music is growing among colleges and universities with the process of teachers' teaching, and Internet music culture is spreading.





**Figure 2.** Statistics of case teaching of college teachers using Internet music

#### **4. The Value of Internet Music in College Music Education**

##### **(1) Increase students' interest in learning music**

For college students, because of their psychological freedom, they pursue individuality and traditional music cannot make them interested. Internet music has a personalized style and can reflect the different atmosphere of the times, so that the original boring music teaching can meet the interest of students, which can greatly improve the teaching effect of college music education. Colleges and universities should strengthen the communication between students and teachers, so that teachers and students can actively participate in music teaching, which can make the original music classroom activities more harmonious atmosphere.

##### **(2) Highlighting the contemporary nature of music education in colleges and universities**

Compared with traditional music education, Internet music can enrich the music culture nowadays, and most of them are created to adapt to the development of the times. With the development of music education in colleges and universities, both traditional music and Internet music are used as teaching materials for music education, and the two are integrated and innovated so that music education can reflect the characteristics of the new era. The characteristics of the era of Internet music are very clear, and many music works can

reflect the characteristics of the times and the current situation of society. Therefore, in the process of teaching music on the Internet, teachers need to have the ability to use not only music equipment but also a variety of Internet media. Teachers use advanced Internet technology to carry out music teaching so that the characteristics and connotations of Internet music can be fully expressed.

### (3) Enriching music learning styles

Internet music learning can be conducted not only in the classroom, but also at home or in other venues, which is a great reform to traditional music classroom learning. Music education in colleges and universities is not only taught by teachers using teaching books, but also through a variety of other teaching media. Students can find music resources on the Internet and study them independently, or they can use group discussions to learn, which enables students to enrich their learning styles and their access to music knowledge is expanded. Rich ways of learning Internet music can deepen students' understanding of Internet music and enable them to better learn the connotations of Internet music. Teachers can guide students to carry out learning activities and practices on the Internet to make students learn music in more diverse ways and make music teaching more imaginative and vivid by improving the conditions of music classroom teaching.

## **5. CONCLUSION**

In this paper, we study the integration of college music teaching with the communication path of Internet music culture under the perspective of big data, and explore the possibility of integrating Internet music with it by analyzing the reasons for the rise of college music education. Big data is used to obtain the main role of college teachers and students in the communication of Internet music and to redefine its value. The results show that: based on the college student level, the main sources of Internet music dissemination are music platforms accounting for 38% and short video dissemination accounting for 32%, and the use of the Internet is an important path for Internet music culture to be fully expressed. Based on the level of college music teachers, teachers' continuous application of excellent Internet music cases in music teaching is the main result of prompting the spread of Internet music. The research in this paper takes college

music education and Internet music culture communication as the entry point, which can fill the research gap in the field of Internet music and enrich the research results of college music teaching.

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# The application of big data technology in the optimization of incense cultural resources and industrial development in Dongguan in the context of intelligence

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## **ABSTRACT**

This paper analyzes a series of industries such as cultivation, R&D and culture of Guanxiang in Liaobu Town, Dalingshan and Qingxi Town, which are typical representative areas of Dongguan's incense culture industry, and also analyzes the dilemma of Dongguan City's Guanxiang industry development by using big data technology. The primary industry of Dongguan City Guanxiang only accounts for 16.0%, while the secondary and tertiary industries are 52.5% and 41.5% respectively, with obvious problems of unreasonable industrial structure. Compared with the fast-developing Zhongshan City, the industrial value-added of Dongguan Guanxiang industry in the past five years is about 3% lower, and the value-added speed is slower. In the intelligent background with the help of big data technology can clearly see the pain points of the development of Dongguan incense culture industry.

## **KEYWORDS**

Big Data Technology; Dongguan Incense Culture; Industry Structure; Value-added speed

## **1. INTRODUCTION**

Guanxiang has a long history of development, and its high level of production technology and superior quality have made it famous all

over the world. As a product of Dongguan's long history and culture, Guanxiang contains rich cultural connotation and spiritual wealth [1-2]. As a special cultural industry, the development of guanxiang not only has important economic significance, but also has important significance for the inheritance and development of traditional culture [3-4]. In today's rapid economic development, the revival of cultural industry should be combined with local special industries, so that economic benefits and cultural inheritance can be developed together [5]. Based on this, it is necessary to explore the culture of guanxi and its industrial revival.

For the study of spice industry, the literature [6] pointed out that 80%-90% of bulk spices in the spice oil and oleoresin industry would be left as residues, and also suggested that the residues from the spice industry could be applied to the development of dietary fiber foods. The literature [7] assessed the trends in Indian spice exports and their export competitiveness in a global framework and used Simpson's Diversity Index to measure their export diversity. The paper [8] studied the development of the incense industry in Zhongshan City, using the proven technology roadmap of "Research and Development Market Needs, Objectives, Technical Barriers, Requirements" as a blueprint. The literature [9] studied the route and travel distance of traditional organized spice retailing from agricultural locations to consumers, and noted an increase in food miles of spices in integrated supermarkets.

This paper first explores the development history of Guanxiang culture industry in typical Dongguan towns by analyzing the main layout of Guanxiang industry in recent years with Liao Bu town, Dalingshan and Qingxi town as examples. Then, based on the big data technology, the life cycle of Dongguan's incense culture industry is judged, and the big data of its guanxi industry structure and industry development are analyzed to find out its problems.

## **2. The current situation of the development of Guanxiang cultural industry - a typical region as an example**

### **2.1. Guanxiang Industry in Liaobu Town**

The town of Chabu in Dongguan has developed a lot of commercial activities, and incense was distributed here during the Ming and Qing dynasties. The culture of Guanxiang is one of the characteristics of

the town. Since 2009, Chabu Town has implemented the "Eight-One" project of Guanxiang culture and actively explored the characteristics of Guanxiang culture on the basis of developing "culture + tourism + industry", thus embarking on the road of integrating the development of culture and tourism. Relying on Guanxiang culture, Chabu town has built two 4A-level scenic spots, namely Xiangcheng Cultural Tourism Zone and Xiangcheng Zoo, as well as the national 3A-level scenic spot - Ya Xiang Street Cultural Tourism Resort. With the market as its guide, Chabu Town holds a series of festivals and cultural activities such as China (Dongguan) Incense Cultural Industry Expo, Guanxiang Flower Festival and International Automobile Festival every year. The town of Chabu has established China's first incense culture theme museum - China Incense Culture Museum, Tooth Incense Street, Incense City Park and other projects, and introduced a large number of high-quality enterprises, such as the Incense City Group, Burton Group, etc., to provide strong support for the implementation of the Incense City Cultural Industrial Park, Incense Expo Park and other projects. Due to the rapid development of cultural tourism industry, Chabu Town has become a demonstration area of cultural tourism integration development in Guangdong Province, a demonstration area of global tourism in Guangdong Province, and a tourism style town in Guangdong Province.

## **2.2. Guanxiang Industry in Dalingshan**

Dalingshan is a place with a long history and cultural tradition. The area is the birthplace of the Guanxiang production techniques, and its Guanxiang production techniques have been successfully selected as a representative list of national intangible cultural heritage items, while there is one representative inheritor of national intangible cultural heritage items. In recent years, Dalingshan has paid great attention to the protection, research and promotion of guanxiang cultivation technology. At present, Dalingshan has become a very famous traditional production area of guanxiang in China, and Dalingshan guanxiang has also become a national geographical indication protected product. There are more than 1,000 mother trees of guanxiang, more than 60,000 old guanxiang trees producing high quality guanxiang, and more than 100,000 other guanxiang trees in the guanxiang intangible cultural heritage protection park in

Dalingshan. Every year, celebration performances, incense picking days and incense performance activities are held at the time of Snow Festival in the lunar calendar to interact with visitors to taste incense, which further deepens the connotation of guanxiang culture and promotes the healthy development of guanxiang industry. In addition, based on the characteristics of Guanxiang culture and relying on the culture of Guanxiang, Dalingshan Town carries out the cultural tourism festival of "Cultural Tourism-Dalingshan Guanxiang Season" through cultural inheritance, literary creation, cultural activities and online and offline experience activities to further excavate and show the culture of Guanxiang and form the Dalingshan. At the same time, the festival will create a "hit" attraction and promote Dalingshan Guanxiang, making it one of the most popular tourist attractions online.

### **2.3. Guanxiang Industry in Qingxi Town**

With 1,260 mu of Guanxiang Garden in Qingxi Town and a total of about 10,000 Guanxiang trees planted, Guanxiang Garden has a greater advantage in developing the Guanxiang industry. In order to grow and develop the guanxiang industry, the guanxiang garden has formed a professional research team and conducted in-depth cooperative research with universities and scientific research institutions such as Nanchang University, Guangzhou University of Traditional Chinese Medicine, Hunan Agricultural University and South China Botanical Garden of Chinese Academy of Sciences to solve the technical problems of guanxiang cultivation. Liu Dongxiao, the representative inheritor of Dongguan intangible cultural heritage project, started the cultivation of guanxiang in 1998. He is good at opening incense doors and processing incense products, and established Dongguan Guanxiang Horticultural Technology Co., Ltd. He invests a lot of research and development funds every year to research the main technical problems of guanxiang products, and has successfully applied for seven invention patents. He led the research and development of biological knotting technology, which increased the knotting rate of guanxiang by 30 times and successfully passed the test of National Food and Drug Administration. At the same time, he also introduced and developed high value-added products such as guanxiang tea, guanxiang flower tea, guanxiang wine and guanxiang pillow through deep processing of guanxiang, which not only

developed guanxiang derivative products but also injected new vitality into the ancient guanxiang.

### 3. Exploring the problems of Dongguan incense industry based on big data

#### 3.1. Judgment method of industry life cycle under big data

The index of industry life cycle should be formed by considering the proportion and growth rate of the industry in the whole market as the stage industry. The industry will have different forms depending on the industry, but it shows uniform characteristics, that is, the industry occupies a small share of the market. After entering the growth stage, the industry's share in the market gradually increases, and its growth rate is much higher than the average growth rate of all industries in the market. In the maturity stage, the development of the industry tends to level off and no major fluctuations occur, so the slope of the life cycle curve becomes smaller. It is important to note that the maturity phase occupies the majority of the industry system. In the decline stage, the lifecycle curve has a decreasing trend and its slope is generally negative. The industry life cycle calculation method based on big data is:

$$y_t = \frac{k}{1 + ae^{-bt}} \quad (1)$$

Where  $y_t$  represents the industry development index,  $t$  is the time, and  $a, b, k$  is the variable. At this point, if  $a > 0, b > 0$  is kept,  $k$  is the current saturation value of the industry. So it can be seen that  $a$  represents the base period coefficient and  $b$  represents the potential coefficient.

In the formation stage, the industry's growth rate is slow, after a certain period of accumulation, the industry will enter into the growth period. Then enter the maturity when the development of flat without fluctuations, and finally the industry is saturated, marking has entered the recessionary period, when the third-order derivative of the formula (1) is obtained as follows:

$$y_t''' = \frac{ab^3ke^{-bt} - 4a^2b^3ke^{-2bt} + a^3b^2ke^{-3bt}}{(1 + ae^{-bt})^4} \quad (2)$$



The dividing point between the industry formation period and the growth period is  $t_1$ , and the dividing point between the growth period and the maturity period is  $t_2$ . Both are the points that make the equation (2) zero.

For the special culture and economy fusion industry of Guanxi industry, its process realizes the fusion of tourism, production, market and cultural resources. The development of cultural industry is also generally divided into four stages of industrial life cycle. Unlike general industry types, the life cycle of Guanxiang industry, a culture and economy fusion industry, is longer and most difficult to enter the mature stage, the reason for which is that its industrial development is closely related to policies.

### **3.2. Analysis of the development dilemma of guanxi industry based on big data**

#### **3.2.1. Dongguan City Guanxiang industry structure is not reasonable**

With the analysis of big data technology, the distribution of Dongguan Guanxiang industry in Dongguan is shown in Figure 1. The distribution of the industry tends to be in the secondary industry (42.5%) and tertiary industry (41.5%), and lacks attention to the root of Guanxiang industry - planting (16%). Moreover, there are only a few leading enterprises in Dongguan's guanxiang industry, such as "Shangzhengtang, Tang's and Huang Ou". Throughout the development mode of the advanced guanxiang industry, only a single point of development has been accomplished, and there is no standard industrial development guideline has been formed. Although there have been "Shangzhengtang, Tang's, Huang Ou" and other enterprises aiming at supply-side reform, but the industrial distribution in Dongguan is still not ideal.

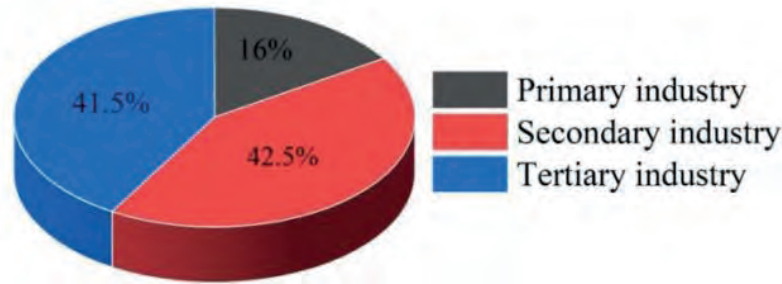


Figure 1. Dongguan City Guanxiang industry distribution

### 3.2.2. Dongguan's Guanxiang industry is developing slowly

In comparison with other regions in China where guanxi (incense) is grown, the development rate of the guanxi industry in Dongguan is not satisfactory even though it is in the growth period. A comparison of the development of the guanxiang industry in each region from 2014-2019 is shown in Table 1. Based on the analysis of big data, Dongguan City guanxiang industry value-added in the past few years is about 10%, and the annual value-added from 2016 to 2020 is planned to reach 12%. In contrast, Zhongshan City and Yunnan Province, which are in a period of rapid development, are expected to reach an industry value-added of about 15%, and Hainan Province and Maoming City, which occupy a larger share of the market, have already left Dongguan City behind due to their large prior base, and their current annual output value has reached the level of billions of yuan.

**Table 1.** Comparison of the development of Guanxiang industry in different regions

Region	Dongguan	Zhongshan	Maoming	Xishuangbanna	Haikou
Growth rate of industrial value	9.60%	17.7%	14.8%	15.5%	14.0%

In addition, in terms of market demand and industrial technology development, the development of guanxi industry technology does not match the demand of the rapidly growing market. At present, although Dongguan guanxiang industry has been trying to expand the number of guanxiang planting and planting area as much as possible, the total amount of guanxiang tree planting can hardly maintain the development demand of local guanxiang industry in Guangzhou. In

order to break the shackles of Dongguan incense development, it is necessary to seek to borrow manpower to accomplish this, one is to develop artificial planting, and the other is to develop artificial incense-bearing technology.

#### **4. CONCLUSION**

This paper analyzes the typical town of Dongguan Guanxiang cultural industry and uses big data technology to analyze the problems in the development of Dongguan's incense cultural industry. Dongguan's Guanxiang industry has experienced two development histories, the first from the Tang Dynasty to the pre-reform and opening-up period, through the formation stage, growth stage, maturity stage, decline stage and extinction stage. The second time is from the reform and opening up to the present. Based on the analysis of big data, it is predicted that Dongguan Guanxiang industry is currently in the growth stage of the industry, and it is predicted that the industry will reach maturity in 2025. Dongguan Guanxiang industry has problems such as weak industrial competitiveness, unreasonable industrial structure, slow industrial development and unsatisfactory industrial efficiency. The reasons for these problems are mainly due to the mismatch between government policy support and the industrial cycle of Guanxiang, insufficient preliminary planning of Guanxiang industry, low aggregation of Guanxiang industry-related enterprises, and unclear profit model of Guanxiang industry for incense farmers.

In order to solve the problems of Guanxiang industry development in Dongguan, it is necessary for the government to take the lead, clarify the positioning of the industry life cycle, give full play to the government's standardized guidance, formulate a comprehensive plan for the development of Guanxiang industry, optimize the industrial layout, create leading enterprises, vigorously explore the profit model of Guanxiang industry, and finally realize the development of Guanxiang industry in a diversified way with the integration of three industries.

#### **5. FUNDING**

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# Reform of diversified art design professional teaching mode based on big data cloud platform

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## **ABSTRACT**

In order to understand the reform direction of diversified art design professional teaching mode, this paper starts from the big data cloud platform and analyzes the different functions of big data and cloud platform. At the same time, it analyzes the diversification of art design and gives the reform direction of the teaching mode of diversified art design majors, namely the comprehensive teaching mode. Based on this model to analyze the teaching organization form and teaching objectives with the big data cloud platform. From the viewpoint of teaching objectives, cultivating students' ability to complete design is the ultimate goal of comprehensive teaching, accounting for 17.47%. In addition, the hands-on practical ability accounts for 15.49% and the communication and expression ability accounts for 12.78%. Thus, when teaching diversified art and design majors, the main goal should be to cultivate students' comprehensive ability.

## **KEYWORDS**

Big Data; Cloud Platform; Diversification; Artistic Design

## **1. INTRODUCTION**

Since entering the 21st century, the development of art and design has opened a new chapter. With the accelerated pace of social development such as knowledge economy, information society, green revolution, creative industry, "picture-reading era" and low-carbon life, it has prompted the upgrading of design ideas and design methods in

the overall cultural form [1-2]. Art and design are constantly adapting to become a driving force in society [3]. Art and design majors also continue to explore the reform direction of teaching mode in the advancement, so as to better meet the demand for design talents in the diversified development of society [4-5].

The reform of the teaching and learning model for diverse art and design courses is a research direction for many scholars. The literature [6] investigates the ways in which drawing is taught and assessed in UK schools with a particular focus on A level art and design courses. Its historical survey of the development of syllabuses and assessment methods traces how the role of drawing has changed in the curriculum over the last sixty years. Using the methodological tools of visual design grammar, the paper [7] develops a pedagogical proposal based on the Art Thinking Project at Harvard University and proposes a new type of approach to teaching artworks in the Socratic era. The literature [8] reveals the mechanisms of formation of professional competences and artistic values of students of architectural art. It argues that modern interactive teaching is of great interest, which requires teachers to provide quality education, especially in the area of creative disciplines. The literature [9] considers the limitations of traditional methods of education and teaching in the training of professionals, and proposes innovative new media interactive teaching concepts and models. It analyzes the current situation and problems of using new media environment education in college teaching and proposes the innovation of new media interactive teaching concepts and models in the process of practice.

This paper first briefly analyzes big data and describes its characteristics, illustrating the various data mining means and deep learning techniques involved in big data analysis techniques. Secondly, by decomposing the architecture of the cloud platform, it explains the specific functions that constitute each part of the cloud platform. Then, the factors affecting the diversified development of art design are introduced, and the teaching mode of art design majors is analyzed according to the influencing factors, while the reform of the teaching mode of art design is proposed with the integrated teaching mode. Finally, the teaching organization form and teaching objectives

are analyzed for the integrated teaching mode of art design majors, so as to illustrate the feasibility of the integrated teaching mode.

## **2. Big Data Cloud Platform Technology**

### **2.1. Big Data**

Big data is characterized by its wide range, fast dissemination and large capacity, which is an inevitable product of the extremely rapid development of modern network technology. Large capacity refers to the fact that Big Data is generally a data collection of data volume level, which is higher than several exponential levels compared with other data collections, and the data inside is cumbersome and complex, unlike the general data collection of a single type. Diversity refers to the variety of information in the data collection, and the variety of data formats, such as images, text, sound, etc. Speed refers to the fact that the technology of Big Data is growing particularly fast and developing rapidly. This requires that the processing of big data should also be as fast as possible, otherwise it will result in data accumulation. The value of big data is characterized by its own huge data contains certain laws and value trends, and this characteristic is also the driving force that motivates us to study big data.

### **2.2. Architecture Analysis of Big Data Cloud Platform**

From the perspective of user experience, the overall system architecture of the data visualization project is designed by combining visualization technology and web technology. The data visualization project is divided into the following parts: application layer, user authentication layer, business layer, data layer, and physical layer.

The application layer is responsible for presenting all the functions of the data visualization project to the users. The data visualization project adopts a B/S structure, where the browser receives user input and requests a response from the server.

The user authentication layer is responsible for providing users with authentication. The data visualization project is divided into several modules according to the functions, and users can access between all modules by logging into one module.

The business layer is the core module of the data visualization project, which involves several functions such as canvas editing, record management, and project deployment.

The data layer is used to store the relevant resources used by users in the visualization project and to do data persistence for these resources.

The physical layer is used to provide the underlying hardware support, including the relevant network resources, storage resources, etc.

### **3. Analysis of the teaching mode of diversified art and design majors**

#### **3.1. Factors affecting the development of art and design diversity**

##### **3.1.1. Diversity in the field of modern design**

Art design in the information age has been subdivided into various fields, in addition to the most common clothing, interior, architecture, garden, advertising, industry, packaging, etc., there are also some new design fields such as the comprehensive design of corporate culture system. Some modern large-scale designs focus more on group cooperation and the synthesis of various design fields to obtain a broader design idea to achieve better design results.

##### **3.1.2. Diversification of design elements**

The development of the whole design is in the direction of diversification, in addition to the overall development of diversification, in the design of specific materials, technology, shape, color, function, concept and style are in a diversified development.

Designers' grasp of materials, selection and preferences are different. The development of science and technology has brought more new materials, and different materials have different expressive power. When modern designers create designs, they have more choices in materials due to the diversity of materials, and they can be more open to their own design thinking, and more creative and individual designs can be finally implemented, which is complementary to the development of design diversity.



### **3.2. Analysis of the teaching mode of diversified art and design majors**

In the atmosphere of the market economy, if a designer is bent on catering to the market and the technical conditions of production, it is easy to lose his own unique design concept, which is not conducive to the development of design. Design is for people's lives, but also the expression of the designer's own ideas, as a designer should keep a clear head, in addition to design for people's lives, but also to maintain the artistry of design.

#### **3.2.1. Thinking about the teaching mode of art and design majors**

Compared with traditional single-subject instructional design, integrated instructional design not only includes the first two items, but also promotes analysis and integration skills through multidisciplinary perspective analysis and interdisciplinary integration, so that students can conduct integrated interdisciplinary research and practice more effectively.

The process of integration-oriented instructional design refers to the integration of students' knowledge from multiple disciplines based on the professional practice of design disciplines under the guidance of teachers. Through the interaction between different disciplines, students are able to deepen their study of the subject matter by applying basic principles, design ideas, methods and tools from other disciplines, reflecting an integrated interdisciplinary understanding.

#### **3.2.2. Analysis of the organization form of the teaching mode of art design majors**

In terms of micro-level instructional organization, it includes three basic forms of instructional organization: synchronous learning, group learning, and individual learning. In comprehensive design education, based on different types of courses and teaching objectives, different teaching objects, research and practice projects, a variety of teaching organization forms are flexibly adopted. Based on the big data cloud platform to investigate and analyze the art design students, so as to clarify the organization form of art design professional teaching mode, the results are shown in Figure 1.

In terms of students' opinions on the organization of diversified art and design teaching modes, 41.26% of students prefer the organization of individual learning. This is because individual learning is embodied in the whole process of integrated teaching and learning activities, which is an interdisciplinary learning based on students' comprehensive analysis and judgment of problems and for solving them, which is conducive to cultivating students' interdisciplinary thinking and deep thinking. Group learning came in second with 25.32%. In addition to individual learning, some students also prefer to study art and design in groups because it not only gives full play to students' autonomy and initiative in learning, but also develops students' ability to communicate and coordinate, analyze and synthesize, and express and elaborate.

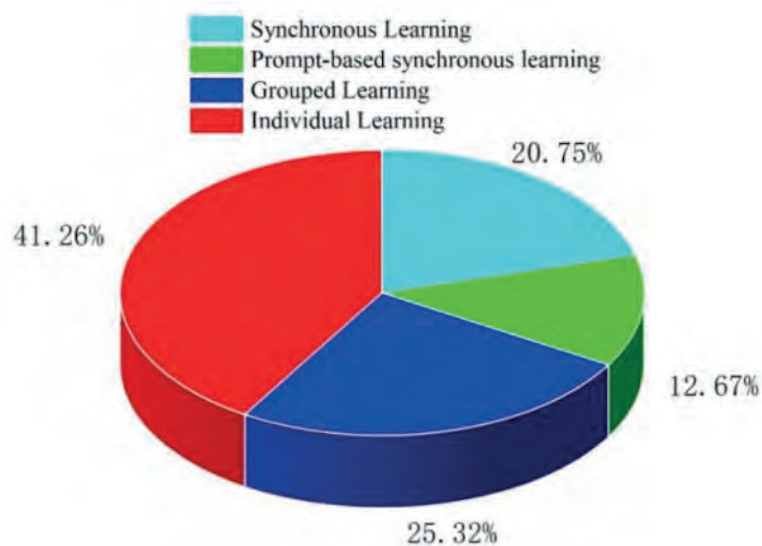


Figure 1. Analysis of the organization of the teaching model

### 3.3. Analysis of the training objectives of the integrated teaching model

In order to better stimulate students' creative thinking, this paper proposes an integrated teaching model based on both themes and problems. Through the integrated teaching model for diversified art and design majors, we focus on cultivating several core competencies of students. Student learning data is collected and analyzed through the big data cloud platform, and its analysis results are shown in Figure 2.

By analyzing the data from the big data cloud platform and teaching diversified art and design majors in an integrated teaching mode, we

can effectively integrate course teaching and team writing. In this way, students can be equipped with eight core competencies, such as cognitive ambiguity, ability to learn from others, ability to synthesize information, ability to experiment quickly, ability to think systematically, ability to construct methods, ability to practice with hands, ability to communicate and express, and ability to complete design. Among them, developing students' ability to complete design is the ultimate goal of integrated teaching, accounting for 17.47%, followed by hands-on practice ability, accounting for 15.49%, and the third is communication and expression ability, accounting for 12.78%. The integrated teaching mode can effectively help students to carry out art design and better exercise their practical art design skills. Students can improve their communication and expression skills through group learning and teamwork, and then they can effectively express their own opinions or actively present their design solutions.

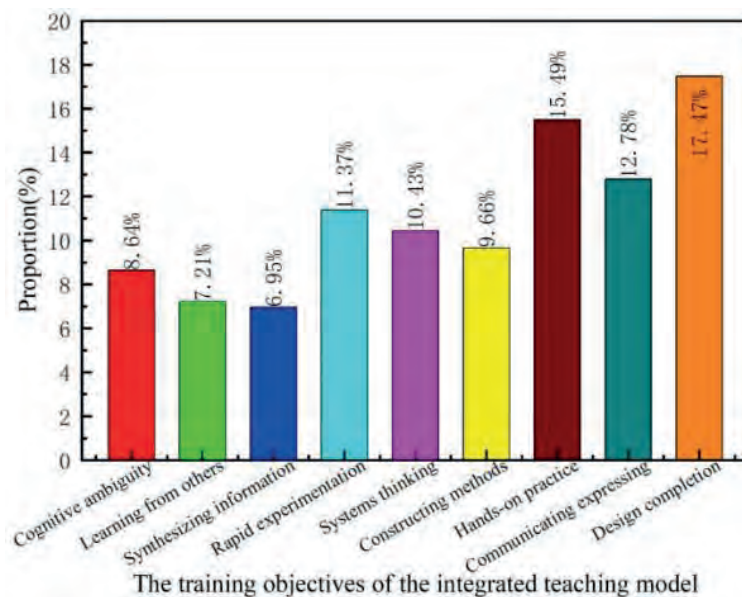


Figure 2. Analysis of integrated teaching models

#### 4. CONCLUSION

In this paper, the teaching mode of diversified art design majors is analyzed and studied under the technology of big data cloud platform. From diversified art design to the comprehensive teaching mode of art design majors, the data analysis of the organization form and teaching objectives of this teaching mode was conducted with the big data cloud platform, and the results of its analysis are as follows:

(1) As for the organization form of the integrated teaching mode, 41.26% of students prefer the organization form of individual learning because it is conducive to cultivating students' interdisciplinary thinking and deep thinking.

(2) In terms of the teaching objectives, the core competencies such as cognitive ambiguity, ability to learn from others, ability to synthesize information, ability to experiment quickly, ability to think systematically, ability to construct methods, ability to practice, ability to communicate and express, and ability to complete design can be achieved.

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# Inheritance and Development of Tatar Drama Art of Xinjiang Ethnic Minority in the Context of Big Data

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## ABSTRACT

The rise of big data is of great significance to the preservation and transmission of traditional minority literary arts. This paper examines the role played by big data technology in the inheritance and development of traditional minority literary arts, and analyzes the big data of Tatar theater art works and audience viewing experience on the Internet platform. From 2006 to 2020, the number of Tatar theater art works added on average about 41 new works per year, and the percentage of viewers who expressed interest also increased year by year. Big data technology can help Tatar theater art get out of the dissemination dilemma and burst into new vitality.

## KEYWORDS

Big Data; Tatar Theatre Art; Number of works; Audience Attitude

## 1. INTRODUCTION

Xinjiang, known as the "homeland of songs and dances", has a theatrical art as glorious as that of songs and dances. According to the records of Chinese historical books, as well as a large number of local cultural relics and archaeological research in Xinjiang, the Tatar drama art has a long history and a long history [1-2]. It is easy to see from the Guzi Grottoes murals the progressive scenes of theatrical performances, the male and female musicians playing various instruments, the dramatic figures with different shapes and forms, the artists wearing various ornaments and masks, and the men, women

and children watching the performances. This shows that since ancient times, the art-loving Tatar forefathers made the art of singing and dancing into the hall [3-4]. Wherever the Tatar people live, there must be singing and dancing art, and wherever there is singing and dancing art, there must be theater art as well. The Tatar people were not only intoxicated by singing, dancing, and maixilev, but also theater was an important part of their social and cultural life, as evidenced by many historical documents and excavated cultural relics [5].

In the new century, people pay more and more attention to the culture and art of ethnic minorities. Wei et al. took Fishing City as an example to study the development dilemma of traditional drama of ethnic minorities in the present time and put forward the basic ideas of innovation in terms of ideology, spectacle and artistry [6]. Sun et al. argued that traditional ethnic minority motifs contain the minority's love for beauty, happiness, and the pursuit of a better life, and have a strong national flavor and manifest their aesthetic concepts. They tried to apply traditional ethnic patterns to visual communication design and designed works that meet the cultural and psychological structure of the public [7]. Gand et al. found that the traditional patterns of ethnic minorities in Gansu Province are ethnic arts with strong ethnic characteristics and used the Surf feature point recognition algorithm to extract feature points of ethnic patterns based on the feature point extractor in OpenCV [8]. Based on previous studies, this paper studies the role of big data technology in the inheritance and development of minority theater arts from three aspects: data processing, big data dissemination patterns and precise analysis, especially the origin and development of the Tatar minority theater arts in Xinjiang, and analyzes the changes in the dissemination of Tatar theater arts on the Internet platform from 2006 to 2020 with the help of big data technology, the and the attitude change of the viewing audience.

## **2. Big Data and the Preservation and Transmission of Traditional Ethnic Minority Literary Resources**

"Big Data" is the sum of data resources generated in the process of informatization, with the characteristics of large volume, miscellaneous types, fast speed and low value density. Among them,

mixed types and low value density are the biggest differences between Big Data and traditional data, which means that Big Data originates from multiple data sources and is a kind of comprehensive data, including not only traditional structured data, but also semi-structured and unstructured data such as audio, video, web pages and text. Therefore, Big Data can show multifaceted information connotation, which can make people notice the multifaceted correlation of different things, discover new knowledge and create new value. Due to the above-mentioned characteristics of big data, it is of great significance for the preservation of traditional minority literature.

## **2.1. Data processing**

Data mainly consists of structured data, semi-structured data and unstructured data. Traditional databases are mainly for structured data collection, storage and correlation analysis. The most common database query language is structured query language, which shows the neat arrangement of data. With the popularity of the Internet, semi-structured data and unstructured data in the form of text, audio, video and images have sprung up, accounting for about 85% of the global network data volume, among which unstructured data introducing ethnic traditional literature and arts are also increasing in large quantities. The number of websites and web pages dedicated to the history, customs, music, songs and dances of ethnic minorities in China is increasing. For example, "China Tibetan Netcom", which introduces traditional Tibetan culture, supports dynamic video on demand and online distribution of video files in Chinese, Tibetan and English. There are more than 100 websites introducing Mongolian culture and tradition, such as "Mongolian Culture" and "Grassland Eagle". The websites showcasing traditional Uyghur culture include "Avanti", "Nafu" and others. Comprehensive websites introducing the traditional literature and arts of southwestern minority groups include "Qian southeast ethnic culture network" and "Yunnan minority network". These websites are published every day.

Since the traditional data retrieval and analysis technologies mainly focus on structured data, they cannot handle complicated unstructured or semi-structured data, making the use of these massive data resources on the Internet greatly restricted. Now,



Hadoop, an open source distributed processing technology that can run on general-purpose servers, has been created to process large-scale unstructured data quickly and obtain a general outline and developmental context. This technology can help people grasp the current situation of something, social repercussions and future trends in a short period of time.

## **2.2. Big data communication model**

According to the "Integration of Chinese Folk Dances" (Yunnan Volume), there are about 6,718 types of traditional folk dance routines in Yunnan, and only the "playing song" of the Yi ethnic group has nearly 30 to 40 types of dance routines, which are difficult to record and pass down in written pictures. For the literary heritage of non-written ethnic groups, this mode of protection is even less applicable. For example, the traditional folk song "Zaendal" of the Daur ethnic group has no lyrics and is sung with insubstantial words, but the emotions in the song can be expressed by the singer. With the emergence of digital recording methods such as audio and video, the carrier of literary resources is transferred from people to new media such as databases, which can prevent the phenomenon of "people dying and art dying" and help protect a large number of unwritten ethnic literary resources. Yunnan University and the Yunnan Provincial Electronic Computing Center have taken the lead in a demonstration study on the preservation and transmission of minority cultural heritage through the use of interactive multimedia software for cultural presentation and interpretation, relying on the Dongba cultural data, to recreate the extinct Naxi "rituals". For the general public, although we can rarely hear those ancient folk songs in our daily lives, we can learn them through modern media and through the Internet.

## **2.3. Big data precision analysis**

Since a large amount of user identity information and broadcast behavior information is recorded in the background, online video platforms have built big data analysis websites for both online video and keyword search. These sites currently provide video big data analysis with a maximum period of 5 years, including daily, weekly, monthly, and annual search index and broadcast index of a certain video program, broadcast devices, broadcast sites, episode analysis, user broadcast behavior, and core user characteristics. Through the

analysis of these unstructured data, researchers can grasp the social demand for a certain minority traditional culture and promote its industrialization process. At the same time, to better understand the audience's attitude and preference, to make precise judgment on the audience of a certain minority traditional literature and art video, and to carry out targeted cultural promotion and marketing. Through the analysis of viewer comment data, the shortcomings of traditional minority culture and arts in terms of performance and dissemination forms can be identified and improved, thus enhancing its appeal to the audience. In addition, the analysis of the site's search index and broadcast index can also promptly identify the trend of marginalization of certain traditional minority cultures and arts, and then rescue and support them to enhance their vitality.

### **3. The development and inheritance of Tatar drama art**

#### **3.1. The Origin and Development of Tatar Theatre Art**

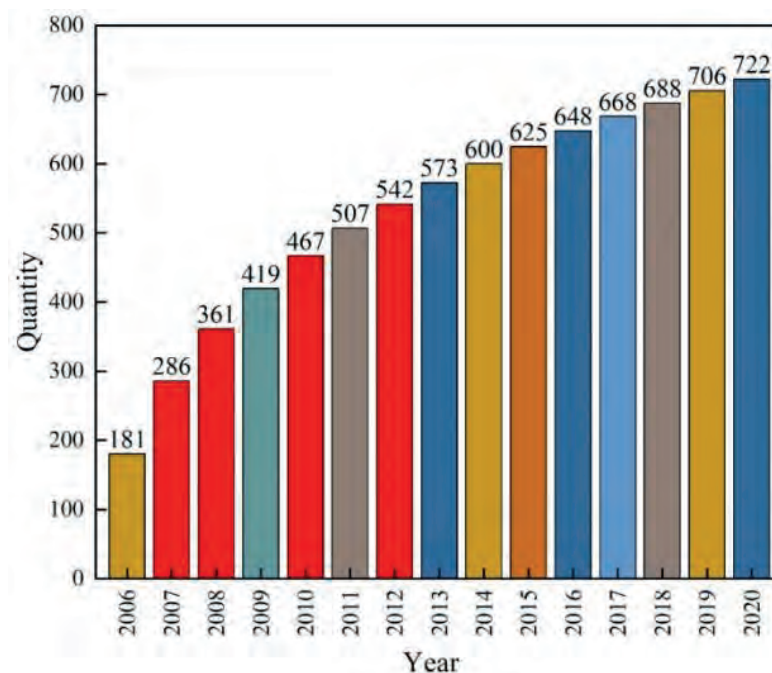
Historically, Persian and Indian primitive drama was imported into the West one after another with the religions of Central and West Asia as cultural carriers. In recent years, a large number of Zoroastrian, Nestorian, and Manichean sermon texts have been excavated in Xi'an, Dunhuang, and Turpan. Dunhuang Buddhist drama and Persian primitive drama had a gradual process of being recognized in the 20th century. The book "Blessed Wisdom" compiled by the famous falcon poet Yusuf Hass Hajiff of the Western Kara Khan Dynasty between 1069 and 1070 is considered by many scholars in China and abroad to be an exhortatory poetic drama.

The most popular folk drama derived from ancient games and entertainment gradually developed into mini-drama, from fragment to whole, and from one-act to multi-act, and then became a fully-fledged drama in the real sense. Arif-Senem is a long classical oriental poem with different plots widely circulated among the Tatar, Uzbek and Tajik tribes of Xinjiang and Central Asia. This folklore was widely spread around the Caucasus in the middle of the 19th century, and the great Russian poet Lermontov composed a long poem "Arif the Lover" based on this legend when he was in exile there, but "Arif-Senem" was widely spread among the Tatar folklore in the 15th and 16th centuries. According to scholars' research, "Arif-Sainaim" was composed in Tatar folklore after the Islamization of Tatar. During the

evolution of legends, songs and long poems, it was repeatedly refined and adapted by folk artists, and was intertwined with the spiritual life of the people, and its dramatic characteristics became increasingly distinctive and socially influential. In the 16th century, "Arif-Senem" became a regular play of the court troupe of Yarkand Khanate.

### 3.2. Big data-based results and analysis

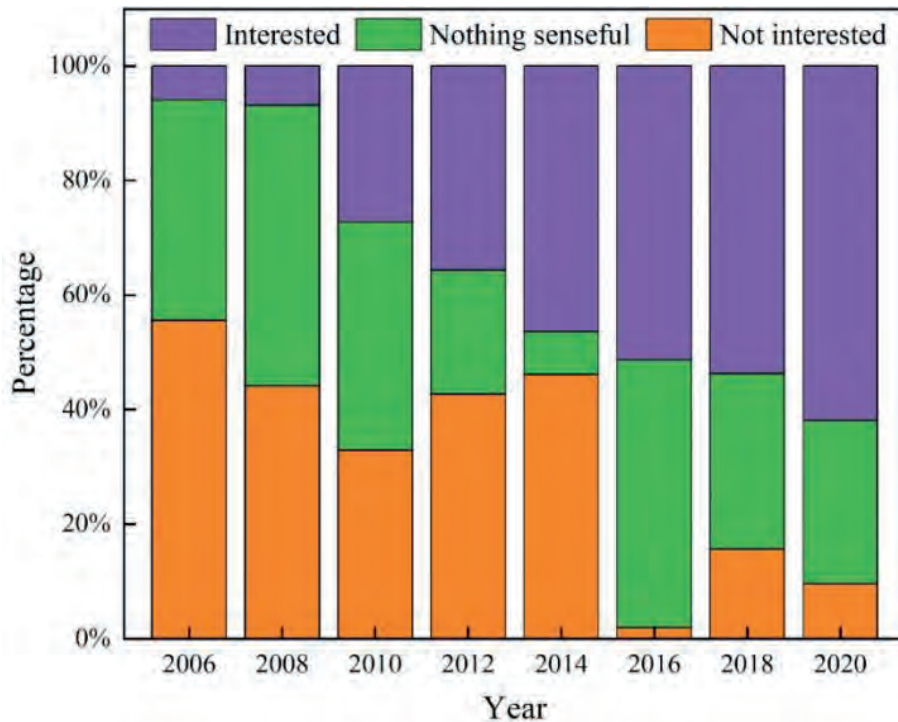
Using big data technology to mine and analyze the development of the Tatar minority theater art in Xinjiang in recent years, the growth of the number of works related to Tatar theater art from 2006 to 2020 is shown in Figure 1. From 2006 to 2020, the number of works related to Tatar theater art grew from 181 to 722, with an average increase of about 41 works per year. It can be seen that with the increase of national attention to minority arts, Tatar drama art is getting more and more attention and recognition from creators, and more creators will take the initiative to find and explore Tatar drama culture and its extension.



**Figure 1.** The number of works related to the Tatar theatre arts has increased

By analyzing the big data of the audience's attitude towards watching Tatar drama art, the attitude change of Tatar drama art audience is shown in Figure 2. Overall, in 2006, 55.58% of the audience were not interested in Tatar drama art at all, 38.48% of the audience had indifferent attitude, and only 5.94% of the audience expressed

interest. And in 2020, the audience's attitude toward Tatar theater art has changed, with only 9.59% of those who are not interested at all, 28.51% of those who do not care, and 61.90% of those who express interest, which is more than half of the audience. It can be seen that in the past ten years or so, with the help of Internet platform and technologies such as big data, Tatar theater art has been more widely disseminated and has a wider audience base.



**Figure 2.** Changes in attitudes of the audience of the Tatar theatre arts

#### 4. CONCLUSION

This paper studies the origin and development of the Tatar theater art of Xinjiang minority in the context of big data, and the changes in the number of Tatar theater art works and the change of audience's attitude in the new era with the help of big data technology. The inheritance and development of Tatar theater art under the background of big data can be started from the following aspects.

- (1) Technically, Tatar theater art should strengthen data resourcefulness and cooperation with digital media.
- (2) In terms of methods, Tatar drama art should break through the traditional mode of literary inheritance.

(3) In terms of social benefits, organizations at all levels should back big data to provide precise support for Tatar drama art and give appropriate support to individuals and groups who create.

(4) On the process, the ways of public participation in the inheritance and protection of traditional minority literature and arts should be actively broadened.

(5) At the academic level, the academic community should expand the depth and breadth of research on traditional minority literary arts.

## **5. FUNDING**

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# Application of Artificial Intelligence Technology in Piano Fingering Feature Analysis

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## ABSTRACT

This paper analyzes the training methods and strategies of piano fingering, and proposes a piano fingering feature analysis algorithm based on the judgment Hidden Markov Model in piano fingering. Combining the a priori knowledge of fingering rules, two judgment functions are first introduced in the judgment HMM, which effectively overcomes the drawback that the traditional HMM cannot combine the note key sequence information, and removes the wrong through-span fingering and the fingering beyond the playable span. Through the algorithm analysis, the number of combinations of four-note chords and five-note chords accounted for 86.7% of the total number of combinations. In the output probability parameter matrix consisting of single notes and two- and three-finger chords, two- and three-finger chords accounted for 96.1%. There are various fingerings for piano, and players can choose the fingerings that are suitable for them scientifically and reasonably according to their own finger characteristics, which can help improve their playing level.

## KEYWORDS

Cryptomarkov; Piano Fingering; Feature Extraction; Note key sequence

## 1. INTRODUCTION

Fingering is the most important part of the piano learning process, as it directly affects the progress of piano learning [1-2]. Piano fingering,

in general, is how a player uses his fingers to move on the piano keyboard and strike the keys to produce each note of a piece of music, thus forming a musical sound [3-4]. The most important aspect of fingering is how to use the right fingers in the right place on the keyboard to play the right keys for each note of a melody, which is the key to piano performance [5].

In [6], a feature matching method based on "dynamic closed-value adjustment" is proposed, and a feature matching strategy using both pitch and pitch length as musical features is proposed, with rough selection first and then fine selection later. In [7], pitch and rhythm are used as matching musical features, and a linear alignment matching method is proposed to approximate melody matching. The literature [8] proposed a music feature recognition method based on Blockboard structure, which can realize music recognition from the perspective of human auditory discrimination mechanism. The contour line algorithm proposed in the literature [9] is widely used, and this method only takes the highest pitch note part when processing music to achieve the extraction of the main melody with a high pitch melody line. However, it failed to pay attention to the duration of the notes, but only took the highest notes.

For piano fingering feature extraction, a Hidden Markov based extraction method is proposed in this paper. The method parses the note feature matrix, screens the piano track blocks and separates them to extract the note key sequences separately. The track-separated key features take into account the specific key information corresponding to the fingers in the actual piano playing process, as well as different hands corresponding to different voices and tracks, which is beneficial to the establishment of fingering generation models.

## **2. Fingering of the piano**

The scientific method of piano playing requires not only the correct sitting of the body, but also the sensitive and reasonable use of the fingers, and the science of law enforcement plays an important role in the performance of the piano. Therefore, in the process of piano playing, the correct fingering should be chosen in a reasonable and scientific way, which will greatly improve the performance effect and technique. Choosing the correct fingering will improve the efficiency



and effectiveness of the performance, and it will help to interpret the music in a more concrete way, which will help to understand the work correctly, and it will also help to combine one's strengths with one's own characteristics in the process of playing, and to form one's own style and technique. The use of the fingers and piano playing is a part of the whole process of piano playing, which requires a high degree of cooperation and perfect unity between the fingers and the piano keys. In the process of playing the piano one should choose the fingering according to the style of each work, which will help to understand the content of the work. In piano performance fingering training, the use of fingering must be mastered, accurate and rapid, taking the movement of the fingers as a prerequisite, using the fingers to dominate all parts of the body, unifying their memory, thinking and cognitive abilities effectively, unifying all the senses of the body into a whole, gradually accumulating playing experience and fingering in the long-term practice of piano performance. In the long practice of piano playing, we gradually accumulate experience in playing and fingering, which provides a good reference for the performance of the piano and the expression of the content of the work.

## **2.1. The importance of fingering in piano training**

In the process of piano playing, the use of each finger is related to the expression of the content of the score and the unity of the score as a whole. Playing the role of each finger well has an important role in promoting the expression of the score. In piano fingering practice, a reasonable and correct fingering is the organic coordination of each rhythm and note. Fingering practice in piano training is an important step in piano teaching and a fundamental step in piano teaching. A scientific and reasonable choice of piano training fingering helps the player to master the music better and to understand the music better, which is essential to improve the efficiency and smoothness of the performance.

## **2.2. Piano fingering training methods and strategies**

### **2.2.1. Make the most of your fingers and strengthen your training**

Fingers are irreplaceable in piano playing. Therefore, in piano performance training, it is important to pay attention to the effective use of finger strength and playing speed for the piano sound, which is important for the overall effect of the music. The length of the fingers

also has an impact on the strength of the piano playing. According to the characteristics of the fingers themselves, the length of the thumb is very different from the other fingers, and the strength and direction it holds is also very different. Therefore, it is difficult to harmonize the strength of the thumb with the other fingers in the playing process. The index finger is considered to be the most inert finger, so it is difficult to coordinate the repetition of movements, but it has its own advantages in terms of speed, which cannot be replaced by other fingers. The middle finger is the longest of the fingers and it has a good control of the tone of the piano playing and its role in controlling the keyboard. The ring finger, on the other hand, lacks independence and has no unique personality of its own, so it is important to strengthen the training of the ring finger in piano training. The little finger, although not dominant among several other fingers, is the most powerful support in the octave of piano playing and is the main force of the octave playing. In the piano training process, it is necessary to make full use of the characteristics of each finger itself, to conduct targeted training for their own fingers, to strengthen training for the fingers that play weaker, and to develop corresponding training methods and techniques according to the characteristics of different fingers.

### **2.2.2. Reasonable distribution of various fingerings**

In the process of creating a score, musicians and composers of scores make the score according to certain playing rules and methods, so in piano performance training, special attention should be paid to the reasonable matching and use of fingerings. There are certain rules between the notes and phrases in the score, so it is necessary to allocate and use the ten fingers in a reasonable way. In the piano training process, the player must be clear about the characteristics and connotations of the music played, and use different fingerings according to the content of the piano score. In the process of playing, the player must be flexible in the use of various fingerings and use the fingerings that are suitable for him or her according to his or her own characteristics. When playing a score, you should be clear about the content and emotional characteristics of the work, train strictly according to the fingering specified in the score, and make reasonable adjustments to the actual situation where appropriate.

### 3. Piano fingering analysis based on artificial intelligence technology

#### 3.1. Judgment Hidden Markov Model

Based on the existing first-order HMM and the relevant prior knowledge of fingering, this paper proposes an improved judgment HMM, detailed as follows in the first-order HMM. Let the input note sequence be  $o_1, o_2, \dots, o_{N-1}, o_N \in O$  and the corresponding fingering sequence be  $s_1, s_2, \dots, s_{N-1}, s_N \in S$ . The prediction objective is to maximize the conditional probability of the fingering sequence given the note sequence.

$$s_1, \dots, s_N = \arg \max_{s \in S} P(s_1, \dots, s_N | o_1, \dots, o_N) = \arg \max_{s \in S} \frac{P(s_1, \dots, s_N, o_1, \dots, o_N)}{P(o_1, \dots, o_N)} \quad (1)$$

From the chi-square Markov assumption and the observation independence assumption of the first-order HMM, it follows that:

$$P(s_1, \dots, s_N, o_1, \dots, o_N) = \prod_{t=2}^N P(s_t | s_{t-1}) P(o_t | s_t) \quad (2)$$

#### 3.2. Predicting the optimal fingering sequence

When the interval distance between  $t-1$  and  $t$  (here all refer to the single note interval) exceeds the maximum interfingering range  $\varepsilon$  of 1.5, the fingering at the moment of  $t$  cannot be transferred to any fingering state in the natural hand position to achieve the note transition, and the fingering correlation is interrupted at the moment of  $t$ . The judgement transfer probability can be expressed as:

$$\prod_{t=2}^N P(s_t | s_{t-1}, |o_t - o_{t-1}| > \varepsilon) = 0 \quad (3)$$

At this point the fingering path is searched for the entire sequence of notes. It will result in:

$$\prod_{t=2}^N P(s_t | s_{t-1}, o_t, o_{t-1}) \cdot P(o_t | s_t) = 0 \quad (4)$$

Therefore, in the set  $U = \{I_1^*, I_2^*, I_3^*, I_4^*, \dots, I_a^*\}$  of the maximum probability paths ending in different states obtained using local information, the penetration index  $l$  in path  $I_j^* = s_1, \dots, s_{\tau-1}, s_\tau$  under the corresponding note sequence  $O = o_1, \dots, o_{\tau-1}, o_\tau$  is calculated, and the path with the smallest  $l$  is selected as the optimal path with the highest performance efficiency  $l$  is calculated as

$$l(I_j^*, O) = \begin{cases} \sum_{t=2}^{\tau} -\frac{1}{2} (\text{sgn}[o_t - o_{o-1}(s_t - s_{t-1})] + 1) & \text{Right Hand} \\ \sum_{t=2}^{\tau} \frac{1}{2} (\text{sgn}[o_t - o_{o-1}(s_t - s_{t-1})] + 1) & \text{Left Hand} \end{cases} \quad (5)$$

Then the optimal path  $I_{all}^* = \arg \min_{1 \leq j \leq a} (I_j^*, Q)$ , the optimal path of all small segments are stitched together to get the optimal fingering sequence of a note sequence.

### 3.3. Characteristics of Fingerprint Data

The number of combinations of 88 notes output is very large, and the parameters in the output probability matrix will reach 64881, of which the number of combinations of four-note chords and five-note chords accounts for 86.7%. The number of notes and fingering in the data set is extremely low, approximately 0. Therefore, the output probability matrix is reduced to 15347 by deleting the four-note and five-note chord notes and fingering in the output probability matrix and the transfer probability matrix, and the conditional state transfer matrix is 764. In the output probability parameter matrix composed of single notes and two- and three-finger chords, the two- and three-finger chords account for 96.1%. The right-hand fingering frequencies are shown in Figure 1. In the self-built dataset, the multi-finger chords are very low-frequency and many positions have a frequency of 0. The reason is that the model effect is more concerned with the monophonic sequence of scores that require more finger transitions, so there is not much chord coverage in the training set, and more datasets with chords need to be added subsequently. Theoretically, the output matrix is spread over all notes. The right hand note frequencies are shown in Figure 2. The range of note Midi numbers (21-108) covered by the right hand is mainly concentrated in the right

half of the region, and the left hand is concentrated in the left half of the region, with very few appearing in the other half of the region. Therefore the output probability matrix of the left- and right-handed model to be trained parameters is again reduced by half.

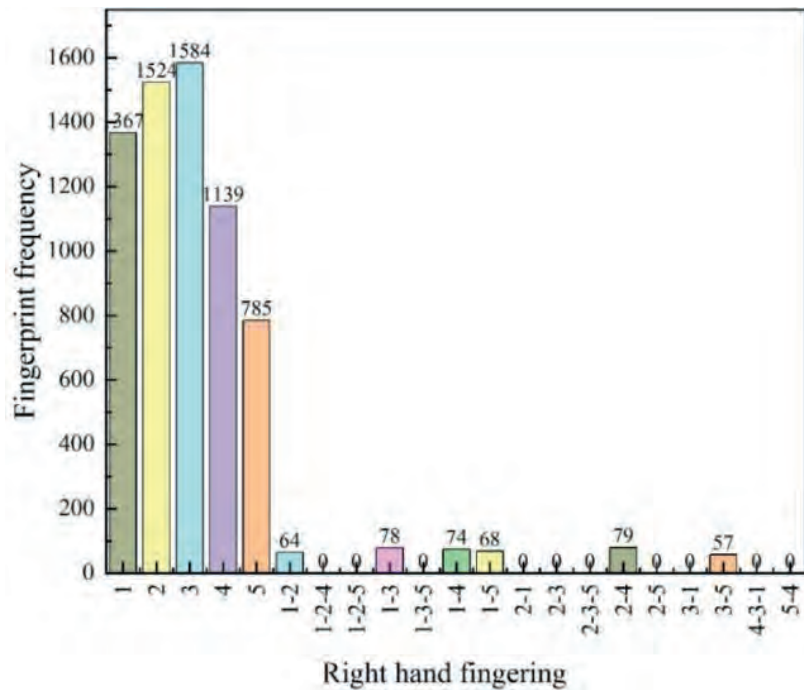


Figure 1. Right hand fingering frequency distribution

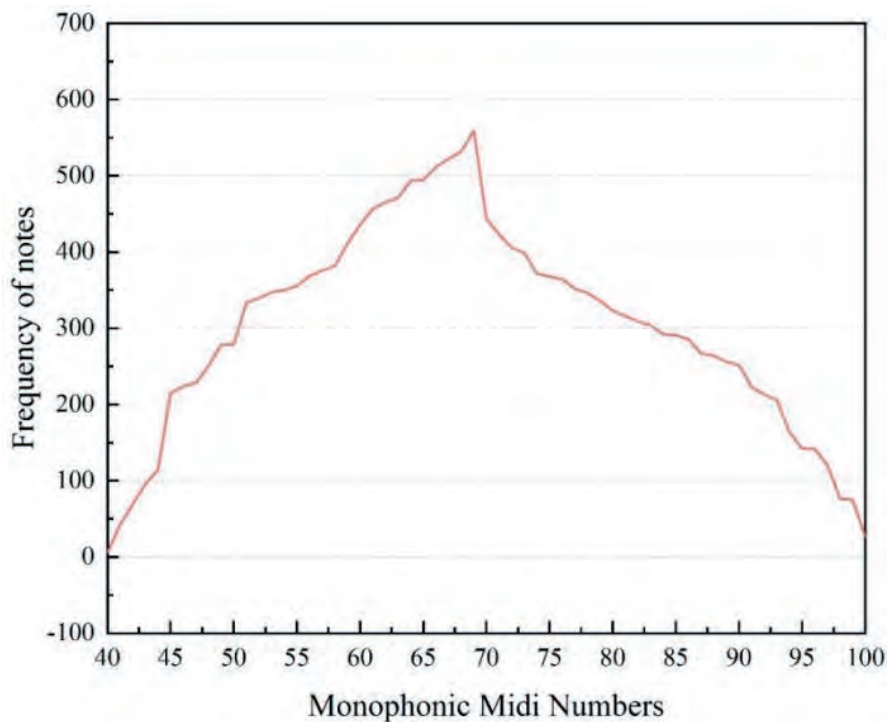


Figure 2. Frequency distribution of right-hand notes

## 4. CONCLUSION

Piano performance and finger usage are throughout the whole process of piano performance, which requires a high degree of cooperation and perfect unity between fingers and piano keys. The fingering characteristics of the piano were analyzed by predicting the optimal fingering sequence based on the verdict hidden Markov model in this paper. The number of combinations of four-note chords and five-note chords accounted for 86.7% of the total number of combinations. In the output probability parameter matrix consisting of single notes and two- and three-finger chords, the two- and three-finger chords accounted for 96.1% of the output probability.

The output probability matrix of the left and right hand models to be trained parameters was reduced by half.

The ability of fingers includes the flexibility, sensitivity and strength of fingers, which is the basic ability of finger training. It requires the player to use each ability of fingers flexibly and strengthen these aspects in piano training and adapt to the playing skills and fingerings in order to have good results in piano playing.

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## Optimization of talent cultivation path of preschool education majors in universities under the use of multimedia

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### ABSTRACT

With the increase of national attention to the field of preschool education, the society's requirements for preschool education talents are getting higher and higher. This paper firstly analyzes the multimedia technology ability that kindergarten teachers must master in the current situation from the actual demand of applying multimedia technology ability in the daily work of kindergarten teachers, and optimizes the cultivation path of preschool education professionals. The evaluation indexes are constructed according to the training objectives of preschool education talents, and the data are collected through survey and analysis. After analyzing the data, we found that the scores for the three indicators of "attitude and behavior toward children", "attitude and behavior toward child care and education", and "personal development and behavior" ranged from 4.45 to 4.5. The scores for these three indicators ranged from 4.45 to 4.57, indicating that the early childhood teachers rated their own professional ethics as high. This study should not only focus on the teaching mode and teaching methods, but also on the professionalism and professional ability of preschool educators, so as to further optimize the cultivation path of preschool education talents.

### KEYWORDS

Multimedia; Preschool Education; Cultivation Path; Evaluation Indicators



## 1. INTRODUCTION

In recent years, people's quality of life has been significantly improved, and many parents pay high attention to their children's education. Preschool education, as a basic educational link, is related to the cultivation of learning habits of young children [1-2]. Looking at the current mode of cultivating talents in preschool education, early childhood knowledge education is the focus of its education and teaching, but there is a deficiency in cultivating other abilities of students, which makes the comprehensive quality of preschool education talents unsatisfactory [3-4]. As the main site for cultivating preschool education professionals, colleges and universities should promote the further optimization and improvement of the personnel cultivation mode of preschool education professionals to effectively enhance the comprehensive ability of students [5-6].

The literature [7] analyzed the current situation and trends of internationalized talents cultivation of preschool education majors at home and abroad, and on this basis explored the feasible paths to improve the quality of internationalized talents cultivation of preschool education majors in colleges and universities from three dimensions: the connotation of goal interpretation, optimization of process system and improvement of evaluation mechanism. The literature [8] adopts practical strategies to achieve the precision of talent cultivation objectives, scientific and rationalization of curriculum setting, diversification of teaching methods and diversification of evaluation system, in order to optimize the undergraduate talent cultivation mode of preschool education majors to cultivate talents who can adapt to the new era.

This paper firstly combines multimedia technology, the concept of talent training program, key elements and the own characteristics of applied bachelor's degree, and determines the research content mainly for the theoretical exploration of four aspects: talent training objectives, talent training planning, curriculum structure exploration and practical link arrangement of applied undergraduate preschool education majors. Then, on the premise of determining the cultivation objectives, the competencies that applied preschool education talents need to achieve are decomposed, which is the concretization of the talent cultivation objectives. Finally, the evaluation index system is

formulated according to the training plan of applied preschool education talents, and the evaluation analysis of preschool education talents is carried out from three aspects: professional philosophy and teacher morality, professional knowledge and professional ability.

## **2. Multimedia measures to promote the optimization of talent cultivation mode of preschool education majors in colleges and universities**

### **2.1. Restructuring the teaching format of preschool education**

With the development of early childhood education, how to promote the all-round development of young children has become the focus of education. In preschool education majors in colleges and universities, teachers in charge of classes should focus on cultivating students' teaching ability and adjusting and innovating their teaching methods. By adopting various teaching methods, such as group cooperation methods and role plays, students are guided to analyze and think about problems based on the perspective of young children, so that they can further understand the psychological state and inner needs of young children and lay the foundation for improving their teaching ability. Young children are young, have relatively limited cognitive ability, and are curious about new things, so they often ask questions that are embarrassing or difficult for adults to answer. In the teaching of preschool education, teachers should make this clear to students and conduct situation simulations so that students can respond to different situations in order to enhance their resilience and solve various young children's problems flexibly and effectively, thus promoting the healthy physical and mental development of young children.

### **2.2. Stimulate interest in learning**

For early childhood teachers at this stage, the scientific and rational use of information technology during education and teaching can create a very high-quality learning atmosphere for early childhood students. For early childhood students, the main motivation for learning is interest, without which the whole educational activity will lose its own meaning. Therefore, early childhood teachers can make use of multimedia courseware to show the abstract knowledge in a more concrete way during the design and implementation of educational activities. For some of the content that needs to be

expressed in words, the early childhood teacher can rely on the projector or computer to express the images depicted in words more graphically. Overall, the use of multimedia technology in preschool education is very extensive, not only to promote the efficiency of preschool teaching activities, but also to further promote the effective development of all aspects of early childhood students' abilities. Early childhood teachers must pay more attention to the screening of educational information in multimedia technology during the actual use of multimedia technology.

### **2.3. Create an excellent game situation**

Multimedia technology is the best means to create teaching situations. When creating game situations, teachers should take into account students' understanding and acceptance ability to make the situations more relevant to students' actual situation. Especially in indoor learning, teachers should make the game context more colorful through audio, music, video and other resources. The core of the game context teaching mode is "teaching for fun", so that students can learn to cooperate and feel friendship in the game, and cultivate a good sense of rules and correct three views while participating in the game activities. For example, music games combined with dance can help strengthen students' sense of rhythm and increase their activity level to ensure their physical fitness. And number games can help students develop creative thinking, logical ability and so on, making students' thinking more active and deepening their understanding of numbers. In addition, attention should also be paid to setting up a reward system for students to increase their participation in the game by rewarding small gifts and giving small medals to help them master the relevant knowledge points in the game.

### **2.4. Build awareness of teacher-student interaction**

In multimedia teaching, teachers need to give students sufficient free discussion time, pay attention to and participate in students' discussions in a timely manner, observe each student's discussion status, and thus establish a good friendship relationship with students. In addition, teachers can also form an interactive response relationship with students in the classroom to avoid indoctrination. With the role of multimedia, teachers need to get rid of the traditional teaching concept and participate in classroom learning with students,

which not only increases the communication between teachers and students, but also enables teachers to learn about students' problems and learning situation in the communication. With the help of the Internet, teachers and students have more opportunities to communicate online anytime and anywhere, which quickly brings the distance between teachers and students closer.

### **3. Analysis of talent cultivation based on multimedia preschool education**

Table 1 shows the evaluation index system. This part was based on the Professional Standards (Trial), and the Early Childhood Teachers' Questionnaire and the Kindergarten Directors' Questionnaire were prepared. A total of 390 questionnaires were collected, excluding invalid questionnaires, and the remaining valid questionnaires were 385. The questions in both questionnaires corresponded to the secondary indicators in the Professional Standards (for Trial Implementation). The Early Childhood Teacher Questionnaire invited the early childhood teachers to choose the degree that matched their personal situation. The questionnaire was scored on a 5-point scale, ranging from "not at all" to "fully", with 15 points each. The higher the mean score of each dimension, the higher the level of professionalism of the teachers in that dimension. Question 2 was scored inversely to question 1. In the Kindergarten Director Questionnaire, the directors were asked to rate the importance of the professionalism of qualified kindergarten teachers on a scale from "very important" to "not important", with the higher the mean score of each dimension indicating the more important the professionalism of the kindergarten teachers in that dimension. The higher the mean score of each dimension, the more important the professionalism of the teachers in that dimension.

**Table 1.** Evaluation index system

Level I indicators	Secondary indicators	subject
Professional concept and ethics	Professional understanding and understanding	1-2 questions
	Attitude and behavior towards children	3-4 questions
	Attitudes and behaviors towards childcare and education	5-6 questions
	Personal accomplishment and behavior	7-8 questions
professional knowledge	Early childhood development knowledge	9-10 questions
	Knowledge of ECCE	11-12 questions
	General knowledge	13-14 Question
Professional competence	Ability to create and utilize environment	15-16 questions
	One day life organization and conservation capacity	17-18 Questions
	Ability to support and guide game activities	19-20 questions
	Ability to plan and implement educational activities	21-22 Questions
	Incentive and evaluation ability	23-24 Questions
	Communication and cooperation ability	25-26 questions
	Reflecting and developing ability	27-28 Questions

### 3.1. Analysis of early childhood teachers' professional philosophy and teacher moral situation

Figure 1 shows the professional philosophy and ethics of early childhood teachers. As can be seen from the teachers' evaluation of their own professional philosophy and teacher ethics, questions 1-2, which are related to the indicator of "professional understanding and awareness," scored "3.5" and "4.125" respectively, which are significantly lower than the other questions. "These scores are significantly lower than the scores of other questions. The lowest score for the question "I am willing to work in early childhood education for the rest of my life" indicates that the professional beliefs of early childhood teachers need to be improved. The scores for the questions "Attitudes and behaviors toward young children," "Attitudes and behaviors toward child care and education," and "Personal development and behaviors" ranged from 4.45 to 4.57. This indicates

that early childhood teachers have a high opinion of their own professional ethics.

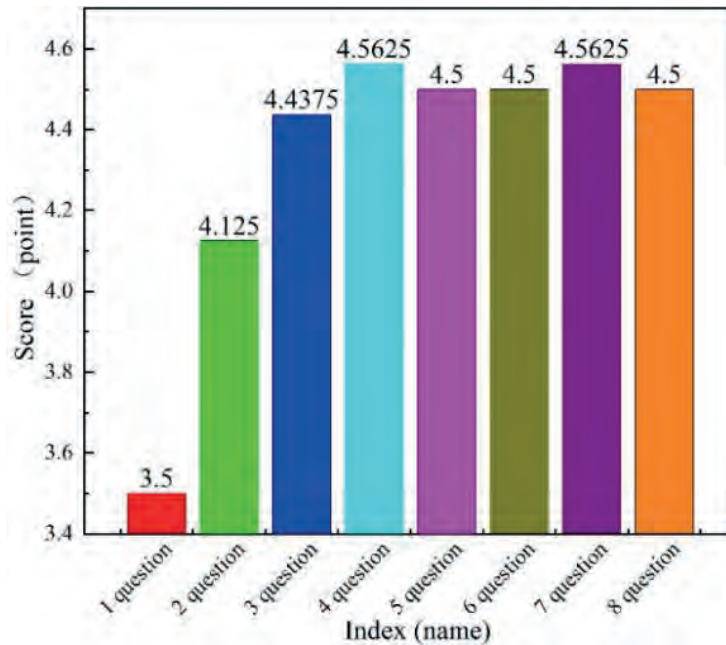


Figure 1. Preschool teachers' professional ideas and ethics

### 3.2. Situation analysis of early childhood teachers' own expertise

Figure 2 shows the professional knowledge of early childhood teachers. The data show that in the evaluation of teachers' professional knowledge, questions 13-14, which correspond to the indicator "general knowledge", scored "3.5" and "4.125", respectively. "These scores are lower than the scores of other questions. The lowest score was given to the question "Often cannot answer questions about natural and social sciences asked by children", indicating that teachers' general knowledge needs to be further developed. The 10th question, which corresponds to the indicator "knowledge of early childhood development," scored 4.125, indicating a lack of knowledge in understanding issues that tend to arise in early childhood development. Other questions scored between 4.23 and 4.38, which is relatively low compared to the scores for professional philosophy and ethics in the previous section, suggesting that early childhood teachers believe their expertise needs to be strengthened.

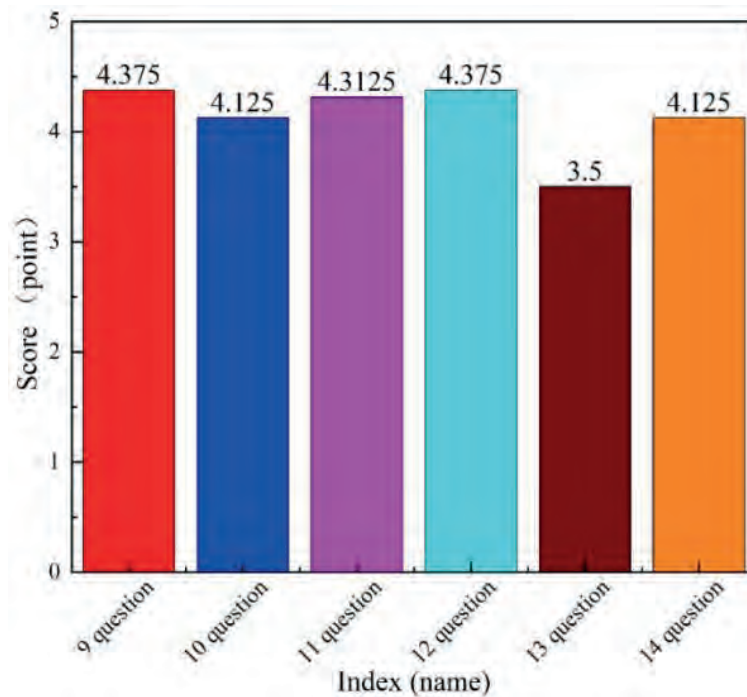


Figure 2. Preschool teachers' professional knowledge

### 3.3. Analysis of professional competencies of early childhood teachers

Figure 3 shows the professional competencies of early childhood teachers. The data show that the best scores for questions 18 and 23 are "4.5", which correspond to the "ability to organize and care for the day" and "ability to motivate and evaluate" respectively. "This indicates that the teachers' abilities in these two areas are high. Questions 16, 19-20 had the lowest scores of 4.187, corresponding to "ability to create and use the environment", "ability to support and guide play activities", and "ability to reflect and develop". "This indicates that teachers' abilities in these areas are low and need further improvement. With the exception of questions 18 and 23, which corresponded to the indicators of "ability to organize and care for the day" and "ability to motivate and evaluate," the rest of the questions scored between "4.18 and 4.3," which is consistent with the above. The relatively low scores for professional knowledge indicate that teachers' recognition of their own abilities is low and needs to be further improved.

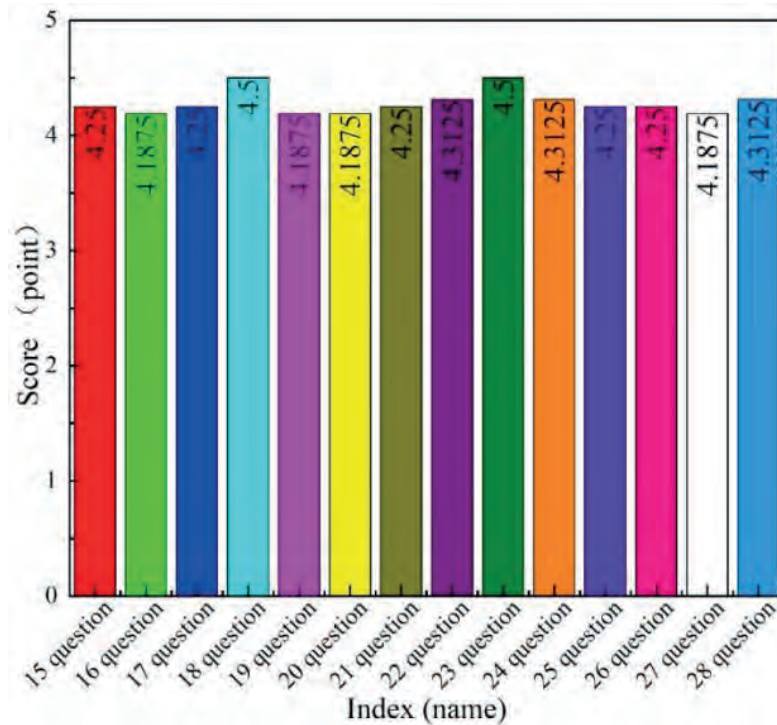


Figure 3. Professional competence of preschool teachers

#### 4. CONCLUSION

Based on the use of multimedia, this paper constructs the specification system for the cultivation of talents of preschool education majors in colleges and universities around the cultivation objectives, explains the principles and ideas of arranging practical aspects, and designs the cultivation program of preschool education majors in colleges and universities accordingly, and the following conclusions can be drawn.

(1) Regarding the evaluation of the teachers' professional philosophy and ethics, the scores of questions 1-2, which correspond to the index of "professional understanding and awareness", are "3.5" and "4.125" respectively. "These scores were significantly lower than the scores of other questions. The lowest score for the question "I am willing to work in early childhood education for the rest of my life" indicates that the professional beliefs of early childhood teachers need to be improved.

(2) Regarding teachers' evaluation of their professional knowledge, the scores for questions 13-14, which corresponded to the indicator of "general knowledge," were 3.5 and 4.125, respectively. "These scores are lower than the scores of other questions. The lowest score was given to the question "I often cannot answer questions about



natural and social sciences asked by children", indicating that teachers' general knowledge needs to be further developed.

(3) Regarding the teachers' evaluation of their own professional abilities, questions 18 and 23 scored the best with 4.5, corresponding to the indicators of "ability to organize and care for children during the day" and "motivation and evaluation," respectively. The teachers' ability in these two areas is high. Questions 16 and 19-20 had the lowest scores of 4.187, corresponding to "ability to create and use the environment", "ability to support and guide play activities", and "ability to reflect and develop", respectively. "This indicates that teachers' abilities in these areas are low and need further improvement.

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# Application of information fusion technology in college nursing practice education

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## **ABSTRACT**

The information integration-based practice teaching model is integrated with intelligent systems to set up problem-oriented situations to further stimulate college nursing students to enhance their learning interest and internal drive in practice. The project task-driven approach promotes upward extension of students' thinking, and through the use of information technology, timely and accurate information on students' learning status, learning obstacles and learning effects is collected for teachers to achieve accurate teaching, supplemented by developmental evaluation, so as to implement the teaching objectives from classroom to practice. Through comparison, it was found that the control class taught in accordance with the original teaching method had an exit score of 77.8 and an overall core competency rating of 64.4, while the experimental class taught with information integration technology had an exit score of 83.1 and an overall core competency rating of 81.9, so the results were improved. Therefore, the use of combining information fusion technology in the teaching of nursing practice in colleges and universities is more effective.

## **KEYWORDS**

Nursing Practice Teaching; Information Convergence Technology; Task Driven; Intelligent Systems

## . INTRODUCTION

Nursing is one of the most important professions in the secondary vocational health professions. However, in some institutions, in order to achieve the goal of quickly cultivating skilled talents, the teaching method is still based on the "teacher speaks, students listen" fill-in-the-blank education. The classroom is the only teaching environment, and teachers' preparation and students' learning are based on textbooks, so there is a lack of relevant and effective teaching content and extensive information sources, which is not conducive to the development of students' creativity and autonomy [1-2]. With the continuous development of society, the demand for application-oriented talents in various industries is on the rise. More and more employers are interested in talents with strong hands-on and practical skills, so that graduates can be quickly put into the workplace and shorten the subsequent training time [3-4]. The demand for nursing students is also the same, so its practical teaching is becoming more and more important. With information technology as a platform, universities should focus on strengthening practical teaching while adhering to the important status of theoretical teaching. Teachers should improve the level of practical teaching in vocational education, combine it with information technology, and use advanced teaching methods so as to improve the quality of teaching and even the learning performance and ability of students. How to apply information integration technology in nursing professional practice education is one of the important issues that need to be urgently addressed in the process of teaching reform in vocational education [5-6].

The literature [7] considers nursing skills practice as an important aspect of service to patients and as one of the priorities of nursing staff. It affects not only the recovery of patients but also the overall level of nursing staff quality; therefore, practice teaching should be a very important part of nursing profession teaching. The literature [8] argues that colleges and universities do not pay enough attention to the way of practice teaching reform and are backward from the concept, and the majority of schools are limited to the application of information technology only to the application of images and dummies, and do not apply high-end information technology teaching methods such as microgrid teaching and high simulation technology

to the teaching of nursing practice, and the overall performance is rather backward. The literature [9] proposed that in future studies different standard competencies for nursing students of different academic levels need to be developed for access to the lead teacher so that clinical teaching work can meet the needs of talents at each academic level. The literature [10] concluded that the core model of nursing education in the UK is self-directed learning, usually teacher-led, which improves the ability of students to learn independently. The literature [11] found that countries such as the Czech Republic and Poland generally have nurse leaders and highly qualified nurses as teachers, with the aim of enabling students to learn more specialized clinical skills during clinical practice and enabling them to develop their own professional ethics and literacy, etc.

This paper is precisely based on the thinking of clinical practice, and under the guidance of constructivist learning theory, a practical teaching model based on information fusion is constructed. Information fusion in this paper contains two aspects: first, the fusion of multiple information technology platforms, such as the fusion of technologies such as network communication, multi-sensing systems, big data, intelligent systems, and digital resources. The second is the integration of information technology and teaching, i.e. education technology should not only stay in the learning environment, but be embedded in the learning system, which requires a shift from tool-based thinking to artificial intelligence thinking. After building the practical teaching platform of information integration, students can be dynamically evaluated according to their mastery of new knowledge in a tiered grouping display, and face-to-face interaction between teachers and students can be promoted by problem-oriented and project task-driven lines, so as to achieve the purpose of clearing doubts and solving problems.

## **2. Teaching Nursing Practice in Universities with Information Fusion Technology**

### **2.1. Hands-on teaching**

Practical teaching means that in a certain teaching environment, teachers organize and instruct students in a purposeful way, so that students can carry out learning that is compatible with professional practice and has application and practicality, thus they can pass on

practical knowledge, form skills, develop their practical ability and innovation ability, and improve their overall quality. Generally speaking, practical teaching can be divided into two aspects: on-campus practice and off-campus practice. Among them, on-campus practice includes experimental class and practical training class, the experimental class is the cultivation of professional theory application ability, and the practical training class is the cultivation of basic skills application ability. Off-campus practice mainly includes apprenticeship and internship, apprenticeship is the cultivation of professional skills application ability, and internship is the cultivation of comprehensive practical application ability.

## **2.2. Nursing Practice Teaching**

Nursing is a highly practical professional discipline that requires students to have a solid theoretical foundation as well as the ability to perform skilled nursing practical training. The content of practical teaching in nursing school mainly includes the skills included in nursing work, such as bed making method, patient transportation method, assisting patients to change the lying position method, the use of protective gear, clean disinfection and sterilization techniques, aseptic operation techniques, isolation techniques, entry and exit care, dietary care, patient cleaning care, observation of patients' vital signs, various methods of drug administration, intravenous infusion and intravenous blood transfusion techniques, The nursing knowledge and basic nursing operation techniques include observation of patients' conditions, resuscitation and care of critically ill patients, care of terminally ill patients, and writing of nursing-related documents. Through these nursing operation skills, we provide professional nursing services for patients, so the quality of nursing practice teaching is directly related to nursing services.

## **2.3. Information integration innovation, highlighting the educational service function of the practice platform**

Under the background of "industry-education integration", the implementation of "Internet+education training" cooperative education mode is in line with the policy guidance of collaborative innovation and achievement transformation. Relying on the information integration characteristics of the "Internet+" professional cluster practice teaching platform, the professional, open and shared

education information service function of the platform can be highlighted, forming a community of information sharing and win-win benefits.

### **2.3.1. Technology integration innovation, highlighting the paid service function of the practice platform**

By virtue of the practical teaching platform of "Internet+" professional clusters, universities can carry out technical cooperation with medical institutions, open the interchange of resources between universities and institutions for a fee, and implement mutual recognition channels for course credit conversion through the point system to ensure students' participation in classroom and clinical practice. The government and medical institutions can precisely release various kinds of supply and demand information such as supply and demand of local regional and industrial talents, R&D of school-enterprise cooperation projects and technical services, retrieve and recommend relevant value-added services for a fee, encourage students to participate in project R&D and technical services, etc. to guide their learning with practical experience, enrich their experience and accumulate experience. In addition, by virtue of the platform shared information, universities can also adjust the professional structure and talent training plan timely through the industrial clusters, and purchase teaching services such as innovation and entrepreneurship information, frontier technology courses, research and technology services, and library resources from the platform suppliers. In the environment of knowledge payment, the value of existing resources is given full play, intellectual property rights are respected, knowledge "dividends" are realized, and the paid service function of the practice platform is manifested.

### **2.3.2. Cultural integration and innovation, highlighting the mutually beneficial win-win function of the practice platform**

Based on the concept of mutual benefit and win-win situation, universities should take advantage of cultural resources and use the practice teaching platform of "Internet+" professional cluster to strengthen the integration of campus culture and hospital culture, which helps the cultural innovation of both partners. The university can join hands with the hospital to form a "dual-teacher" team, in which the teachers in the university and the high-level practitioners in

the hospital jointly guide the practice teaching to carry out classroom teaching case studies. Through the introduction of real cases of clinical work in hospitals, the teachers can carry out practical teaching, spread and promote the culture of medical-educational collaboration in the school, and spread the cultural influence to the campus and the society.

### **3. Set up in-class tiered mixing for task-driven problem solving**

#### **3.1. Introduction to the problem situation**

Teachers can collect students' confusions and questions based on the pre-course pre-reading session and introduce the session by carefully designing problem situations. The problem situations are related to students' previous thinking difficulties and similar to their life experiences, so they can stimulate students' interest in learning. By motivating students to engage in class, it can greatly reduce ineffective content and improve the efficiency and quality of classroom teaching.

#### **3.2. Project Task Driven**

Teachers carefully design "step-by-step" tasks between problem situations and teaching objectives, interconnecting tasks and layering them with difficulty, just like playing a game of "breakthrough". This helps students with different learning bases and levels to find appropriate developmental tasks, experience success and joy in solving problems and completing tasks, and gradually increase their self-confidence.

#### **3.3. Classroom testing**

In order to understand the learning effect of students in time, classroom testing is a necessary part. Teachers must leave enough time for students to complete tests in class, including practical operations and knowledge quizzes, and make instant evaluation of practical operations, on-site hands-on and on-site demonstration. For the knowledge quizzes, students can answer and submit them online through the practice teaching platform, which will automatically correct and analyze students' completion and scores horizontally and vertically in multiple dimensions. Through the practice teaching platform, teachers can instantly grasp the classroom teaching situation, consider whether the teaching objectives are achieved and

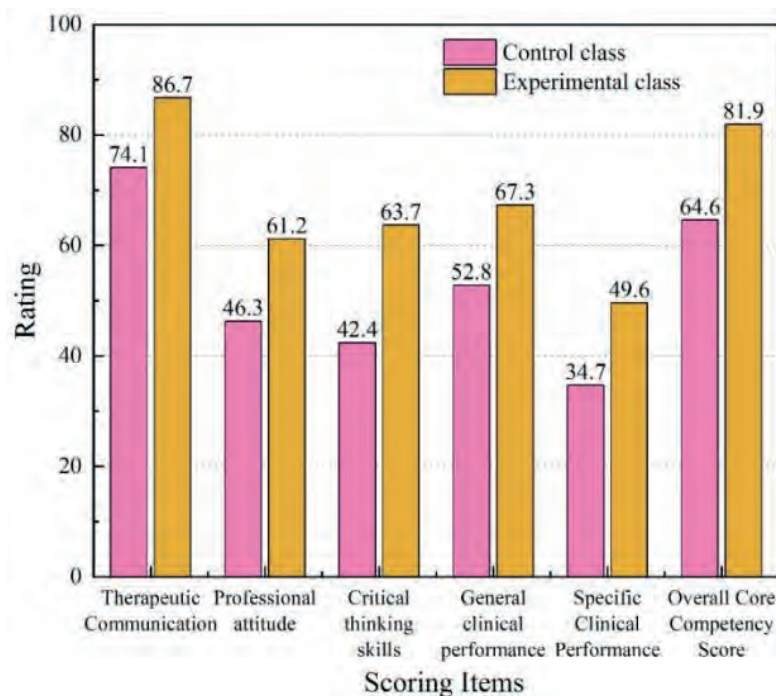
what confusion students still have, etc., and provide big data support for their accurate confusion and evaluation of student learning.

### 3.4. Research Subjects and Methods

One hundred and forty nursing students with a mean age of (20.6±1.5) years were included in the study and all students gave their informed consent to this study. The students were grouped according to the random number table method, i.e., experimental and control groups, with 70 students in each group. The control group was taught according to the original teaching method, while the experimental group was taught using the information fusion-based practice teaching platform. The comparison of case analysis exit exam scores is shown in Table 1, and the comparison of nurse core competency scale scores is shown in Figure 1. By comparison, it was found that students in the control class taught according to the original teaching method had an exit exam score of 77.8 and an overall core competency score of 64.4, while students in the experimental class taught using information fusion technology had an exit exam score of 83.1 and an overall core competency score of 81.9.

**Table 1.** Comparison of case analysis scores

Group	Number of people	Admission Test	Results
Control class	70	74.6	83.1
Experimental class	70	76.3	77.8



**Figure 1.** Total core competency score



#### 4. CONCLUSION

This paper proposes a practical teaching platform based on information fusion technology, and then interest as a carrier, so that classroom knowledge becomes a source of interest maintenance through the teacher's elaborate design of teaching content, which stimulates students' interest by optimizing classroom teaching. The teaching content is presented in a multi-information technology integration way, so that students can participate in it and have new experiences and gains at times. In this way, the students' entrance score is 74.6 and their exit score is 83.1, which is complementary to each other and greatly stimulates their curiosity and motivation, thus laying the foundation for nursing professionals.

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## **Research on the current situation, dilemmas and their countermeasures in medical care in the era of big data**

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### **ABSTRACT**

With the development of data technology and the popularity of the Internet, the role of high efficiency brought by big data in the medical nursing system has gradually come to the fore. This paper firstly explains the advantages of medical nursing application in the era of big data and the comparative analysis of the application of big data in medical nursing at home and abroad, and then summarizes the problems arising in the development and application of big data medical nursing in China and puts forward targeted countermeasures. Finally, the data analysis of the development of medical nursing career, as of the end of 2018, there were 1653,297 registered nurses and a total of 2082,258 licensed physicians in China, and the development of China's nursing career lags behind the development trend of the discipline of nursing. This study, through the establishment of a big data interaction platform, can provide a carrier

for the processing and utilization of massive data, which is important for promoting the deep integration of big data with the field of medical nursing.

## **KEYWORDS**

Big Data; Medical Care; Application Status; Solution Countermeasures

## **1. INTRODUCTION**

With the popularization of big data infrastructure and the development of the Internet, big data has been gradually applied to the medical care industry, and the advantages of big data have brought convenience and progress in the field of medical care [1-2]. However, many new challenges have been encountered in the construction and application of big data medical care, which need to be urgently considered and solved by the academic community, namely, how big data fits the needs of medical care and how medical care can gain new development through big data applications [3-4]. In this paper, we summarize the dilemmas of big data application in medical nursing and propose targeted solutions through the investigation of the current situation of big data application [5-6].

In [7], a review of the "flipped classroom" teaching model and its application and research status in the field of medical education was conducted, aiming to provide reference for Chinese nursing educators to promote nursing education reform in the new form in line with Chinese conditions. The literature [8] analyzed the current status of TCM nursing interventions in AD in recent years, and TCM interventions have gradually become one of the important ways to prevent and treat AD. As an important part of Chinese medicine, TCM nursing also plays a key role in the prevention and treatment of AD, and clinical studies have also confirmed that TCM nursing can improve the cognitive function, psychiatric symptoms and self-care ability of AD patients to a certain extent. The aim of TCM nursing is to further promote and facilitate its application in AD and to provide a feasible reference for TCM prevention and treatment of AD.

This paper first summarizes the problems that arise in the development and application of big data medical care in China,

namely, the lack of technical support and specialized service personnel in rural areas, so that the rural population cannot enjoy the medical convenience brought by intelligence in the era of big data, and the data collection equipment and platform construction are not perfect. China has a huge amount of medical data resources, but not enough attention is paid to data collection, and the data entered are not comprehensive. The deep integration of big data with the healthcare field is promoted by proposing targeted solutions, i.e., cultivating big data thinking in the modern healthcare system. This study focuses on the platform construction of big data medical care in the direction of precision care and nursing management, creating a big data center platform that allows more nursing staff to participate and industrialize, and further promoting the innovation and creation of big data medical care.

## **2. Status and Problems of Big Data Application in Medical Care**

### **2.1. The current state of big data applications in medical care**

With the construction of big data infrastructure, the application of big data in medical nursing has increasingly become an important topic of academic interest. The application of big data in medical nursing is at a relatively mature stage in foreign countries, being applied to several nursing fields, such as elderly care, infant and child care, critical care, etc. For nursing workers, the involvement of foreign countries using big data can change the original nursing decision-making mechanism, rationalize nursing resources, and give clinical nurses more decision-making power. Incorporating big data into the decision-making and policy-making process can prevent nurses from being inefficient and improve the effectiveness of medical care by adjusting the nursing process and promoting the rational allocation of nursing resources. Nurse leaders can use big data to achieve the triple aim of improving quality, improving patient experience and reducing costs. Currently, the application of big data in medical nursing in China is in the initial stage, but there are developments, such as: Guangzhou University of Traditional Chinese Medicine constructed a target diagnosis model for cervical cancer infection, combined with a big data information monitoring system for cervical cancer, to provide a basis for early diagnosis and treatment of cervical cancer patients; Beijing nursing staff reduced the incidence of infection in hemodialysis patients

through preventive nursing interventions with big data to improve patients' quality of life.

## **2.2. Problems with the application of big data in medical care**

### **2.2.1. Big data medical applications are not sufficient and comprehensive**

At present, China's collection of big data is only voluntarily declared by hospitals, through which they can statistically analyze the situation of the hospital itself, and also compare the situation of other hospitals horizontally for data analysis. The national level only stays at the point where hospitals that voluntarily join can have statistics and analysis of data, but does not include primary hospitals, specialist hospitals, basic health centers, township medical service centers, nursing homes, etc. The lack of technical support and specialized service personnel in rural areas prevents the rural population from enjoying the medical convenience brought by intelligence in the era of big data.

### **2.2.2. Data collection equipment and platform construction is not perfect**

China has a huge amount of medical data resources, but not enough attention is paid to data collection, and the data entered is not comprehensive, leading to data bias in research and search. Zhang Luxia pointed out that China has a high degree of health care informatization, but the uneven degree of informatization and unified data standards among different regions make it difficult to directly extrapolate foreign medical big data quality assessment models to China for use. Therefore, it is urgent to establish a health care big data quality assessment model suitable for China's national conditions and develop assessment tools. However, China has not yet established an authoritative platform for data preservation and analysis.

### **2.2.3. Big data concept lags behind for clinical care workers**

Big data can improve work efficiency and reduce the burden of nursing staff, but at the hospital level, big data has not been pushed from theory to application, and inertial thinking has limited the application scenarios of big data. There is still much room for the development of big data in clinical applications and personnel

management in hospitals, and the lack of big data thinking ability of medical and nursing staff leads to the limitation of the application scope of big data. Hospital outpatient nursing management is not IT personnel, and they do not have a good grasp of big data related technology or even a serious lack of it, so they need to introduce or focus on training talents with both big data technology, nursing knowledge and management skills.

#### **2.2.4. Immaturity of policies and legislation for big data privacy protection and big data industry**

China should improve relevant legislation to protect the security of big data and user privacy, and safeguard the rights and interests of big data collection and big data users. In 2018, although the state introduced relevant regulations in the application of big data: the Notice on the Issuance of National Management Measures for Health Care Big Data Standards, Security and Services (for Trial Implementation), the regulations related to the legal collection and use of medical data are not perfect enough. The legislation on privacy protection of big data is not detailed enough. The state and government do not support the big data industry, especially big data medical care, enough in terms of policy.

### **3. Countermeasures to solve the dilemma of applying domestic big data in medical care**

#### **3.1. Improve the sophistication of data collection equipment and data processing systems**

China is generating huge amounts of medical data every day, and there is a need for efficient and comprehensive data collection with more advanced and convenient devices to improve the efficiency and quality of data collection. Medical institutions can monitor through various wearable devices or cell phones, while strengthening the development of new analytical tools to enhance the relevance of big data collection and clinical applications. Greater efforts can also be made to promote the construction of authoritative platforms for big data, focusing on the construction of platforms for big data medical care in the direction of precision care and nursing management, creating big data center platforms that involve more nursing staff and industrialization, and promoting the creation of innovations in big data medical care. It can also strengthen the construction of the

processing big data center platform to provide a platform for the processing and analysis of big data, and at the same time provide a guarantee for the professionalism of the nursing discipline.

### **3.2. Fostering big data thinking in modern healthcare systems**

Leverage the guidance of big data to provide a more standardized framework for medical care. Every caregiver can become a creator of nursing data as well as a decision maker in nursing. Abandoning the superstition of authority, using big data to break the inertia, exploring the blind spots of nursing managers, and giving more big data-minded nursing participants the opportunity to join the decision making process to make nursing decisions more rational. Big data nursing is an important part of promoting big data healthcare, especially in data collection, to improve nurses' ability and confidence in big data collection, analysis and application. Increase support for innovation and creativity in the nurse community, and actively explore ways to apply big data in nursing, so that the scenarios of big data use meet the actual needs of nursing, especially for specialty nursing.

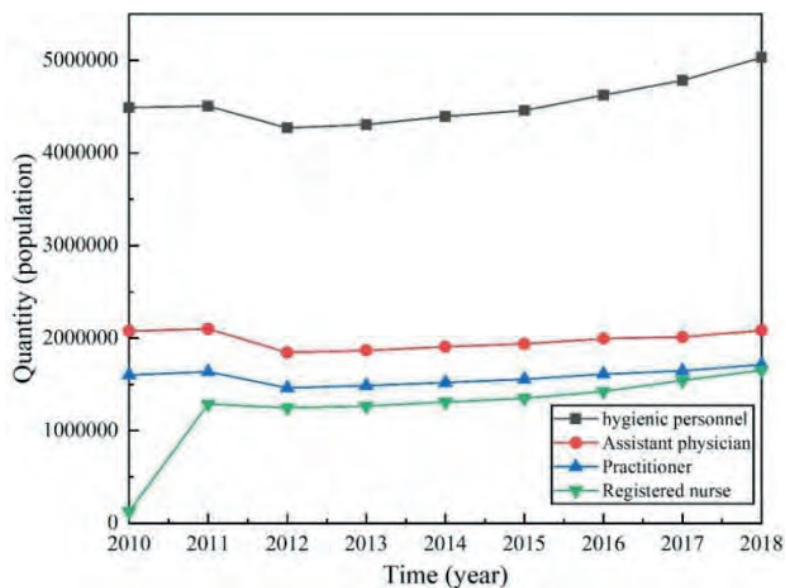
### **3.3. Promote the deep integration of big data and health care field**

Accelerate the application of big data into medical institutions, especially to reach the medical institutions in townships. Strengthen the training of community nursing personnel, improve the construction of township networks, use big data to guide the work of community nursing staff, bring township medical institutions into full alignment with tertiary hospitals, and allow community medical services such as medical checkups to benefit a wider range of people using big data. Relying on core technologies such as the Internet of Things and cloud computing, we will change the situation that each community unit is an "island" in the past, realize information sharing among streets and counties, effectively solve the problem that big data resources are not shared universally in grassroots and less developed areas, and effectively improve medical facility construction and medical services by relying on big data technology.

### **3.4. Promote the deep integration of big data and health care field**



Figure 1 shows the number of human resources for health in China from 2010-2018. According to the China Statistical Yearbook 2019, by the end of 2018, there were 1,653,297 registered nurses and a total of 2,082,258 licensed physicians in China. The development of nursing in China lags behind the development trend of the discipline of nursing, with very little relevant research on nursing theory and clinical practice and insufficient research funding, resulting in the low status of the discipline of nursing in China, serious lag in discipline construction, lack of high-level nursing experts, lack of respect for nurses by patients, and too slow development of the holistic nursing model.



**Figure 1.** Number of health human resources in China from 2010 to 2018

Table 1 shows the number of health technicians per 1,000 population in China from 2010-2018. The number of registered nurses per 1,000 population was 1.25, and the ratio of health care workers was 1:0.79. According to the World Health Organization, the number of nurses per 1,000 population was 8.1 in high-income countries, 4.0 in upper-middle-income countries, 1.4 in low- and middle-income countries, 1.0 in low-income countries and 2.8 nurses per 1,000 population in all member countries. In comparison, the number of registered nurses per 1,000 population in China is low and only slightly above the level of low-income countries, with 26,799 registered nurses in Chongqing, for example, and only 0.82 registered nurses per 1,000 population in 2018.

**Table 1.** Number of health technicians per 1000 population in China from 2010 to 2018

particular year	hygienic personnel			Practitioner			Registered nurse		
	total	city	county	total	city	county	total	city	county
2010	3.63	5.17	2.41	1.68	2.31	1.17	1.02	1.64	0.54
2011	3.62	5.15	2.38	1.69	2.32	1.17	1.03	1.65	0.54
2012	3.41			1.47					
2013	3.42	4.84	2.19	1.48	2.08	0.97	1.00	1.59	0.50
2014	3.46	4.93	2.16	1.50	2.12	0.95	1.03	1.63	0.50
2015	3.49	4.99	2.15	1.52	2.14	0.96	1.06	1.66	0.51
2016	3.58	5.14	2.17	1.54	2.20	0.96	1.10	1.74	0.53
2017	3.66	5.35	2.14	1.54	2.22	0.94	1.25	1.99	0.58
2018	3.81	5.58	2.21	1.58	2.28	0.94	1.25	1.99	0.58

#### 4. CONCLUSION

This paper studies the current situation, dilemmas and their countermeasures of medical nursing based on big data technology, and the following conclusions can be drawn.

(1) Use big data to guide the work of community nursing staff, so that rural medical institutions can be fully integrated with tertiary hospitals, and so that medical services such as community medical checkups can use big data to benefit a wider range of people. Realize information sharing among streets and districts, effectively solve the problem of failure to share big data resources universally in grassroots and less developed areas, and effectively rely on big data technology to improve medical facility construction and medical services.

(2) Analysis of medical nursing career development based on big data technology. The number of registered nurses per 1,000 population is 1.25, and the ratio of medical and nursing personnel is 1:0.79. In high-income countries, the number of nurses per 1,000 population is 8.1, while in upper-middle-income countries it is 4.0, in lower-middle-income countries it is 1.4, in low-income countries it is 1.0, and in all member countries the number of nurses per 1,000 population is 2.8. The number of registered nurses per 1,000 population in China is relatively low and only slightly above the level of low-income countries.

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# Research on the application of university mental health education resources in the construction of psychosocial service system based on the background of big data

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## ABSTRACT

This paper analyzes and explains the health education resources and psychosocial service system (PSS) respectively, starting from the structure of mental health education (MHE) resources and PSS in colleges and universities (CU). It also analyzed the data of psychological services in a city using the synergistic development of MHE resources in CU and the structure of PSS. The way of holding regular mental health lectures was approved by 36.34% of the residents. Thus, with the effective allocation of mental health resources in universities, the structure of social psychological service system is more diversified. It can well see the various psychological service needs of residents.

## KEYWORDS

Big Data; Mental Health; Educational Resources; Psychosocial Services

## 1. INTRODUCTION

At the present stage, people's material conditions have changed dramatically along with the current economic development and social progress, and their wealth has increased significantly. In particular, more emphasis has been placed on spiritual satisfaction, which has led to many problems in mental health, and these problems have had

an adverse impact on the physical and mental health of individuals and social harmony and stability [3-4].

The continuous development of MHE resources in CU also provides a new structure program for the PSS, using the reasonable allocation of MHE resources in CU. In turn, it helps social psychological services to become more diversified [5-6].

The structure of the PSS aims to enrich the spiritual culture of the masses, and the literature [7] argues that the structure of the PSS should be viewed from the perspective of the whole society, be oriented from the psychological needs of the society as a whole, respect and understand the psychological demands of individuals and groups, and conform to and understand the laws of psychological behavior. The literature [8] argues that the first priority of the structure of the PSS is to build a perfect mental health service network, construct a mental health service platform, and achieve extensive coverage of mental health services, and then substantially promote mental health services to achieve concrete effects. The literature [9] believes that improving people's mental health through mental health services is currently the most realistic and effective channel to achieve the goal of social psychological service system structure, and the realization of mental health services is the first priority and premise of the social psychological service system. The literature [10] argues that psychological services belong to the category of public services and public goods from the essential analysis, and the structure of the PSS should start from a comprehensive perspective of social psychology and focus on avoiding the occurrence of negative social mentality.

In order to explore the application of MHE resources in CU in the structure of PSS, this paper analyzes and studies from three parts. The first part analyzes and explains the MHE resources in CU, including the analysis of MHE, college MHE and college MHE resources. The second part is the analysis of the structure of PSS, and gives the basic content and corresponding description of the system structure. The third part is the analysis of the synergistic development of MHE resources in CU and the structure of social psychological service system, with the relevant data analysis of mental health service in a city. It mainly includes the factors affecting

the structure of PSS and the effectiveness of synergistic development using MHE resources of CU.

## **2. Analysis of MHE resources in CU**

The perfect state of mental health is the state of harmonious development, which is reflected in the harmony between human and nature, human and society, human and others, and human and self, with good physiological and psychological development functions and good social adaptability, etc., and with relatively ideal personality characteristics. The concept of mental health in the framework of multiculturalism is to examine and understand one's own psychology and the psychology of others with equality, tolerance and respect, so as to truly realize the integration and compatibility between the psychological cultural environment and the psychological ecological environment. CU should strengthen the philosophical reflection on the presupposition of psychological theories, so as to promote the dialogue and communication between different views of mental health, promote psychological theories towards meaningfulness, contextualization and depth, expand the boundaries and scope of understanding psychology, and promote and lead the continuous expansion and innovation of psychological theoretical vision. Through further optimization of the allocation of MHE resources in CU, it contributes to the structure of social psychological service system for MHE in CU.

### **2.1. MHE Analysis**

MHE originated from the West, and was initially conducted in the mode of combining theories, methods and techniques of Western psychology with local Chinese educational practices. In imitating, copying and reflecting, it slowly created and explored theories and methods in line with China's national conditions and students' reality, and gradually developed into a nationwide sensational and fervent situation of MHE.

MHE is an educational activity that promotes the overall and harmonious development of students' physical and mental health based on their psychological and physiological development characteristics, relying on psychological theories and techniques, and in accordance with specific plans and purposes. MHE is not only to use psychological knowledge to realize the meaning and value of

psychology itself, but also to cultivate a sound personality so as to enhance psychological quality and improve the quality of life.

MHE is a systematic project that requires the support of all sectors of society. The system needs to integrate various resources from the individual's psychological needs and current psychological situation, using various ways and means, and to set purposes and plans and use them for active education and counseling, ultimately promoting the harmonious development of students' personalities and thus enhancing their mental health.

## **2.2. MHE in CU**

CU provide a solid backing for the output of talents in society, and MHE in CU also makes an important contribution to maintaining the stability of society. The integration of college MHE into daily ideological and political education work is also accepted by college ideological and political educators, and MHE is incorporated into daily teaching activities and given certain credits at the same time.

MHE in CU is a kind of education that educators use theories and techniques of psychology, pedagogy and other related disciplines according to the physiological and psychological development characteristics of students. Through the MHE curriculum, MHE activities, subject penetration, psychological counseling and consultation and optimization of the educational environment and other ways and methods related to MHE. It is a kind of educational activity that helps students solve their psychological problems in the process of growth and promotes the improvement of psychological quality and healthy development of physical functions of all students.

## **2.3. MHE Resources for CU**

It is generally believed that resources are a general term for various environmental elements or things that can be exploited by human beings under certain socio-historical conditions to improve their own welfare or survival, which have some scarcity and are subject to social constraints.

For the view of MHE resources in CU, they should include human, material, financial and information resources needed to carry out educational practice activities. All the resources needed for educational practice can be called educational resources, that is,

educational resources is the collective name of various resources needed for educational practice. In this paper, the MHE resources in CU are defined as faculty members, educational funds, venues and facilities and MHE institutions.

### **3. MHE resources and PSS structure in CU**

As an indispensable and important part of the structure of social psychological service system, MHE in CU helps provide more professional talents for social psychological service system. Through reasonable allocation of MHE resources in CU, it can effectively maximize the allocation of MHE resources and help the structure of social psychological service system to a higher level.

#### **3.1. PSS**

The social psychology was introduced by the German scholar Scheffler in his book written in 1875. Marx specifically began a scientific and systematic analysis of social-psychological phenomena, and he considered social psychology to refer specifically to the psychological state embodied in society and most groups at a certain time. Social psychology includes both individual and group psychology and is characterized by its extensiveness and relative stability. Extensiveness means that it will produce a wide range of influential and group demonstration effects in the process of development, and stability means that it should have a fermentation period, growth period and disappearance period.

This paper argues that the PSS is drawn to fully meet the psychological needs of the people, improve their mental health as much as possible, cultivate a positive social mentality, and create a good social atmosphere. Combining theories, techniques and methods from multidisciplinary fields such as applied psychology and public management, it integrates resources from various government departments, social organizations, social groups, markets and other subjects through public policy adjustments and changes in governance. It is a systematic service project to calm social mentality, resolve social conflicts, prevent and control social risks, gather social consensus, and lead value orientation.



### **3.2. PSS structure basic content**

China's PSS is developed on the basis of the previous mental health service system, from focusing on crisis control at the social level to full participation in social governance. It has gradually expanded and brought into play the functions of value leadership, emotional support and emotional relief of the PSS at the macro level of society. The structure of the PSS mainly includes two elements.

The first is to establish a sound working mechanism, strengthen organizational leadership, set up a multi-departmental leading group responsible for special work, and establish a joint meeting system. Establish and improve the supervision and evaluation mechanism, the structure of PSS into the local development planning outline and supervision and evaluation of the assessment content. Focus on the implementation of education and training programs for service providers, services for patients with severe mental disorders and enhanced management mechanisms.

The second is to build diversified ways and methods of structure of psychosocial services and do a good job of platform structure. Establish and improve the education system, institutions and enterprises psychological services platform, grassroots psychological services platform, professional medical institutions mental health services platform, psychological assistance services platform, to foster the incubation of social professional institutions. Use the time, do a good job of publicity and education, to strengthen mental health science and technology publicity.

### **3.3. Analysis of the synergistic development of social psychological service system structure**

The original intention of social psychological service system structure is to practice the fundamental purpose of serving the people, and the purpose is to improve the level of mental health of the general public, promote the stability of social mentality and interpersonal harmony, make the general public more self-esteem and self-confidence, more rational and peaceful when things go wrong, and more positive life and work. This requires the concerted efforts of the government system, social organizations, the market and the general public, and the concerted governance of strengthening the MHE resources of CU

and the structure of social psychological service system should become the preferred policy.

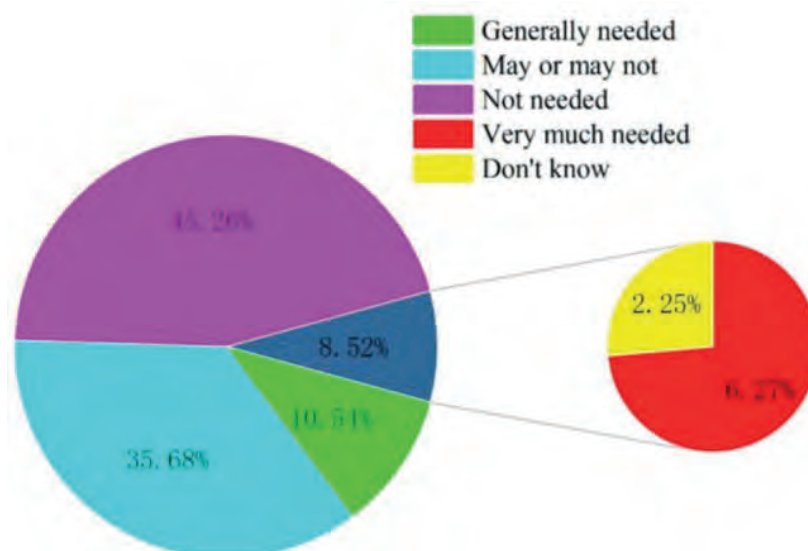
### 3.3.1. Analysis of the factors influencing the structure of social psychological service system

At present, the structure of PSS has received more and more attention, but there are still some degree of problems in the development and structure process. In order to analyze the effective measures for solving the problem, we visited a city to investigate the factors affecting the structure of PSS.

#### (1) Lack of enthusiasm for public participation

The public is the service object of the PSS, and the participation of the public is especially important to the structure effectiveness. However, through the questionnaire survey, the choice of psychological service needs is not satisfactory. The results of the survey are shown in Figure 1.

For the demand of psychosocial services, only 6.27% of people think they need it very much, 10.54% think they need it in general, 45.26% think they don't need it, and 35.68% think it is optional. This shows that most people think they do not need psychological services, or think that psychological services are optional, and the public has not yet established the correct demand for psychosocial services.



**Figure 1.** Choice of psychological service needs

#### (2) Diversification of demand for psychological services

For the masses, although the enthusiasm for participation is relatively low, there is still a certain demand for psychological services. For people who want to receive psychological services, the diversification of psychological service needs has become an obstacle to the structure of a social psychological service system. The results of the research visit for the psychological service demand of the public and the analysis of the diversified psychological service demand are shown in Figure 2.

From the survey data, the content of the public's demand for social psychological service system tends to be diversified. 14.64% want to relieve work stress through psychological services, 10.07% think psychological services can help optimize family education, 13.55% feel that psychological services can effectively improve parent-child relationships, and 6.79% want some degree of mental health status assessment. For 8.57% of the people, psychological services can help them reduce personal anxiety and relaxation, the largest proportion of the demand for psychological services to control depression is 21.51%, and there is a part of the people want to psychological counseling and improve interpersonal communication skills through psychological services, accounting for 11.16% and 13.71% respectively. This shows that the structure of social psychological service system should be more diversified to meet the different psychological service needs of different people.

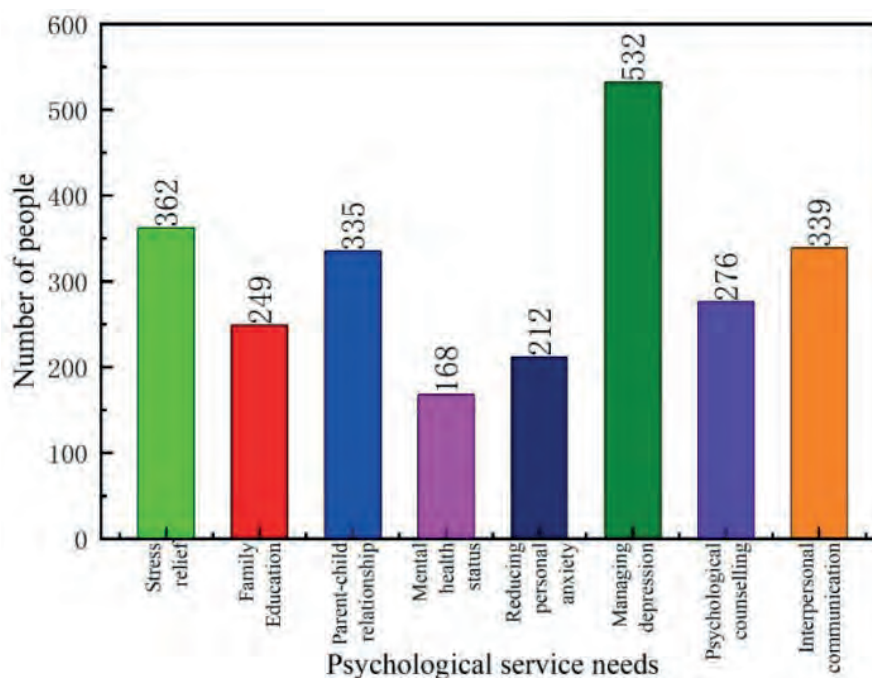


Figure 2. Results of the psychological services needs analysis

### 3.3.2. Synergistic development of MHE resources in CU

In response to the factors that affect the structure of social psychological service system, the structure of social psychological service system is helped to be more diversified through reasonable allocation of MHE resources in CU. The analysis of the effectiveness of synergistic development results of MHE resources in CU for the structure of social psychological service system is shown in Figure 3.

Through the effective allocation of college MHE resources in the structure of social psychological service system, it can better provide one-to-one psychological consultation, group psychological counseling, psychological column propaganda, network psychological consultation and hotline consultation for the masses, accounting for 16.94%, 8.72%, 11.65%, 19.37% and 6.98% respectively. And regular psychology lectures are the most chosen service method by the public, accounting for 36.34%. This shows that through the effective allocation of MHE resources in universities, more residents can be helped to realize diversified psychological service needs. Different MHE professionals can provide more diversified psychological service methods, which in turn help the residents to build a good mental health lifestyle.

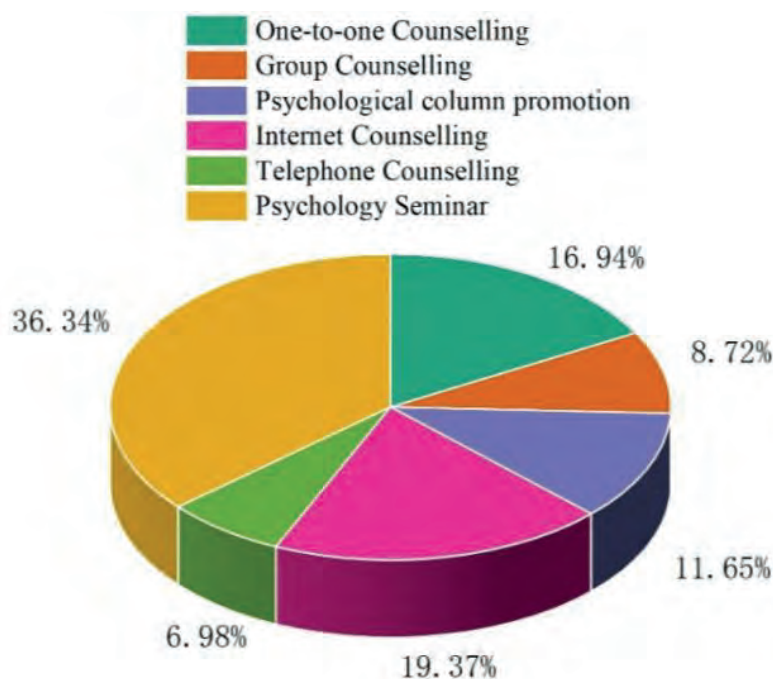


Figure 3. Effectiveness of MHE resources

#### 4. CONCLUSION

In order to explore the application of college MHE resources in the structure of PSS under the background of big data, this paper starts from college MHE resources and PSS. The effective allocation of college MHE resources and the effectiveness of social psychological service system structure are analyzed accordingly with the mental health development data of a city.

In order to make the MHE resources of CU better integrated into the structure of social psychological service system, it is necessary to reasonably allocate the MHE resources of CU so that the two can develop effectively and synergistically. In turn, it helps the social psychological service system become more diversified and realize the diversified psychological service needs of the residents.

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# Study on the information realization path of electronic cross-border commerce in rural agriculture

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## **ABSTRACT**

The implementation of the rural revitalization strategy and the extension of the Internet platform have led to the influx of policies, capital and personnel into the rural e-commerce market, giving rise to the transformation and upgrading of rural cross-border e-commerce. Taking "Internet+" as the background of the times, this paper analyzes the real problems of rural cross-border e-commerce such as unsound infrastructure, logistics service to be improved, insufficient personnel training mechanism, and lack of agricultural technology level and industrial scale. On this basis, recommendations for improving rural cross-border e-commerce infrastructure and optimizing the operation mode of rural cross-border e-commerce enterprises are given in a targeted manner. The results show that the disposable income of rural farmers who opened agricultural electronic cross-border commerce increased by 15.3%, effectively helping farmers to realize poverty alleviation. The development of rural cross-border e-commerce trade proposed in this paper facilitates the globalization of agricultural production, trade and consumption, and promotes the transformation of traditional agricultural trade into a digital trade model.

## **KEYWORDS**

Agriculture; Rural revitalization; Internet; Cross-border e-commerce

## 1. INTRODUCTION

With the continuous development of digital technology, the era of digital economy has quietly arrived. The application of digital technology has broken the limitation of global geographic space and promoted the transformation of global trade to digital trade [1]. With the continuous popularization of mobile Internet and the gradual improvement of logistics system, Chinese e-commerce gradually moves from urban to rural areas. Cross-border e-commerce in rural areas has ushered in an important development opportunity period [2-3].

At present, the global epidemic is still in the pandemic stage, and the demand for digital trade and online consumption is more urgent. As an important part of China's cross-border e-commerce, the development of rural cross-border e-commerce is conducive to building a more benign dual domestic and international cycle for agricultural products and further extending the boundaries of China's agricultural trade [4]. As the world's largest producer and consumer of agricultural products, the scale of China's agricultural trade has continued to grow in recent years, and cross-border trade in agricultural products urgently needs to expand its market through online channels [5].

With the continuous sinking of e-commerce in rural areas, the production and life patterns in rural China have undergone significant changes [6]. Taobao villages as well as rural e-commerce cooperatives have emerged, the development trend of clustering of rural e-commerce industry chains has become more and more obvious, and many individual farmers have started to try to market local products through e-commerce platforms, which has changed the traditional trade model of agricultural products [7]. In addition, to support the development of cross-border e-commerce, China has established five batches of a total of 105 comprehensive pilot zones for cross-border e-commerce, which provide extensive customs clearance, logistics, finance, exchange and information support for cross-border trade of agricultural products [8]. Meanwhile, with the continuous promotion of the development strategy of rural revitalization, various regions have introduced relevant financial support policies to encourage the development of cross-border e-



commerce agricultural trade, which has created a favorable external environment for cross-border agricultural e-commerce business in China [9].

This paper mainly elaborates the challenges faced by China's cross-border trade of agricultural products, while providing the effectiveness of further enhancing the industrial empowerment of digital economy. On this basis, targeted countermeasures are given to improve the network infrastructure of rural cross-border e-commerce, optimize the operation mode of rural cross-border e-commerce enterprises, improve the quality of rural cross-border e-commerce logistics services and construct a training system for rural cross-border e-commerce talents, with a view to promoting the realization of rural cross-border e-commerce informatization and helping rural revitalization.

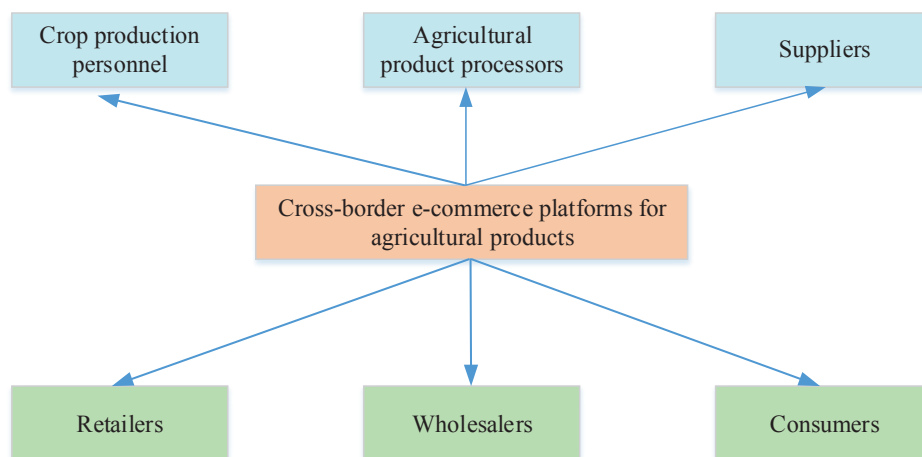
## **2. The foundation of the cross-border e-commerce ecosystem for agricultural products**

### **2.1. Network Infrastructure**

Jiangsu Province's Internet infrastructure resources remain at the forefront of the country. By the end of 2021, the total length of fiber optic cable lines in Jiangsu was 4.16 million kilometers, an increase of 170,000 kilometers over the same period in 2020, and the total length continued to rank first in the country. The total number of fixed Internet broadband access ports is 74.643 million, ranking second in the country. In terms of Internet users, by the end of 2021, the number of fixed Internet broadband access users in Jiangsu Province reached 40,716,000 (excluding broadcasting data), a net increase of 3,148,000 over the end of 2020, ranking second in the country in terms of total number of users. The household broadband access penetration rate is 115.3 per 100 households, ranking third in the country. Among them, rural broadband access users reached 15.607 million, ranking first in the country. With the perfect network facilities and high network coverage and other information technology applications continue to promote, accelerate the development of cross-border e-commerce of agricultural products in Jiangsu Province.

## 2.2. Product cross-border e-commerce ecosystem construction

Cross-border e-commerce ecosystem is defined as a "population" of individuals, organizations, enterprises or government agencies related to cross-border e-commerce activities. The cross-border e-commerce platform is used as a means and medium of communication, competition and cooperation to continuously achieve complementary advantages and resource sharing. The e-commerce ecosystem can dynamically realize the communication, sharing and circulation of logistics, trade flow, capital flow and information flow among populations and between populations and the environment. Figure 1 shows the schematic diagram of cross-border e-commerce ecosystem for agricultural products. According to the viewpoint of business ecosystem theory, the main elements in the ecosystem can be divided into four categories: leading population, key population, supporting population and parasitic population according to their respective status and role.



**Figure 1.** Schematic diagram of cross-border e-commerce ecosystem for agricultural products

The leading stock refers to the cross-border e-commerce platform for agricultural products. As the core of the whole system, the cross-border e-commerce platform not only connects the key populations and supporting populations in the system to create one-stop services, but also plays the role of coordinator and communicator. By providing platform and regulation and other related services, the leading species integrates system resources and provides an indispensable foundation for the symbiosis and evolution of the ecosystem.

The key species is the main body of transactions in cross-border e-commerce of agricultural products. Without key species, the whole ecosystem cannot function properly. Key species include crop producers, agricultural product processors, suppliers, wholesalers, retailers and consumers of agricultural products.

Support species provide support services for trade flow, capital flow, information flow and logistics in the entire agricultural products cross-border e-commerce ecosystem. Although support populations carry out activities and provide support around core and key populations, unlike parasitic populations, support populations are not dependent on the ecosystem for survival.

The parasitic populations are companies that provide support services for the cross-border e-commerce ecosystem, including operation service providers, online marketing service providers, e-commerce consulting service providers, translation companies, legal institutions, etc.

### **2.3. Optimize the operation mode of rural cross-border e-commerce enterprises**

Through in-depth study of the existing operation mode of rural cross-border e-commerce through visits and surveys, we analyze the regional characteristics of rural areas and propose a more suitable combination of "cross-border e-commerce mode + rural areas".

First, to create a hybrid model of "online + offline", the first rural 5G base station will be completed and opened in 2019, and rural areas will gradually be covered by 5G network, so a new online brand display platform + offline channels can be constructed with the realistic skills needs of physical e-commerce. At the same time, the education process should pay attention to the convergence of agriculture, farmers and professional courses, the preparation of professional teaching materials and innovative education model. In addition, we should form a rural cross-border e-commerce management system and a learner-based teaching model, optimize relevant talent training programs, use rural cross-border e-commerce scenario education, and export "finance + cross-border e-commerce + logistics" knowledge.

Second, complete the school-enterprise cooperation cultivation mechanism. The government should establish a rural cross-border e-commerce industrial park and introduce e-commerce enterprises, rural business entities, universities and students to create more practice opportunities for teachers and students. It should develop a differentiated combination incentive system and tax incentives and subsidies for e-commerce enterprises of different scales and development potentials, establish a normalized system of cooperation between industry, academia and research, and open periodic rural cross-border e-commerce vocational skills competitions.

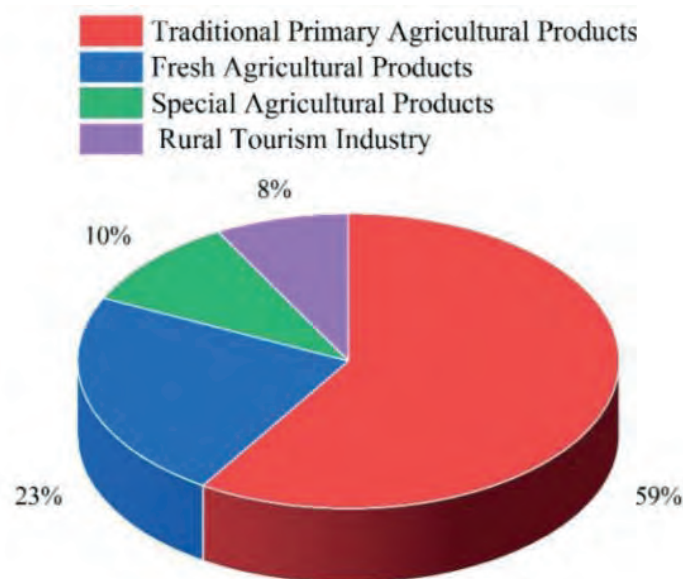
Third, construct a localized cross-border e-commerce talent training mechanism. Develop a targeted training program to cultivate local cross-border e-commerce talents by virtue of the advantages of the agricultural industry and regional rural characteristics, highlighting the actual needs of the agricultural economy. Specifically set up customized classes and practical training bases for rural cross-border e-commerce, and periodically launch rural cross-border e-commerce promotion activities to recruit industry-wide talents.

### **3. Results and Analysis of Informatization Path for Cross-border E-Commerce in Agriculture**

In recent years, as the work of poverty eradication has continued to deepen, the Yanji municipal government has been increasing the project investment in 10 poor villages and 6 key poverty-related villages. In particular, by supporting the "Internet + poverty alleviation" model to promote the industrial development of poor villages and key poverty-stricken villages as the main means, the development of rural e-commerce industry in the above 16 villages has been significantly strengthened, and 33 kinds of special brands of poverty-alleviating agricultural products have been established and focused on sales through Taobao, WeChat, Shake Live and other platforms. The layout of the industrial development of the surrounding villages has been gradually formed with the poor villages and key poverty-related villages as the center, and the industrial development of the surrounding villages has been driven by radiation.

At present, there are more than 50 types of agricultural products sold on the Internet in Yanji City, with more than 300 single products and more than 120 "three products and one standard" products. In 2020,

the online sales of agricultural products in Yanji City reached 1.224 billion yuan, with 59% of traditional primary agricultural products, 23% of fresh agricultural products, 10% of special agricultural products and 8% of rural tourism industry. 10%, and rural tourism industry accounts for 8%. Among them, among primary agricultural products, Yanbian rice ranked first in sales volume, with 10.19% of the network retail sales and greater consumer viscosity. Next, Yanbian sticky corn and Yanbian soybeans ranked second and third respectively, with online retail sales accounting for 9.8% and 8.3% respectively. Fresh agricultural products accounted for a relatively small proportion, only strawberries, apples pears, plums and other seasonal fruits. In recent years, with the deepening of the structural reform on the supply side and the integration of one, two and three industries, the Yanji municipal government has introduced a number of policies to continuously strengthen the efforts to cultivate the brand of agricultural products and the construction of quality assurance system.



**Figure 2.** Network sales of agricultural products in Yanji City in 2020

At the same time, the local combined with the tourism development strategy, and actively promote the development of rural farm caravans, suburban tourism, picking tours and other tourism industries, has achieved remarkable results. Thanks to this, Yanbian's special agricultural products such as spicy cabbage, cold noodles, rice wine, rice intestine and mingtai fish, as well as rural tourism industries have shown rapid development momentum, and the proportion of these two categories in the online retail market has

increased year by year. 2020, among the special agricultural products, spicy cabbage, rice wine, mingtai fish, etc. were among the top three, and the proportion of online retail sales were 5.4%, 5.1%, and 4.7%. In the rural tourism industry, rural tourism brands such as "small bridges and flowing water people" in Wufeng Village of Xiaoying Town and "ancient Korean villages" in Chunxing Village of Yilan Town are among the top, with the online retail sales accounting for 4% and 3.6% respectively.

#### **4. CONCLUSION**

The strategy of rural revitalization is crucial to the economic transformation of China, especially the relatively remote and backward rural areas, and to a large extent, it has added nutrients to the sprouting and growth of rural cross-border e-commerce. Relatively speaking, the rapid development of rural cross-border e-commerce is of great significance in promoting "Internet + agriculture" and practicing the rural revitalization strategy. It is noteworthy that the informationization of rural agricultural cross-border e-commerce has increased by 15.3% for rural areas, which indicates that the sustainable development of rural cross-border e-commerce requires strong support from government policies, collaborative development of cross-border e-commerce enterprises and logistics enterprises, and active participation of rural indigenous villagers and high-quality talents.

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# **The construction of a model for cultivating the rule of law thinking ability of college students in the big data environment**

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## **ABSTRACT**

Under the background of big data and comprehensive rule of law, college students are an important force in the future construction of the country. This paper firstly constructs the cultivation model of rule of law thinking ability of college students, which mainly consists of three parts: theoretical rule of law thinking ability cultivation, practical legal thinking ability cultivation, and perfect system management. Then it analyzes the reasons for the problems of the rule of law thinking ability of college students, including the deviation of the concept of rule of law thinking cultivation and the lack of teachers. Finally, the analysis of the rule of law thinking ability of college students was conducted by big data technology. The results show that 61.04% of the researched college students are interested in cell phone AAP and 46.98% are interested in WeChat microblog, and colleges and universities can cultivate college students' rule of law thinking for this purpose. This study transforms the cultivation of rule of law education for college students from legal knowledge to rule of law awareness through big data, which is conducive to promoting the cultivation of rule of law thinking of college students.

## **KEYWORDS**

Big Data; Training Model; College Students; Rule of law thinking skills

## **1. INTRODUCTION**

As the trend of globalization of big data technology develops and intensifies, the knowledge economy has become the driving force for the development of various countries and regions. Higher education institutions are an important platform for implementing quality education and promoting the all-round growth of college students [1-



2]. The education and training of university students' rule of law thinking ability has a significant effect on the promotion of legalized governance in China. Different subjects of society are actively participating in this process, positioning the starting point as the cultivation of university students' awareness of the rule of law and launching a series of publicity work on the rule of law [3-4]. Combining the improvement of teachers' quality level with cultural construction, the work of cultivating the rule of law thinking ability of college students is given a strong impetus to support, so that college students can receive more knowledge about the legal system and gain more in a good atmosphere [5-6].

The literature [7] points out the common features of college students' rule of law thinking in the context of new media and analyzes the defects of the normative practices of college students' rule of law thinking development. By exploring the "double-edged sword" effect of information technology development on the development of rule of law thinking in the context of new media, the paper proposed the correct use of new media to build a three-in-one pattern of social education, school education and family education for the development of rule of law thinking among college students. The literature [8] analyzes the current problems in the rule of law thinking of college students, explains the necessity of cultivating the rule of law thinking of college students in the context of the comprehensive rule of law, and proposes the cultivation strategy of the rule of law thinking of college students in the context of the comprehensive rule of law, so as to learn the law, respect the law, abide by the law and use the law with practical actions. Only with rich legal knowledge and good rule of law thinking can college students become an important force to promote the comprehensive rule of law, improve their comprehensive competitiveness and problem-solving ability, and better contribute to the construction of the country.

This paper firstly compares the construction, characteristics and contents of the rule of law thinking ability cultivation mode of college students, and elaborates the significance of rule of law thinking ability cultivation of college students. Then, we analyze the reasons for the problems of cultivating the rule of law thinking among college students from five aspects: deviation of the concept, insufficient teachers, thin content, single cultivation method and poor environment. Finally, based on the big data technology, the teaching content of rule of law education is enriched, the cultivation method is improved and the cultivation environment is optimized to propose countermeasures to strengthen the cultivation of rule of law thinking among college students.

## **2. Constructing a model for cultivating university students' rule of law thinking skills**

### **2.1. Theoretical rule of law thinking skills development**

First, theoretical legal thinking skills development is imaginative teaching and brain-mapping learning. This is envisioned by the tutoring style and the seminar style. One of the features of the tutor-led approach is that students are able to think in a relaxed atmosphere, and one of the features of the seminar approach is that students are able to express their opinions directly. Imaginative teaching and brain-mapping learning models take advantage of and innovate these features. Imaginative teaching is a model for teachers to teach, and it should become the dominant method for law teachers to teach. The key is to let students imagine and understand without being bound, to break through the traditional rote memorization to make abstract legal concepts or propositions tangible, and at the same time to create the right type of confusion, as if each legal concept or proposition is a visible and bouncing elf. Through imaginative teaching, on the one hand, teachers can teach with ease, and on the other hand, students can understand and reflect deeply on theoretical issues through imagination with great interest.

#### **2.1.1. Brain Map Type Learning**

Brain mapping is a model for students to develop theoretical thinking skills both in and out of class. Brain mapping is derived from "brainstorming", which is the practice of drawing on diagrams to form an unbounded mental web of human interaction with one's own mind and recording that web one by one. The key role of brain-mapping learning is that it is characterized by a non-linear philosophical effect. The effect of  $1+1>2$ .

#### **2.1.2. Gathering Style Networking**

The idea of gathering-style communication was inspired by the book club model of Northwestern University of Political Science and Law. The idea was to create a model similar to the community exchange model - a gathering exchange - because of the pressure the book club model would bring to students. The "party-style exchange" requires students and teachers to get together and talk like a family, but the content of the talk must be limited to law-related issues and matters, and the participants of the party can form a certain theoretical and logical thinking through the talk. The "get-together" should become a branded teaching model in law schools, where everyone (teachers and students alike) is a teacher and a student at the same time. The law school should invisibly consider the

performance of students and teachers in the "party exchange" as one of the criteria for evaluating the quality (quality of teaching, etc.) of teachers.

## **2.2. Practical legal thinking skills development**

The cultivation of practical legal thinking skills focuses on guiding students to actively practice, guiding them to combine theoretical thinking with practice and form a set of practical logical thinking. Based on the following considerations: First, although the legal clinic teaching model has been implemented in many law schools, it is still in the embryonic stage and not yet mature. Second, the maturity of moot court development is higher compared to the clinic style. Third, the moot court model is more virtual and does not allow students to truly feel the reality. Drawing on the merits of the legal clinic model and the degree of development of the moot court model, the legal aid moot court model was constructed in terms of practical thinking skills cultivation.

The legal aid moot court model contains two characteristics: First, it has the nature of pro bono assistance. Second, it has the nature of a moot court. Of course, the premise of whether this model can operate healthily requires law schools to promote "pro bono legal aid" both on and off campus in order to get a large number of cases. Second, although the model emphasizes student autonomy, it should also set up certain practical performance management mechanisms to prevent the model from becoming a formality. Finally, students' autonomy should play a key role, and they should clarify the importance of their own practical thinking skills and actively participate in the legal aid moot court.

## **2.3. Improve system management**

The way to cultivate college students' rule of law thinking is not all in the classroom, but permeates all aspects of students' study and life. It is necessary to cultivate a rule of law atmosphere on the campus to act according to the law and protect rights. No matter the leaders of the institution or ordinary teachers and staff, they should abide by the legal system, deal with school affairs according to the law, and be a good example and role model of governing the school according to the law, so that students will believe in the law and do things according to the rules and regulations and legal procedures. The school should pay attention to the participation of students, listen to their opinions, and incorporate their rationalized suggestions when formulating and improving rules and regulations related to students' interests. In the process of revising the rules and regulations for the implementation of disciplinary actions against students, I brought the

draft document to the classroom and let everyone discuss it in groups and give their opinions, which resulted in positive discussions and enthusiastic speeches from students. In particular, most of the students thought that the investigation of student disciplinary actions should involve not only the staff of the department concerned, but also members of the student council of the school or department, in order to ensure the fairness and transparency of the investigation. The school's sense of student ownership was created as a result of the changes made to the article in accordance with the students' suggestions. By participating in legal activities and using legal knowledge and methods to think and analyze problems in practice, students can slowly develop the habit of thinking about the rule of law and their ability to think about the rule of law can gradually improve.

### **3. Research Analysis of College Students' Rule of Law Thinking Ability Based on Big Data**

#### **3.1. Analysis of the cultivation of rule of law thinking among college students**

Figure 1 shows the main reasons for the cultivation of rule of law thinking among college students. In the information database of teachers of ideological and political theory courses in colleges and universities, an online survey was conducted among teachers of undergraduate ideological and political theory courses (hereinafter referred to as "Civics"). The data of "the main factors affecting the cultivation of the rule of law thinking among college students" show that, besides the lack of students' enthusiasm and initiative in the course, the other aspects are: first, the teachers' teaching ability, quality, theoretical level, responsibility and commitment; second, the lack of attention of the school and the unreasonable arrangement of the curriculum and class time. These are all factors that affect the cultivation of rule of law thinking of college students. Therefore, the cultivation of college students' rule of law thinking ability is weak, no matter the guarantee of school policies or the investment of funds. Due to the influence of the biased educational philosophy of university leaders, schools accordingly pay more attention to the development of teachers of professional courses. The status of "basic" course teachers in the school is not particularly important, which causes some teachers to slacken on the course teaching and lack of responsibility and commitment. Schools can hold academic seminars and lectures on rule of law education, organize rule of law education forums, broadcast rule of law-related movies and broadcasts, and encourage students to create or participate in school rule of law clubs, which can broaden students' access to rule of law

information, establish a campus culture that respects the rule of law, and effectively enhance the effect of cultivating rule of law thinking.

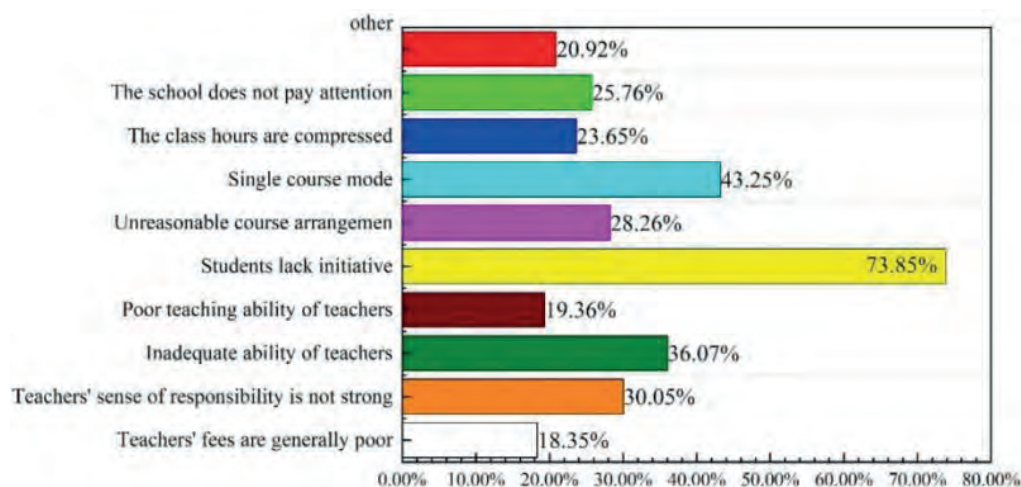


Figure 1. The Main Reasons for Cultivating College Students' Thought of Rule of Law

### 3.2. Analysis of new media teaching methods

Figure 2 shows the acquisition methods of interest to the studied college students. With the continuous development of current science and technology and network information, new media technology has been continuously integrated into our teaching. The application of new media can not only concretize abstract knowledge, but also transmit information to students in multiple channels and in all directions, increase the interest of the classroom, improve the teaching effect of the classroom, and thus achieve the teaching objectives. The application of new media technology has higher requirements for teachers' computer operation level, integration of information of materials and control of classroom teaching. By mastering this technology well, teachers not only let students learn knowledge in a relaxed environment, but also improve classroom effects. 61.04% of the researched college students are interested in mobile AAP and 46.98% are interested in WeChat microblogging, which shows that college students like to use the Internet and mobile clients to get the resources they need. Colleges and universities can make use of this way to cultivate rule of law thinking, using scattered and fragmented time to show through tools such as WeChat, QQ and Weibo, and pushing or releasing some latest events at any time so that students can understand the information in a short time. In WeChat, a small bit of legal knowledge is pushed every day using the school's official WeChat public number. In the school QQ service number, we post updates on the latest law changes and promulgations; in the official school microblog, we post stories of legal figures, legal cases and legal anecdotes, so that students can feel the

legal atmosphere in a relaxed and pleasant environment. This way of teaching is subtle and will slowly change the way of thinking of college students. At the same time, the school can also combine the hot legal events on TV and internet, and use the vividness and image of media video, image and sound to present them through catechism and micro-lesson, so that the students will be subconsciously interested in law, from which they can better grasp the rich legal knowledge points and achieve the ideal effect of rule of law education.

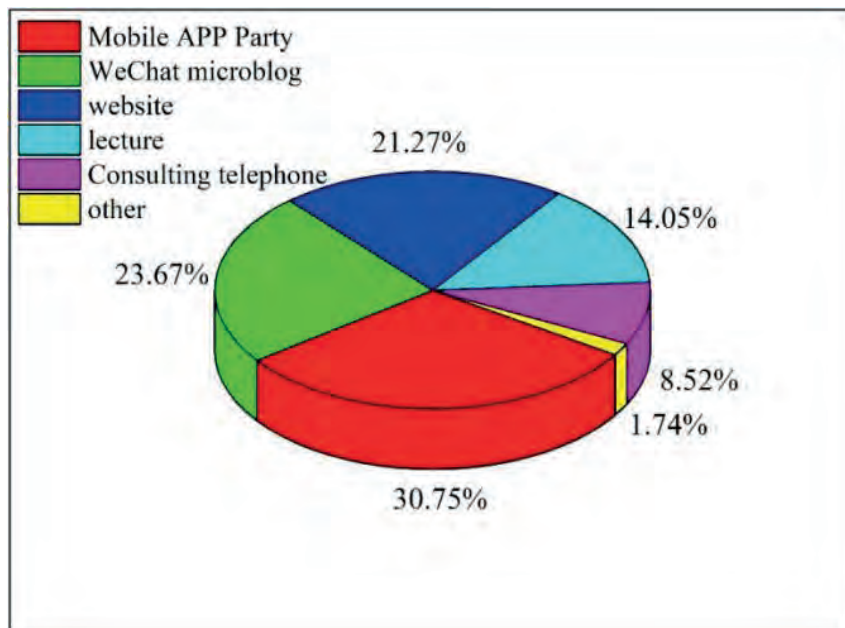


Figure 2. Acquisition methods of interest of surveyed college students

#### 4. CONCLUSION

This paper discusses the cultivation of rule of law thinking of college students from the theoretical basis of rule of law thinking and big data technology, and sorts out the concept, characteristics and contents of rule of law thinking. After analyzing the current situation of cultivating the rule of law thinking among college students, we found that 61.04% of the surveyed college students are interested in mobile AAP and 46.98% are interested in WeChat microblog. This indicates that college students like to use the Internet and mobile clients to get the resources they need. The school can combine the hot legal events on TV and internet and use the vividness and image of media video, image and sound to present them through catechism and micro-class. As long as the classroom enthusiasm of college students is enhanced and the teaching effect is highlighted, so that the students' legal knowledge, awareness of the rule of law and ability to apply the law can be improved continuously and the formation of their rule of law thinking can be promoted.

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# Application of Artificial Intelligence Technology in Teaching Painting in Universities

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## **ABSTRACT**

This paper firstly analyzes the means and ways of technology application based on the current situation of artificial intelligence technology development. Secondly, based on pedagogy and psychology, the research of distributed learning theory, constructive cognitive learning theory and situational learning theory are taken as the theoretical basis for the analysis of the feasibility of technology application in the teaching scene of painting and design universities. Finally, based on the research on the product scenario and user analysis of the current stage of the application of artificial intelligence to painting and design education in colleges and universities at home and abroad, the problems of the existing technology application are summarized and its application significance value is discussed. The results show that the application of AI technology to painting teaching in colleges and universities effectively improves students' learning efficiency by 23.6% and increases their learning interest by 33.8%. The research of this paper provides suitable application strategies for the popularization and characteristic development of the future application of AI technology in college painting and design education, and has certain practical significance for the development of social education multi-structure.

## **KEYWORDS**

Artificial Intelligence Technology; Distributed Learning; Teaching in higher education; Painting Design



## 1. INTRODUCTION

As AI technologies are widely used in more and more industries and fields, the application model of AI technologies in art and design education is undergoing a process of moving from ambiguity to clarity [1]. First of all, the dissemination of AI technologies into the field of education has been the forefront of AI applications. Image recognition, language recognition, and other processing based on AI technologies have been applied in the process of popularization and instrumentalization of education [2]. Numerous AI courses are emerging, and the wide application of AI technology in the education sector has become one of the main directions of education reform and education optimization in recent years [3-4].

The impact of AI technology on the ecology of art design has also been gradually reflected, and in 2018, Google launched the "DeepMind" AI program, which allows users to learn to draw independently and achieve artistic expression by decomposing and reconstructing many pictorial information [5]. The substantial breakthrough of artificial intelligence technology in art creation has inspired art and design professionals to explore the creation of artificial intelligence [6]. In the field of art and design, which is bound to go to the market, the impact brought by the application of AI technology is an objective existence that every art and design creator cannot ignore [7]. Moreover, art and design education based on AI technology does not reject the traditional human educational engineering with inheritance, humanity, and systemic nature [8]. Rather, it helps human beings to improve education and learning efficiency through the application of AI technology with higher efficiency, so as to better achieve the purpose of education universality, intelligence and automation [9].

This paper firstly summarizes the technical and theoretical foundations of AI technology applied to art and design education in colleges and universities, and forms the basic dimensions of the investigation. Secondly, it summarizes the current situation of the application of AI technology in college art and design education, including the change of AI technology on art and design ecology and the specific application and analysis of AI technology in college art and design education. Finally, through the analysis of textual


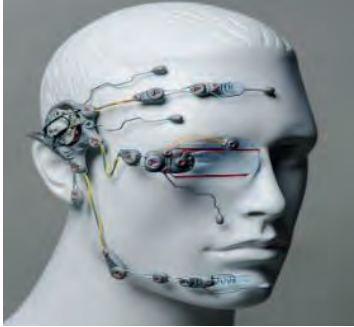

information, questionnaire data and interview results, the current situation, problems and causes of the application of AI technology in college art and design education are summarized.

## **2. Analysis of the current situation of the application of artificial intelligence in college painting education**

### **2.1. The Impact of Artificial Intelligence on the Ecology of Painting and Design**

The influence of artificial intelligence on painting and design is firstly reflected in the influence on the creation of painting and design, which is also the realistic basis for the application of artificial intelligence technology to painting and design education in colleges and universities. Thanks to the development of intelligence and automation of AI technology, the creative ability of painting, which traditionally requires a long period of painting education, can be cultivated. In the era of artificial intelligence, relying on computer algorithms, distributed learning, neural networks, natural language processing and other underlying technologies, the "painting creation ability" of AI systems can be cultivated, and this ability can create excellent paintings. Table 1 shows the impact of artificial intelligence on art and design creation.

**Table 1.** Impact of Artificial Intelligence on Art and Design Creation

The impact of artificial intelligence on the creation of painting and design	Contrast		Case Study	Impact
	Traditional	Emerging		
Innovative Artists The Creative Concept	Art from Life The content determines the form, art is the expression of the subject's emotions	The creative style of classic heirloom artists can be restored by AI technology	 <p>"The Next Rembrandt" is entered into an algorithmic system for automatic AI creation</p>	The artist expresses his thoughts on the world through artificial intelligence and cognition
Expanding and restructuring Designer community	Artistic creation is a small number of artists or design masters master designers area of expertise	Everyone is an artist Home, will design and creation community to almost all to almost all general public	 <p>Artist "Cyborg", AI intelligent system forms a super designer that empowers to every general public</p>	When human intelligence creates works superior to human hair artists continue to innovate the concept and form of creation
Innovative art design Creative approach to design Style	Artists rely on creativity and experience to create, requiring a high level of artistic education and artistic talent	A collaborative human-machine approach that gives AI systems the ability to create art independently of humans	 <p>Artificial intelligence deer class can automatically generate more than 8,000 posters in one second, which greatly develops the commercial prospect of artificial intelligence art design</p>	The creative process and results of AI can be a great source of inspiration and a huge source of material

The impact of artificial intelligence on painting creation is divided into three main aspects: first, AI technology revolutionizes the creative concept of art. Secondly, AI technology expands and reorganizes the group of designers. Third, in artificial intelligence innovates the creative method of art and design.

## **2.2. The current application of artificial intelligence in college painting and design education**

### **2.2.1. Teaching content**

The current stage of human-machine collaboration is an inefficient state of human-machine collaboration, and in March 2018, China became the second country in the world to include the development of artificial intelligence technology as a national strategic direction. This signifies that China is currently progressing from the mobile information era driven by the Internet of Things to the era of full AI applications. The ability of human-computer synergy includes the ability to integrate information of teaching materials, the ability to synergize teaching methods, and the ability to create painting and design. Due to the uniqueness of its discipline, painting and design education focuses on both the accumulation of art theoretical knowledge and the comprehensive development of creative inspiration and hands-on skills in painting. Artificial intelligence technology based on distributed learning can be well integrated into the production and creation of educational content.

### **2.2.2. Teaching Media**

Artificial intelligence technology as the framework basis and technical support of a new teaching media, virtual classroom based on VR and AR technology has become a new medium for education and teaching. With the catalyst of this medium, it is more conducive to the popularity and innovation of art and design education. In the future, artificial intelligence is responsible for the duty of imparting knowledge, teachers are responsible for the duty of educating people, and the role of teachers will be changed as a result.

The transformation of teaching media has brought new problems. since the 1990s, teachers can export knowledge to students through the use of a variety of educational media, and students can likewise meet the corresponding needs through a variety of information

channels. under the mode of AI + online education, a series of AI online class platforms have emerged at home and abroad, such as Squirrel AI, New Oriental Online, VIPKID, etc. Until July 2020, the users of mobile Internet in China reached 1.319 billion, and Chinese users occupied 32.17% of the global mobile Internet. The development of mobile Internet makes education information in the network of good and bad, so the development of teaching media, the control of educational content has become a brand new problem.

### **2.2.3. Teaching Environment**

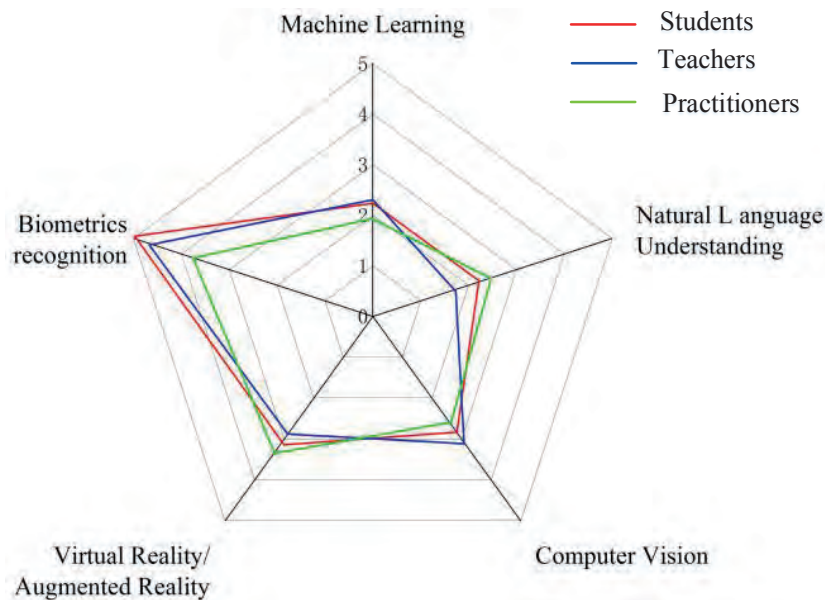
The educational environment under the application scenario of artificial intelligence technology has similarities with the teaching environment in the traditional sense. Analyzed from an objective perspective, the new teaching environment is the basis for carrying out art and design creation, and the objective environment determines the discovery and burial of artistic creativity, and its application changes are mainly divided into the following three aspects.

(1) The physical environment is explained from a narrow perspective, with the development of network technology, virtual reality technology and augmented reality technology. The physical environment of education has been transformed from specific locations such as classrooms and creative workshops to learning environments that can support inter-temporal interaction and contextual experiences.

(2) Broad resource acquisition environment, online information blowout In the network era, the Internet of Things and mobile Internet have become the bearers of information resources. "Beili Beili" is the largest multicultural community in China, which includes communities about art, education and other related areas. "Zhihu, a high-quality Q&A community in China, gathers top commentators in the art, history, technology, and education industries on the Chinese Internet. By selecting two platforms, "Beili Beili" and "Zhihu", to study the information resources in the teaching environment, we found that the speed and popularity of video resources are much higher than that of textual information resources. In terms of audience's understanding of the content, textual information brings a stronger sense of impact.

### 3. Findings and Analysis of Artificial Intelligence in College Painting Education

The statistics for which AI technologies are most likely to be applied to college art and design education are shown in Figure 1. It can be seen that: the top three are natural language understanding (AI translation, question and answer system, etc.), computer vision (image understanding, 3D vision, dynamic vision, machine vision, etc.), and biometric recognition (face recognition, iris recognition, palm pulse recognition, etc.), which are close to each other, accounting for 30% or less. This indicates that from the perspective of students, teachers and practitioners, these three AI technologies are currently the most suitable for application in the field of art and design education.



**Figure 1.** Statistics of art and design education in higher education

For what AI-related technologies have been used in current learning/teaching/work, the statistics show that: computer vision (image understanding, 3D vision, dynamic vision, etc.) has the highest percentage of users, with the highest contribution from practitioners in comparison, indicating that this AI technology is used most frequently among practitioners. The second highest ranking is natural language understanding (AI translation, question and answer system, etc.), in which the highest percentage contribution is from students, indicating that the application of AI technology by the student group is mainly focused on natural language understanding.

The proportion of teachers' applications of the five technologies is more evenly distributed.

On the whole, AI-related technologies have gained a certain degree of popularity in the field of painting and design in colleges and universities, and specific application tools and application environment have been initially formed, and the auxiliary functions for art and design learning and teaching have been initially revealed.

With regard to the attitude of applying AI technology to art and design education in domestic colleges and universities, the statistical results show that the highest percentage of respondents said "AI technology will be fully applied to art and design education". Among them, the proportion of students contributed the most, but the proportion of students, teachers and practitioners all contributed similar values. It means that most of the respondents are optimistic and open to the application of AI technology in art and design education in colleges and universities, and the percentage of "AI technology will assist to complete part of art and design education" is the second highest.

#### **4. CONCLUSION**

This paper discusses the issues related to the application methods, application processes and application techniques of artificial intelligence technology in art and design education in colleges and universities. Through the comparison of the existing application results, application methods and application contents of domestic and foreign universities, the teaching tools, teaching methods and teaching concepts of art and design education are substantially studied. In addition, this study also carries out quantitative research and analysis on the interest attitude, cognitive degree and practice way of applying AI technology to art and design education in colleges and universities through the research questionnaire method.

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# The Construction of Student Management System in Universities Based on Artificial Intelligence Technology

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## **ABSTRACT**

The article firstly discusses the application of artificial intelligence technology in the student management system platform of colleges and universities. In this process, universities should actively take measures to promote the construction of student management platform, establish scientific management concept, improve management system and strengthen the construction of data management faculty, so as to promote the innovation of student management system in universities. Based on the analysis of student management personnel leaving based on artificial intelligence technology, it can be learned that: the lowest leaving rate in the four years from 2009 to 2012 was in School D in 2012, but its leaving rate also nearly reached 5.2%. In this study, we use the advantages of artificial intelligence technology to improve student management in colleges and universities to ensure the efficiency of school management.

## **KEYWORDS**

Artificial Intelligence Technology; High School Students; Management System Platform; Work efficiency

## 1. INTRODUCTION

Applying artificial intelligence in the field of education is conducive to improving traditional teaching patterns and mechanization, promoting personalized education, and fostering innovative thinking talents [1-2]. Calculations with traditional manual statistical analysis of data are slower, have a higher error rate, and are difficult to perform for long periods of time without interruption, while the use of computers allows for faster, more accurate, and longer uninterrupted work [3-4]. With the strong support of artificial intelligence technology, statistical analysis of all aspects of student information is efficient and accurate. By analyzing and mining the big data of students, artificial intelligence can develop a set of scientific and reasonable, personalized educational programs based on the understanding of each student's learning characteristics to provide higher quality education for students, thus promoting the development of education [5-6].

Based on the historical characteristics of the development of artificial intelligence technology and the objective rules of student management in domestic universities, the literature [7] conducted a preliminary brief study on the development trend of artificial intelligence in student management in the future. The literature [8], in the context of AI technology, can improve the skills and ideological awareness of student work managers in colleges and universities, establish the awareness of Internet big data, improve the quality and ability of student cadres team, improve the student management system, and make student management work smoothly. Literature [9] uses artificial intelligence technology to do a good job in student management in order to make the school management more standardized, make the school better and better, and cultivate more excellent talents for the Party and the country.

This paper firstly introduces the relevance of artificial intelligence technology and teaching management application, and proposes a new concept of student management in colleges and universities under artificial intelligence environment. Colleges and universities should establish strategic goals that are compatible with the environment, adhere to the human-oriented concept in the management process, break through the internal hierarchy and implement borderless management, and establish equal and

democratic management relationships among students. The article concludes with an analysis of students' psychological problems based on artificial intelligence technology, which can understand the psychological state of college students nowadays and accordingly provide positive psychological counseling to students, thus contributing to their having a healthy psychological state.

## **2. Artificial Intelligence Technology**

In the era of artificial intelligence, modern information technology has the prospect of deep integration in all aspects of school education and teaching work. The student management data platform collects student behavior data such as student leave, absenteeism, rewards and punishments, etc. The use of AI-related technologies to discover and analyze data trends, intrinsic laws, etc. can provide new ideas and methods for school rectification work. Artificial intelligence is a branch of computer science whose goal is to use computer technology to simulate, extend and expand human intelligence and to produce machines with a certain level of intelligence. In addition to computer science, artificial intelligence involves many other disciplines, and through the combination with the needs of various fields, it generates a "comprehensive knowledge base", makes intelligent strategy analysis, and forms an intelligent system with "information → knowledge → intelligence" conversion mechanism as the core. In this way, it is possible to solve the problems of certain fields of work in order to provide intelligent services for the national economy, society, culture, education and other fields, and thus further promote the modernization of various industries.

### **2.1. Building a student management system**

With the development of information technology, the role of various education information platforms in supporting education teaching management and improving education services has become increasingly significant. As a fundamental resource of various educational information platforms, student data plays a crucial role in supporting in-depth analysis, scientific decision-making, real-time warning and feedback, self-diagnosis and improvement in education and teaching management. Building a student management system based on artificial intelligence, collecting student data from the source, aggregating, organizing, analyzing, mining and sharing

student data, and improving data feedback capabilities are conducive to scientific decision-making for school diagnosis and improvement. With the help of the platform, regular and automated periodic independent diagnosis and improvement can be realized, while the effective implementation and operation of teaching diagnosis and improvement work can be supported by multi-level and multi-dimensional means through information technology, which can promote the modernization of the school's internal governance capacity and thus further improve the quality of school teaching and management services. Colleges and universities should accelerate the construction of student management system platforms, actively introduce advanced information technology and build management data information platforms. At the same time, the existing resources within the school should be integrated and its characteristic development structure should be adjusted, and thus the fragmented data should be effectively saved into the student management system.

## **2.2. Structure and role of the student management system platform**

The student management system platform has a data layer that aggregates raw data and a functional layer with various management modules. The functional layer includes modules for school orientation management, dormitory assignment, class management, leave approval, award and loan management, student activities on campus, student internship and employment management, etc. It brings together the management data of the whole learning and life cycle of students from enrollment to departure. The amount of data generated by students in the school is huge, including basic personal information such as students' names, gender, birthdays and nationalities, academic information such as the date of enrollment, classes and majors, family information such as home address and parents' siblings, dormitory information such as floor and bed numbers, academic information such as study courses and exam results, as well as daily leave approval and cancellation information, scholarship and loan information, internship and employment information, etc. There are many different items and categories. Some of these categories have a high frequency of data generation, such as leave and cancel information, information on participation in

activities and rewards and punishments, which results in a large amount of data generated by each student from enrollment to departure. It is very difficult for schools to aggregate and manage the data of thousands or even tens of thousands of students at the same time, and it is impossible to personalize the management and services for each student's data, and even more difficult to conduct further data analysis and decision-making. This will lead to student data, although it has been continuously generated, but only dormant in the database, can not play the role, and the use of artificial intelligence technology, can solve the above problems.

### **3. The application of student management in universities based on big data and artificial intelligence technology**

#### **3.1. Application in student management**

The key group of people in the college student management system is college students. The college student management system is a dynamic data process from when students first enroll to after graduation, which contains many elements of information service and provides the most original data for the future development of colleges and universities. At the stage of students' initial enrollment, it is possible to make use of big data and artificial intelligence technology to count various data and information of enrolled students, so as to prepare and provide the best solutions for orientation work. For example, the dormitory allocation of college students can be reasonably allocated with the help of big data and artificial intelligence technology. It can divide the enrolled students into more basic information such as their majors, regional cities, nationalities and interests, and provide the best solution for students' dormitory assignment. In student security management, it can identify suspicious people and lawless elements around the campus in a timely manner with the help of face recognition technology, intelligent access control, intelligent establishment equipment and artificial intelligence system, so as to provide a high-quality campus environment for students and effectively protect the life and property safety of teachers and students in colleges and universities.

#### **3.2. Application on teaching mode**

Big data and artificial intelligence for college student management system services are reflected in the teaching mode, which reverses

the teacher's dominant position in traditional teaching and puts students' future development needs as the first priority, so that students' learning is more closely related to the cultivation of abilities. With the introduction of big data and artificial intelligence technology, students can learn teaching resources through online courses or simulate practice and develop various abilities through artificial intelligence. This technology also facilitates communication between teachers and students outside the classroom and enables interactive teaching and learning exchanges. Through these technologies, teachers can also use the platform to exercise their authority and further understand how students usually learn in online courses. Students can also use the intelligent platform to sign in, write assignments, and listen to class punch cards and other works. The application of this teaching mode can greatly facilitate students' learning life, and also actively drive students to take the initiative to learn and strengthen the ability to absorb knowledge.

### **3.3. Analysis of students' psychological problems**

Figure 1 shows the analysis of students' psychological problems. We can get: only 8% of students who have psychological problems turn to counseling, other ways of psychological relief are telling parents (22%), confiding in friends (23%), self-regulation (17%), and seeking help from teachers (7%), all of which are effective ways of psychological relief. The data also show that 23% of the respondents believe that even if they encounter psychological problems, they will only keep them inside and will not tell anyone, which can easily lead to students' psychological disorders that cannot be channeled and depression that cannot be relieved, resulting in psychopathology. When students encounter psychological problems, they will make their self-confidence drop, which requires teachers or counselors to help them overcome their psychological barriers and find self-confidence again according to their specific situations. The lack of psychological counseling facilities and equipment as well as personnel in colleges and universities makes students with psychological problems not get proper care and help, and psychological problems are not solved and treated in time, even causing undue tragedies, which seriously affects the healthy growth of students.

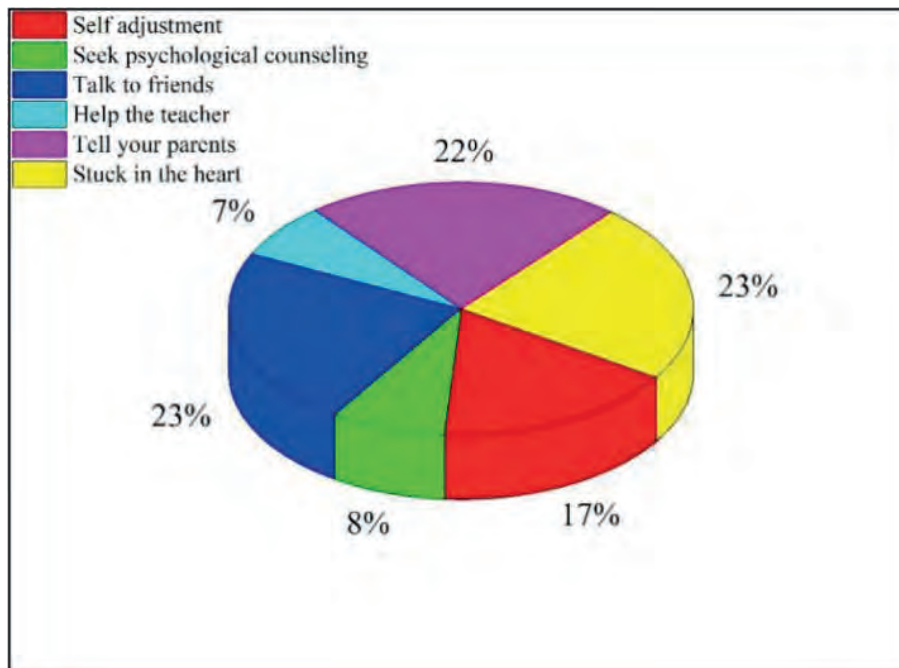


Figure 1. Analysis of students' psychological problems

### 3.4. Analysis of student managers' departure in colleges and universities

Table 1 shows the departure of student managers in colleges and universities. Although the departure rate of college counselors is decreasing year by year, it seems that the overall stability of college counselor team is not high. In the four years from 2009 to 2012, the lowest turnover rate was in School D in 2012, but its turnover rate also nearly reached 5.2%, which is still a relatively high rate. The growth cycle of a counselor takes about 3-5 years, and their departures inevitably cause schools to hire new teachers who are young and have no management experience to rush into the job. Although these young teachers are enthusiastic about their work, they lack experience and are not familiar with the laws of student management, so they can only rigidly apply the school's rules and regulations, and their management methods are too dull. The unstable counselor team causes discontinuity in student management and makes it difficult to implement the school's rules and regulations. Frequent changes of counselors also have a great impact on the students they manage, making them lack ownership and a sense of collective honor, and making class discipline lax, making it difficult to form a class collective with strong cohesion. Some capable counselors see this position as a springboard to get civil service, graduate school and find a better job, so it is difficult to do their job

well. The replacement of counselors has become a common occurrence in private universities, which brings great difficulties to student management.

**Table 1.** Resignation of university student management personnel

school	2009	2010	2011	2012
A	8.30%	7.80%	4.50%	2.10%
B	8.90%	8.60%	5.50%	2.80%
C	8.30%	9.30%	7.80%	5.50%
D	6.50%	6.90%	5.50%	1.90%
E	7.20%	9.10%	4.90%	3.50%

#### 4. CONCLUSION

Based on the historical characteristics of the development of artificial intelligence technology and the objective rules of student management in domestic universities, this paper analyzes the necessity of the application of artificial intelligence in student management in universities. The following conclusions can be drawn.

(1) Based on the analysis of students' psychological problems by artificial intelligence technology, it can be seen that only 8% of students who have psychological problems turn to psychological counseling, other ways of psychological relief are telling parents (22%), confiding in friends (23%), self-regulation (17%) and asking for help from teachers (7%), which are effective ways of psychological relief, and through artificial intelligence technology can clearly understand Each student's psychological problems, so as to carry out targeted psychological counseling and establish correct values of life for students.

(2) The analysis of the situation of college student management personnel based on artificial intelligence shows that although the departure rate of college counselors is decreasing year by year, the overall stability of the college counselor team seems to be low, and its departure rate is nearly 5.2%. According to the artificial intelligence technology, it can accurately and quickly control the feedback of the departure rate of college counselors, so as to improve the efficiency of school management.



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# Application of Big Data Technology in Intelligent Teaching Guidance of Rehabilitation Therapy Technology Major

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## **ABSTRACT**

Cardiopulmonary physical investigation is a significant part of the core course of rehabilitation therapy technology (RTT) in colleges and universities. In this paper, we designed and developed AR teaching software based on augmented reality intelligence technology to simulate the real cardiac physical examination, and designed and realized the real-time interactive visualization application software for the cardiac physical examination part of the medical-related professional diagnosis course. The abstract and difficult theoretical course content was transformed into virtual reality content that is easy to understand and visualize, and real-time interaction was realized. The results show that AR technology can improve students' interest in learning RTT by 23.93%, effectively break through the difficult points of teaching RTT, and improve students' performance in RTT by 15.28%. The AR teaching proposed in this paper is applied to the teaching of higher vocational RTT to enrich teachers' teaching means, improve teaching effect, increase students' learning interest, and have a positive impact on improving students' performance in RTT.

## **KEYWORDS**

Cardiopulmonary physical examination; Rehabilitation Therapy Technology Program; AR Teaching; Real-time interaction

## 1. INTRODUCTION

With the progress of modern education technology, the utilization of augmented reality technology (AR-T) has also commenced to infiltrate into the field of education, and the New Media Consortium of the United States has twice registered AR-T as an innovative technology that will have a weighty influence on modern education in the Horizon Report [1]. AR-T has gathered many worthwhile experiences in a variety of learning modes, such as game learning and collaborating learning, and has positively and efficiently combined digital teaching resources and the real world, and has produced popular educational products such as AR books, AR educational software and AR educational games [2-3]. Thus, the growth of AR-T has placed a respectable substance for its utilization in the ground of education.

The rehabilitation therapy technology (RTT) profession is a science about space, and the RTT profession has characteristics such as regional and comprehensive, involving a large time scale and space scale, and the abstract subject characteristics increase the learning difficulty [4]. AR-T can cover the abstract, especially the geographic knowledge with large time and space scale, real three-dimensional in the actual environment, and the students can be immersive in the increased truth world to observe, experience and understand knowledge, creating advantageous conditions for teaching RTT that are difficult to be compared with other technologies [5]. Faced with the speedy increase of AR-T, teachers should take a confident attitude to encounter the occasions and tasks that AR-T brings to the education of RTT majors [6].

The utilization of amplified truth technology provides educators with brand novel teaching tackles. At the same time, it stimulates students' interest in learning novel knowledge and allows them to stimulus novelty through hands-on experience [7]. Therefore, the utilization of augmented reality in the education industry is a new leap in the progress of educational technology, which creates an environment for independent learning [8]. The traditional "teaching for learning" learning style has evolved into a novel learning style in which students acquire knowledge and skills through a novel information-based environment and tools, which is in line with the educational

perception of the novel teaching reorganization and helps to grow core professional skills and literacy of medical students [9].

In this paper, through a questionnaire survey of students and an interview survey of teachers, we learned about the recent teaching status of RTT majors in colleges and universities, the possibility of applying AR-T in the teaching of RTT majors, and the analysis of teachers' and students' attitudes toward the utilization of AR-T in the classroom of RTT majors. Based on the statistical analysis, the utilization case of AR-T in teaching was designed with reference to the cardiopulmonary physical examination of RTT majors in conjunction with the actual teaching in colleges and universities. Using an accurate experimental research method, classroom teaching experiments were implemented in experimental and control classes of the same level, so as to verify the effectiveness of AR-T applied in teaching RTT majors.

## **2. AR intelligent teaching software system module design and implementation**

The software construction design was completed according to the front-line teaching needs, the practical components to be realized and their supplies were analyzed, and the basic system movement design, software visualization design and collaboration design were completed based on the head-mounted augmented reality device to develop and realize the teaching software for RTT. By importing the operation in the wearable AR device, the real-time interactive visualization utilization software of the diagnostic part of the diagnosis course involving medical profession was designed and realized.

### **2.1. AR-T requirements for visual design**

Visualization is one of the most important elements of AR software. The visualization design of the software needs to fully consider various factors. In the RTT program, the cardiac auscultation part is one of the most representative contents of diagnostics, and its traditional teaching methods are.

(1) Showing the auscultation zone of each valve of the heart on the body surface.

(2) Introduce the changes in auscultatory sounds caused by valve lesions and ask students to visualize the variations in lesions based on their knowledge of cardiac anatomy.

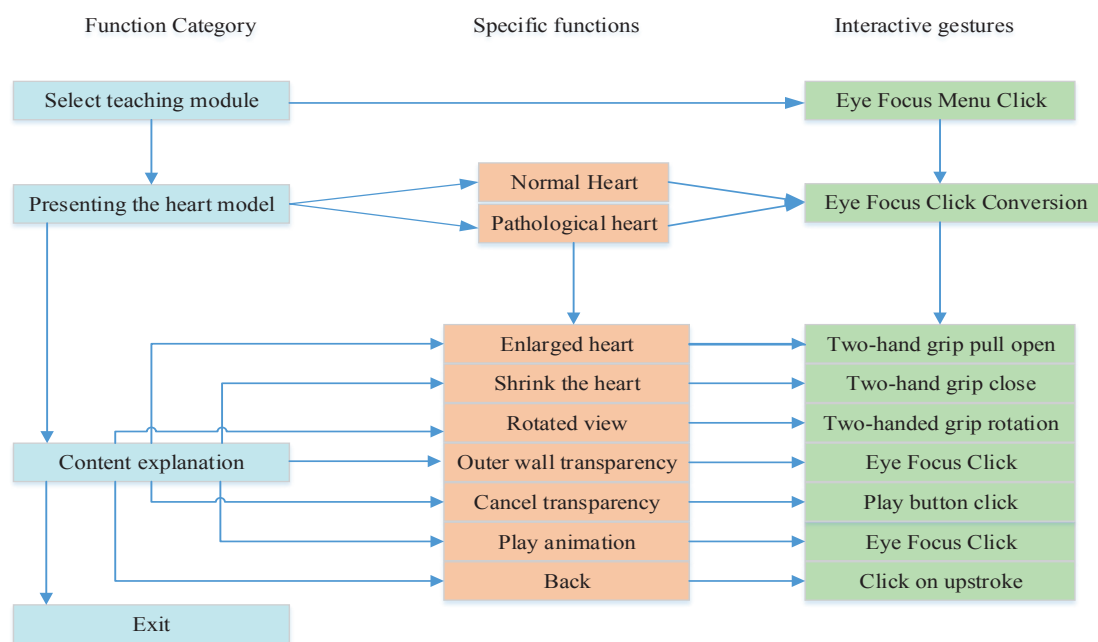
(3) To infer the status of the lesion back from the abnormal heart sounds, multiple associations, transformations, and inferences are made, which has always been the focus and difficulty of teaching diagnostics.

The software reasonably introduces augmented reality technology into the theoretical teaching of the auscultation course, and uses AR-T to project the heart in three dimensions into the classroom. The AR glasses are used to receive and operate through the somatosensory control system to show the teaching content to students, effectively visualizing and concretizing the abstract theoretical knowledge and reducing the trouble of teaching and learning. The conforming dynamic 3D models were established, in which the establishment of the heart model needs to consider aspects such as the visual fineness and realism of the heart model, whether the storage and modification of information can be fed back to the background database in a timely manner. These aspects, because they involve dynamic molding of numerous mutual heart sickness states, are considered in terms of efficiency and material reusability, and the group chose to model some major constructions in the heart separately (left atrium, left ventricle, right atrium, right ventricle, and each valve). Then they are combined in the run, and the modeling can be run in different disease states by simply modifying the affected lesion sites. However, since it is a dynamic model, the separate modeling may have extremely small-time transformations during the dynamic display, which may gather to a non-negligible level if repeatedly played several times. Therefore, in order to achieve a good display effect, this paper chooses to completely re-model all the different disease states to guarantee the display effect as much as possible.

## **2.2. Real-time interaction methods related to teaching content**

The current real-time collaboration methods that head-mounted augmented reality devices can recognize. Voice collaboration can recognize keywords, and gesture collaboration mainly includes clicking, grasping, moving, zooming in, zooming out, rotating, playing

and other functions. The AR teaching software for cardiac physical examination of RTT can present the teaching contents used for teaching through the above collaboration methods. The teacher can design the model projected by the control according to the functional characteristics of the head-mounted augmented reality device to show the abnormal blood flow status in valve lesions from multiple angles for students to observe, thus improving the efficiency of teaching and learning. The specific collaboration design of the software is shown in Figure 1.



**Figure 1.** Real-time collaboration design

### 3. Results and analysis of the utilization of AR intelligent teaching in RTT program

#### 3.1. Statistics and analysis of examination results

Through the analysis of the results of the preliminary survey, a teaching experiment program was developed based on the current situation of teaching RTT to students in a college. At the end of the experiment, the RTT test was used to compare whether there was a significant difference between the performance of the experimental class and the control class in RTT. To find out whether the subjective factors such as interest in learning RTT and learning effect of the students in the experimental class changed through questionnaire survey. The interview survey was used to find out whether AR-T

could help teachers overcome the shortcomings of the traditional teaching model and whether it could play a role in facilitating teaching.

The results of the analysis according to SPSS software are shown in Table 1. It can be seen in the statistical data that the mean scores of the experimental class (Class A) and the control class (Class B) in RTT were 64.28 and 56.37, respectively, and the mean difference between the two classes' post-test scores was 6.25, which was significantly higher than the mean difference of the pre-test RTT scores. The independent sample test data are shown in Table 2. It can be seen that the Levene's test of equivalence of variances significance was  $0.688 > 0.05$ , which means that the condition of assuming equal variance holds. The Sig (two-tailed) =  $0.026 < 0.05$  with reference to the assumed equal variance indicates that there was a significant difference between the post-test scores of the experimental and control classes in rehabilitation therapy techniques within the 95% confidence interval.

Comparing the statistics before and after the experiment, it can be seen that before the teaching experiment began, there was no significant difference between the geographic scores of the experimental and control classes, indicating that the students in both classes were basically at the same level of rehabilitation therapy techniques. And at the end of the experiment, the RTT scores of the experimental class were significantly higher than those of the control class. Through the analysis of the experimental results, we can get the conclusion that AR-T applied to the teaching of RTT can improve students' learning achievement in RTT.

**Table 1.** Statistical results of geographical posttest score group

Classes	Number of cases	Mean	Standard Deviation	Standard error mean
Class A	48	64.28	11.25636	1.69289
Class B	47	56.37	10.56952	1.57493

**Table 2.** t-test results of independent samples of geographical posttest scores

	Levene's variance equivalence			Mean Equivalence t-test			Difference 95% confidence interval test	
	P-value	Significance	t-value	Free	Sig.	Mean	Lower limit	Upper limit
Equal variance	0.163	0.698	2.296	87	0.026	5.239	0.6565	9.8738
Unequal variance			2.289	86.32	0.027	5.239	0.6512	9.8535

### 3.2. Statistics and analysis of questionnaire survey data

The professional performance of RTT can only be used as an aspect to evaluate the effectiveness of AR-T utilization in teaching RTT. In order to increase the scientificity and accuracy of the evaluation of the experimental results, questionnaires and interviews were conducted with teachers and students of the experimental class respectively after the experiment to understand the utilization effect of AR-T in improving students' interest in learning RTT and breaking through the difficulties of teaching RTT.

The survey results showed that 89% of the students expressed interest in the teachers' utilization of AR-T in teaching, 9% of the students expressed indifference, and 2% of the students were not interested. Compared with the conventional teaching method, 95% of the students prefer teachers to apply AR-T to assist teaching, while 5% of the students prefer the conventional teaching method. In terms of learning interest, 70% of the students thought their interest in learning geography had become stronger after the teachers used AR-T, 25% of the students thought their learning interest had not changed much, and 5% of the students thought their learning interest had become weaker. In terms of classroom attention, 66% of the students thought AR-T could sometimes attract their classroom attention, 25% thought AR-T always attracted their attention, and 9% thought AR-T could not attract their attention. The above data show that most students are more interested in the utilization of AR-T in the classroom. Compared with the conventional teaching methods, students prefer teachers to apply AR-T for teaching, and the utilization of AR-T can effectively improve students' interest in learning RTT and attract students' attention in the classroom.



#### **4. CONCLUSION**

In today's comprehensive information age, the utilization of AR intelligent technology in the professional teaching of RTT in colleges and universities is the trend of the times and an innovative move to reshape the classroom. In this paper, to verify the teaching effect of AR intelligent technology applied in the teaching of RTT, two classes with the same level of learning in the teaching of RTT were selected as experimental subjects for the experiment. Under the premise of ensuring the same control variables, the experimental class applied AR-T to assist teaching, while the control class used conventional teaching methods. After the experiment, the teaching effect was evaluated by analyzing the test scores, questionnaire results and interview findings of the teaching in RTT. The results showed that AR-T could improve students' interest in learning RTT by 23.93%. AR-T could effectively break through the difficult points of teaching RTT. AR-T could improve students' performance in RTT by 15.28%.

#### **5. FUNDING**

Project establishment certificate : Department of Traditional Chinese and Mongolian Medicine, Ulanqab Medical College , WLCBYZJ202305

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# Application of agricultural water and fertilizer integrated automatic control system in farming operation

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## ABSTRACT

The water and fertilizer integrated automatic control system in this paper is based on wireless communication technology, which connects the wireless communication module to the core controller PLC of the variable fertilizer applicator. The cell phone APP or computer website can control the fertilizer applicator from a distance in order to complete the command control of data dynamic monitoring, switching control, fertilizer application amount setting, water and fertilizer mixing and pump start/stop. The use of water-fertilizer integration can substantially improve the utilization rate of fertilizer, which can reduce the amount of fertilizer by about 40% per year, and the annual water volume per hectare is only 30%-40% of that of furrow irrigation, with cost savings of 6,000-9,000 yuan. Through water and fertilizer integration automatic control system, it can reflect the water demand condition of crops more comprehensively, save the cost and effectively realize water-saving irrigation and precise fertilization.

## KEYWORDS

Water and fertilizer integration; Wireless Communication; Automatic control systems; Dynamic data monitoring

## 1. INTRODUCTION

Traditional heliostat greenhouses are mainly used for irrigation and fertilization of crops by hand, but the lack of a scientific theory of fertilizer distribution and application by farmers has led to serious waste of water and fertilizer [1]. Water and fertilizer integration system is a modern agricultural technology that can apply water and fertilizer to crops simultaneously through pressure pipes [2]. This technology delivers water and fertilizer mixture through a network of pressure pipes and applies water and fertilizer to crops by means of drip and sprinkler irrigation to achieve efficient use of water and fertilizer [3-4]. The use of agricultural water-fertilizer integration technology can significantly reduce the amount of fertilizer, improve the rationality of water and fertilizer use, reduce nutrient losses in the soil, and enhance the mobility of N, P, and K in the soil [5].

The literature [6] and other scholars studied a set of adaptive optimal irrigation monitoring schemes, which laid the theoretical foundation for the subsequent progress of smart agriculture. Literature [7] and other scholars designed a farm irrigation system capable of remote control and monitoring. The literature [8] researched and proposed an intelligent irrigation system based on open source technology, which focuses on sensing ground parameters such as soil moisture, temperature, and environmental conditions to make real-time predictions of farm irrigation needs and to make automatic irrigation decisions based on this information data. In the literature [9], it is pointed out that Palestine has introduced water-fertilizer integration technology from Israel, and after nearly two decades of application and improvement it has been used in more than 97% of vegetable production in the Jordan River Gorge region, while more than 87% of farms have achieved a significant increase in production efficiency with the help of this technology, putting Palestine at the forefront of agricultural development in the world.

The water and fertilizer integrated remote automatic control system proposed in this paper consists of fertilizer dilution system, uniform mixing system, remote automatic control system, monitoring system and field sprinkler irrigation system, and applies data acquisition, data processing, wireless communication and intelligent control technologies. It consists of programmable controller, wireless

communication module, touch screen, and components such as EC, pH sensor, pressure sensor, solenoid valve and pump to form a complete system. Local control of the fertilizer applicator is realized through the touch screen, and the fertilizer applicator can be controlled from a distance to complete relevant commands with the help of cell phone APP or computer website.

## **2. Water and fertilizer integration automatic control system**

### **2.1. System Composition**

The water-fertilizer integration remote automatic control system is mainly composed of 4 parts: fertilizer dilution system, uniform fertilizer mixing system, remote automatic control system, monitoring system and field sprinkler system. The fertilizer dilution system realizes the dilution and supply of different types of fertilizers and the filtration of impurities in the water-fertilizer mixture through fertilizer drums, mixing pumps, water injection pipes and fertilizer suction switch filters. The uniform fertilizer mixing system includes water inlet channel, fertilizer suction channel, fertilizer mixing channel, water-fertilizer mixing and fertilizer application channel and fertilizer application pump, which can complete the mixing of different fertilizers in proportion and the stable delivery of water-fertilizer mixture in high lift. The remote automatic control system includes PLC, wireless communication module, relay, touch screen, cell phone APP or computer website. The system under off-site through cell phone APP or computer website, local through the touch screen to send commands, can realize the control of fertilizer mixing, fertilizer suction and mixing, timed start of fertilizer suction program. The monitoring system consists of a touch screen, pressure sensors, EC sensors, pH and gauges equipped with 3 types of sensors. The touch screen is able to display the EC value, pH value, water pressure value and other functional options during operation. The field sprinkler system is mainly composed of delivery mains, solenoid valves, spraying components and field pipe network.

### **2.2. System working principle**

The water and fertilizer integrated remote automatic control system is based on PLC as the core, with remote communication module, 1 fertilizer applicator as 1 remote control object and 1 equipment code set. After the wireless communication module is connected to the

network, each variable in the system can be viewed through the cell phone APP or computer website to control the solenoid valve switch of the fertilizer applicator, the start/stop of the fertilizer pump and mixing pump and set different fertilization programs, etc. At the same time, the relevant data monitored is transmitted to the cloud platform, which can be viewed by users in real time on the cell phone APP or computer website.

## **2.3. Important system components and key technologies**

### **2.3.1. Water and fertilizer integrated fertilizer applicator**

The water-fertilizer integrated fertilizer applicator is equipped with control system, monitoring system and uniform fertilizer mixing system. The control software is used to control irrigation, fertilizer application and dilution of fertilizer solution when working. Combined with the data analysis of sensors on the concentration and pH of water and fertilizer mixture, the corresponding fertilization plan is formulated. When the crop does not need to be fertilized, the fertilizer pump can be turned on for water replenishment to achieve high head irrigation. The overall piping of the fertilizer applicator consists of UPVC pipes with an inner diameter of 25.20mm connected. The core components of fertilizer suction on the water-fertilizer integrated fertilizer applicator are mostly venturi type, and SSQ-200 jet pump is selected as the fertilizer suction component. The principle of fertilizer suction by jet pump is that when the water with certain pressure passes through the conical nozzle, the water velocity changes rapidly and a negative pressure is generated in the cavity. Under the action of external atmospheric pressure, the fertilizer solution is sucked into the jet pump, and the centrifugal pump transports the water-fertilizer mixture along the pressure pipe to the field, thus realizing water-fertilizer mixed irrigation.

When the jet pump is used as a fertilizer suction device, the numerical size of the flow ratio  $q$ , pressure ratio  $h$  and fertilizer suction efficiency  $\eta$  are used to indicate the strength of its performance.

$$q = \frac{Q_s}{Q_n} \quad (1)$$

Where  $Q_s$  is the inlet flow ( $m^3 / s$ ),  $Q_n$  is the working fluid flow ( $m^3 / s$ ).

$$\eta = q \frac{h}{1-h} \quad (2)$$

The jet pump conforms to Bernoulli's equation and the continuity equation when it is used as a fertilizer sucker to suck fertilizer.

Bernoulli's equation is :

$$\frac{v^2}{2g} + \frac{p}{\gamma} + Z = C_1 \quad (3)$$

The continuity equation is :

$$v \cdot A = C_2 \quad (4)$$

If you do not count the various losses in the suction line, the suction volume can be calculated by equations (3) and (4) derived as follows:

$$Q = \sigma \cdot \sqrt{-2g \left( h + \frac{p_2}{\gamma} \right)} \quad (5)$$

According to the above formula, the flow rate sucked into the jet pump changes with the change of vacuum at the throat. Only when the  $h + \frac{p_2}{\gamma} \leq 0$ , that is, when the pressure inside the jet pump is less

than the atmospheric pressure, the fluid inside the jet pump will be sucked in, and thus achieve the effect of fertilizer absorption.

### 2.3.2. Control System

As the hub of the whole system, the PLC plays an important role in information acquisition and data processing of the system. According to the functional requirements of the fertilizer applicator, the number of its input bits and output bits are determined. In addition, the touch screen and 3 kinds of sensors and PLC all adopt 485 communication method, the wireless communication module connects and communicates with PLC through network cable, and the solenoid valve of fertilizer suction pipe controls its switch through pulse signal. According to the above needs, Siemens series industrial products S7-1200PLC is selected as the controller, and the program is written with

the help of PORTAL V15 programming software, and the program is written in the form of ladder diagram.

The wireless communication module is selected as an important tool to realize remote control, and the supporting development tool is selected as ZKTools for setting the project of ZKG-2R3E wireless communication module. the relationship of variables is set in ZKTools software, and the PPI protocol is set to communicate with the PLC and associate with the data inside the PLC. The variable name and variable value are set on the remote control interface, and the project file is downloaded to ZKG-2R3E through ZKTools. After inserting the cell phone communication card inside it and communicating with PIC, remote control as well as SMS alarm can be realized by logging in the corresponding device code in cell phone APP or computer website.

### **3. The effectiveness of water and fertilizer integration in farmland**

#### **3.1. Balanced water and fertilizer, saving fertilizer and labor, with obvious agricultural efficiency gains**

The water-fertilizer integration technology of irrigation and fertilizer application is fast and has high nutrient utilization rate, which can effectively avoid the problem of volatile loss and slow dissolution caused by fertilizer application in the dry topsoil layer. In particular, it avoids the problem of volatilization loss of ammonium and urea, nitrogen fertilizer applied on the surface, which not only saves chemical fertilizer but also helps environmental protection. With the water-fertilizer integration system, you only need to open the valve and close the electric gate to directly deliver the fertilizer needed by the crop to the roots of the plant evenly with water. The use of fertilizer, water and pesticides in integrated water-fertilizer and furrow irrigation is shown in Table 1. The crop "drinks slowly and carefully", which greatly improves the utilization rate of fertilizer, can reduce the amount of fertilizer by about 40% per year, and the annual amount of water per hectare is only 30%-40% of the furrow irrigation. At the same time, greatly reduce the problem of water pollution caused by excessive fertilization in vegetables and orchards. Water-fertilizer integration saves 40%-50% of fertilizer compared with traditional technology fertilization, and the same field can save about half the cost of fertilizer expenditure. The amount of pesticides per hectare is



reduced by 15%-30%, saving 10-15 laborers and saving 6000-9000 RMB.

**Table 1.** Comparison of water and fertilizer integration and furrow irrigation

		Orchard	Vegetable Garden
Amount of water used	Water and fertilizer integration	759 t/hm <sup>2</sup>	2348.4 t/hm <sup>2</sup>
	furrow irrigation	2300 t/hm <sup>2</sup>	6180 t/hm <sup>2</sup>
Amount of fertilizer	Water and fertilizer integration	457 kg/hm <sup>2</sup>	384 kg/hm <sup>2</sup>
	furrow irrigation	843 kg/hm <sup>2</sup>	671 kg/hm <sup>2</sup>
Amount of pesticide	Water and fertilizer integration	9.43 kg/hm <sup>2</sup>	7.94 kg/hm <sup>2</sup>
	furrow irrigation	11.35 kg/hm <sup>2</sup>	9.07 kg/hm <sup>2</sup>
Cost	Water and fertilizer integration	12135Yuan	16348Yuan
	furrow irrigation	18274Yuan	25460Yuan

### 3.2. Temperature and humidity control, disease mitigation, and protection for facility agriculture

It is due to the adoption of water and fertilizer integration, vegetables, melons and fruit winter has been guaranteed. Both control the amount of watering, reduce the humidity, but also to improve the ground temperature, to avoid excessive watering caused by the crop compost, yellow leaves and other problems, to play a certain role in temperature control and humidity regulation of the facility agriculture. Many diseases of crops in the greenhouse are soil-borne diseases, which spread with the flow of water, such as pepper blight, tomato blight and so on. The use of water and fertilizer integration can directly and effectively control the occurrence of soil-borne diseases, reduce the humidity in the shed and reduce the occurrence of diseases.

## 4. CONCLUSION

Water and fertilizer integration technology through artificial quantitative control, to meet the needs of the crop in the critical growth period "eat and drink enough", to eliminate any deficiency

symptoms, according to the different crop needs design, the water, nutrients at regular intervals, according to the proportion of direct provision to the crop. Therefore, the production can achieve the goal of good crop yield and quality. According to research and analysis, the use of water-fertilizer integration technology can reduce the annual fertilizer dosage by about 40%, and the annual water volume per hectare is only 30%-40% of the ditch irrigation, compared with the traditional technology of fertilization to save 40%-50% of chemical fertilizer, the same field can save about half of the cost of chemical fertilizer, pesticide dosage per hectare reduced by 15%-30%, saving 10-15 labor, saving costs of 6000-9000 yuan .

## **5. FUNDING**

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# Application of Artificial Intelligence Technology in Cultivating Innovative and Entrepreneurial Talents of College Students

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## **ABSTRACT**

This paper starts from the necessity of artificial intelligence (AI) technology for the cultivation of innovative and entrepreneurial talents in colleges and universities, and analyzes its practical significance and characteristics. Then it analyzes and explains the strategy of cultivating college students' innovative and entrepreneurial talents, including the analysis of the current situation of college students' ability dimensions and the analysis of the influence of AI technology on college students' employment. Finally, the reform direction of college students' innovative and entrepreneurial talents cultivation mode is given. Innovative teaching methods and the introduction of teaching equipment are the main ones, accounting for 13.65% and 12.78% respectively. Thus, AI technology can effectively influence the innovation and entrepreneurship (IAE) talent cultivation mode of college students, and can help colleges and universities realize the all-round cultivation of talents.

## **KEYWORDS**

AI Technology; College Students; Innovation and Entrepreneurship; Talent Development

## 1. INTRODUCTION

Using AI, big data technology and cloud calculating technology to promote the "intelligence+" strategy and the optimization and upgrading of traditional industries to achieve high-quality economic expansion is an important strategy for China's industrial expansion and economic transformation [1-3]. Universities have the important mission of providing high-quality technical and skilled talents for China's industrial upgrading and expansion [4]. With the continuous progress of society and quick expansion of science and technology, AI technology has been gradually applied to various industrial fields, replacing part of the traditional manual work [5-6]. AI has also brought some influence to traditional college education, bringing challenges and opportunities for innovation and change of college talent training mode [7].

Every wave of industrial revolution and the alteration and advancement of industry will put forward higher level and higher-level demand for talents, thus promoting the change of talent cultivation mode [8]. AI, as a new focus of international competition, guides the expansion of all fields of society in the track of intelligence. The application and in-depth expansion of AI in the engineering field has changed the traditional industrial production method and put forward new supplies for the competence structure of engineering talents [9]. As the main base for cultivating and outputting engineering talents, colleges and universities should timely and accurately grasp the changes of social demand for engineering talents, constantly adjust and reform the talent cultivation mode, and deliver engineering talents meeting the requirements for the market [10].

In order to explore the submission of AI technology in the cultivation of college students' IAE talents, this paper analyzes and researches from three parts. The first part explains the necessity of AI technology in the cultivation of innovative and entrepreneurial talents in colleges and universities, including its practical significance and cultivation characteristics. The second part is the analysis of the cultivation strategy of college students' innovative and entrepreneurial talents, including the study of the recent situation of college students' ability dimensions and the analysis of the impact of AI technology on college students' employment. The third part is the reorganization analysis of

college students' innovative and entrepreneurial talents cultivation, using AI technology to analyze and explain the reform of talents cultivation mode, so as to verify the tender of AI technology in college students' innovative and entrepreneurial talents cultivation.

## **2. The necessity of AI technology in the cultivation of IAE talents in universities**

The publication of the Expansion Plan of New Generation AI established the national expansion strategy of AI, which not only creates new chances for the future expansion of Chinese industries, but also puts forward higher requirements for the training mode of college students. AI is mainly the study of the basic concept, method and technology of how to pretend human intelligent performance by using software and hardware.

With the extensive operation of AI technology in various fields of social life, the technology is no longer restricted to simply pretending human performance, which means that with the continuous expansion of AI technology, technical skill talents must continuously improve their learning ability, especially the innovation ability will become the core quality to encourage the sustainable expansion of talents. On this basis, higher education in the era of AI should actively encourage the cultivation of innovative and entrepreneurial talents, taking into account the needs of economic transformation and industrial upgrading.

### **2.1. The Relevance of Integrating AI Technology into College Talent Training**

In the era of AI, the talent cultivation mode of colleges and universities needs to be reformed accordingly. Every technological innovation will bring updates of teaching tools and evaluation methods to the education industry, and AI technology will become the driving force of talent cultivation in colleges and universities. AI technology can also have a significant impact on talent allocation and resource sharing, bringing beneficial effects on talent cultivation in colleges and universities. AI technology not only puts forward new requirements for talent cultivation, but also has an impact on the teaching methods and teaching environment of colleges and universities, and provides a more comfortable learning environment for students.

The wide operation of AI technology will change the mode of talent cultivation in colleges and universities. Talent cultivation in colleges and universities must combine the demands of the market and enterprises to carry out model reform and focus on guiding students to improve their own innovation and creativity. At the same time, the operation of AI technology in various scenes changes the way of talent training in colleges and universities, from traditional classroom teaching to students can learn anytime and anywhere, the learning practice environment for students will be more efficient and convenient.

## **2.2. Characteristics of AI Technology for Talent Training in Universities**

### **(1) Characteristics of Lifelong Learning**

The incorporation of AI technology makes it necessary for talent to develop and advance in order to scientifically develop expansion plans and help companies optimize their business processes. In the expansion process, technically skilled personnel can accumulate knowledge and improve their capabilities, as well as innovate according to the needs of AI expansion. At the same time, their knowledge structure, comprehensive ability and moral quality also need to be constantly improved in order to adapt to the changes of the times and help the expansion of the "Smart+" era. This requires them to actively understand advanced information technology and market needs, and maintain a lifelong learning character.

### **(2) Characteristics of sustainable expansion**

Lifelong learning of talents includes continuous improvement of their knowledge reserves and business levels to achieve lifelong expansion goals. The expansion of AI needs the support of talents. The characteristics of continuous expansion can meet the different needs of different positions and realize the sustainable expansion of talents. The rapid expansion and innovation of science and technology have put forward higher requirements for technical skill talents, which requires such talents to always maintain a learning attitude of keeping up with the times. Through continuous learning, they can improve their adaptability to changes in the industry and market, innovate continuously according to the expansion needs of enterprises, and improve their business ability and professionalism.

Although high quality technical skill talents have high technical level and comprehensive ability, they still need to have strong ability of continuous expansion and learning ability, and continuously strengthen their learning and strive to improve their personal ability while the times are progressing.

### (3) Systematic characteristics

In the expansion process, highly qualified technical skill talents need to maintain continuity and systematization in order to gradually improve their abilities. Taking the career planning of college students as an example, the lifelong expansion plan needs to have a certain degree of continuity in order to help high-quality technical skill talents to get gradual improvement and growth, and finally become composite technical talents. High-quality talents must learn relevant technologies and knowledge systematically to meet the needs of technical positions and lay a good foundation for promoting enterprise expansion, economic expansion and social progress. Through the systematic accumulation of professional theoretical knowledge and practical skill experience, the practical skills and comprehensive quality of high-quality technical skill talents will achieve gradual improvement, which will help form a situation of promoting high-quality economic expansion with technological innovation. Therefore, high-quality technical skill talents must recognize the current expansion situation, actively align with the digital economy and AI era, and always maintain continuity and systematization in the learning and employment process in order to continuously adapt to the needs of economic and social expansion.

### **3. Analysis of Innovation and Entrepreneurial Talent Cultivation Strategies for College Students in High Schools**

The rapid expansion of AI technology has brought significant changes to the labor market, and AI will replace more and more jobs. With the continuous expansion of AI technology, higher education should face the future and keep pace with the times. Colleges and universities must accelerate the transformation of talent cultivation mode and cultivate innovative technical skill talents needed by society.



### **3.1. Analysis of the current situation of competency dimensions of college students in higher education**

The analysis of college students' competency dimensions can be more helpful to solve the problems that arise in the process of talent cultivation in colleges and universities. Under the competence dimension of college students, there are five main elements including teamwork, communication and expression, language ability, critical innovation and lifelong learning. The results of the survey research and data analysis in the form of self-rating are shown in Figure 1.

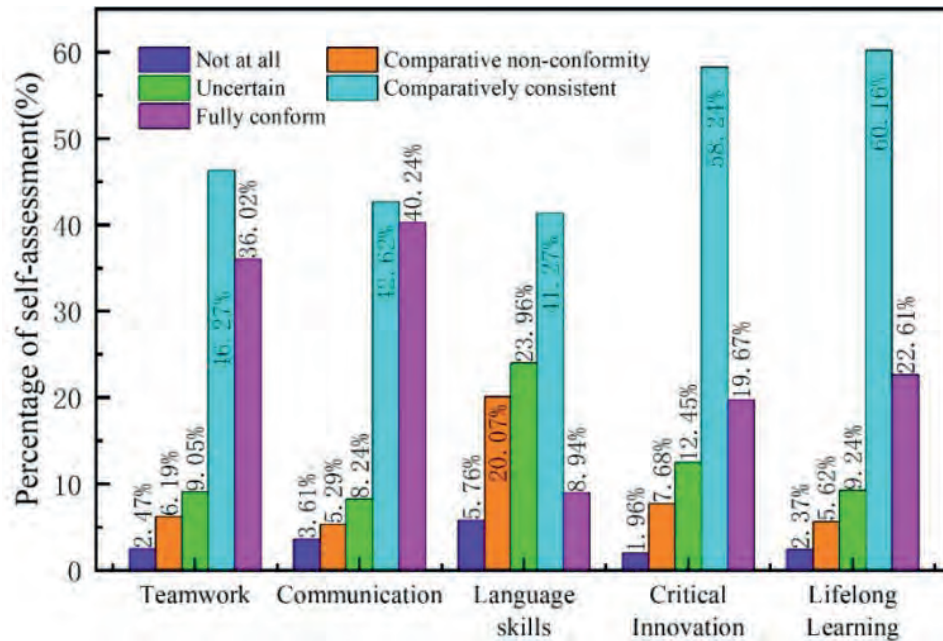
In terms of teamwork, 36.02% of students believe they are fully capable of working with others and coordinating within a team. 46.27% of students believe they are capable of leading teamwork in most cases. Only 2.47% of the students are not very good at cooperating with others and organizing team projects. The current teamwork ability of college students is generally good, but it needs to continue to be improved. In the era of AI, it is not only necessary to focus on teamwork, but also to strengthen the ability of human-computer collaboration.

In terms of communication and expression, 40.24% of the students chose "fully meet" and 42.62% chose "relatively meet" respectively. This indicates that most of the college students have good communication and writing skills, and can communicate well with others and complete the writing tasks related to their majors.

In terms of language ability, only 8.94% of the students think they can use foreign languages for international communication, and 41.27% of the students think they are not fluent enough to communicate with foreigners, and their speaking ability is lacking. With the deepening of globalization and internationalization and the increasingly close communication between different countries in the world, the foreign language ability of talents is especially important.

In terms of critical innovation, only 19.67% of students believe that they are fully aware and capable of critical innovation, flexible in their thinking, and able to reflect and make adjustments to specific situations in a timely manner. More than half (58.24%) of the students have the awareness of critical innovation, but they are still lacking in how to innovate.

In terms of lifelong learning, 60.16% of college students have the awareness of independent learning and lifelong learning, and can actively learn new knowledge. Only 2.37% of college students think they have no awareness and ability of lifelong learning at all. This indicates that talents have a strong concept of lifelong learning.

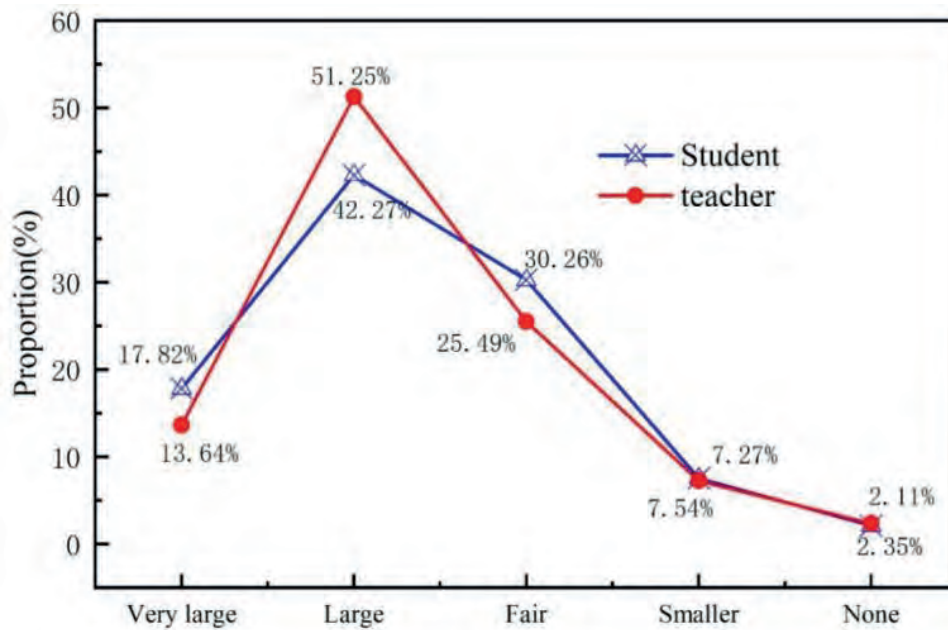


**Figure 1.** Analysis of the current state of the competence dimension

### 3.2. Analysis of the Impact of AI Technology on College Students' Employment

The expansion of AI has encouraged the upgrading and transformation of industrial structure and broken the balance of supply and demand in the traditional job market. Figure 2 shows the survey on the impact of the expansion of AI technology on the employment of college students, more than half (55.81%) of the students think that the expansion of AI technology has a great impact on the employment of college students. 45.31% of the teachers also hold the same view, and 16.41% of the teachers and 12.56% of the students think it has a very great impact. Only a few students and teachers think that the expansion of AI technology has no impact on the employment of college students. It can be seen that both students and teachers have recognized the impact of the expansion of AI technology on the innovative employment of college students.

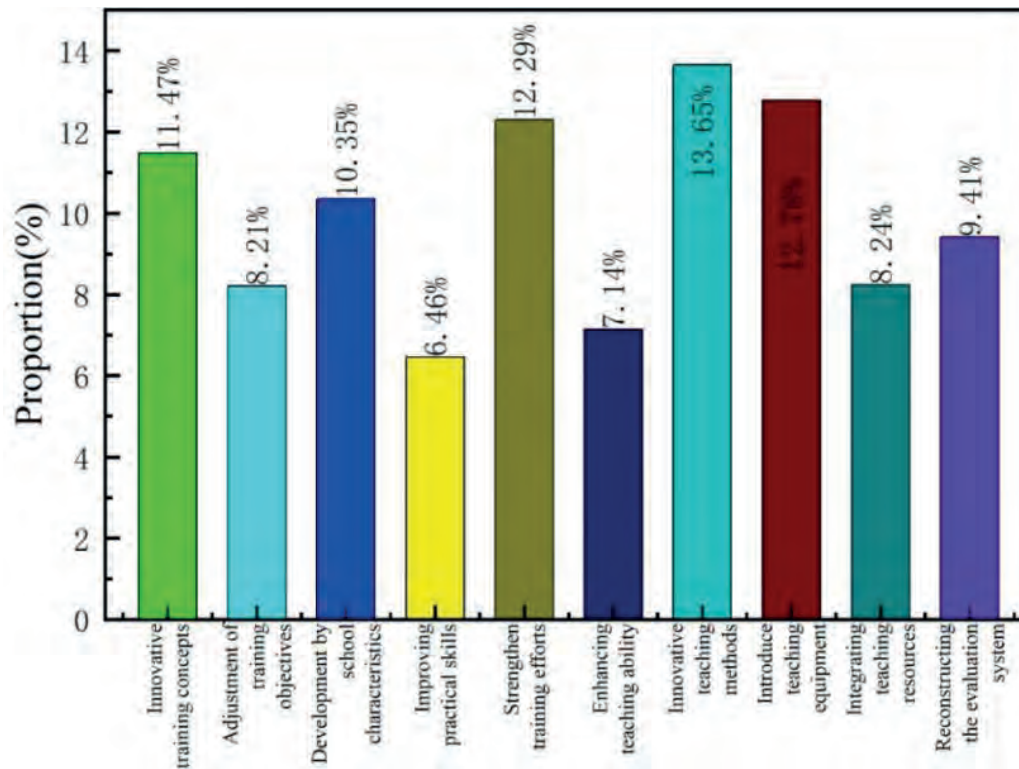
It can be seen that both students and teachers have recognized the impact of the expansion of AI technology on the innovative employment of college students.



**Figure 2.** The impact on the employment of university students

### 3.3. The reform of innovation and entrepreneurial talent cultivation of college students in higher education

A strong education is a strong country, and first-class education and first-class talents are powerful supports and guarantees for national strength and national rejuvenation. Reforming talent cultivation mode and improving the competence of engineering talents in the new era are the core and key to improve the quality of engineering talents cultivation, and the cornerstone to adapt to the expansion of AI technology and encourage the new round of scientific and technological revolution. Aiming at the operation of AI technology in the cultivation of college students' IAE talents, the analysis of its talent cultivation mode reform is shown in Figure 3.



**Figure 3.** Analysis of talent training model reform

The integration of AI technology into the reform of college students' IAE talent cultivation can make corresponding changes to talent cultivation in all aspects. Through AI technology, the talent cultivation mode of colleges and universities begins to change into innovative cultivation concept, adjusting cultivation goal, developing with school characteristics, improving practical ability, strengthening training, improving teaching ability, innovating teaching methods, introducing teaching equipment, integrating teaching resources and reconstructing evaluation system. The most prominent of the reform is the innovative teaching methods accounting for 13.65%, only the teaching methods in line with the expansion of AI technology can better meet the expansion of AI era. Next is the introduction of teaching equipment accounted for 12.78%, in addition to good methods also need good equipment to help college students improve their practical skills. Thus, AI technology can well help colleges and universities to carry out the reform of college students' IAE talent training mode, making college students more in line with the talent needs of the AI era.

## 4. CONCLUSION

AI is the new focus of current international competition and the new direction of the world's future expansion. Talents are the core human support to encourage the progress of science and technology, and it is the responsibility and mission of higher engineering education to reform the cultivation of engineering talents under the expansion demand of artificial intelligence in order to meet the trend of the times. This paper focuses the perspective on the demand of AI expansion on talents' competence in colleges and universities, and under the guidance of AI technology, data analysis is carried out on college students' competence dimension, employment impact and reform of talent cultivation mode. In this way, a systematic investigation and research on college students' IAE its cultivation mode under the background of AI technology is launched.

## 5. FUNDING

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# Reform and Practice of Integrating Mathematical Modeling Ideas into the Teaching of Public Mathematics Courses in the Context of Educational Informatization

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## ABSTRACT

This paper first introduces the connotation of mathematical modeling and the classification of mathematical modeling ability levels, and discusses the necessity of cultivating mathematical modeling ability. Then the current situation of integrating mathematical modeling ideas into the teaching of public mathematics courses is analyzed, and its problems are analyzed in terms of teaching materials, teaching methods, interaction between students and teachers and teaching effects, and reasonable reform measures are proposed. Finally, the effectiveness of the reform practice is evaluated in terms of comprehensive grades and teaching feedback. In terms of students' experience of participating in mathematical modeling, 79.2% of them think that their awareness of applying mathematics to think about problems has increased, and 53.8% think that their computer application skills have been improved. Thus, the method proposed in this paper can improve the efficiency of public mathematics classroom teaching and strengthen the integration of mathematical modeling ideas with the classroom.

## KEYWORDS

Education Information Technology; Mathematical modeling; Teaching Reform; Public Mathematics Classroom

## 1. INTRODUCTION

Mathematics is one of the subject knowledge that students must accept, which can develop students' thinking and enhance their innovation consciousness, and has a very important role in their future development [1-2]. Nowadays, many mathematical problems are abstract and students cannot solve them from the surface meaning, so introducing modeling ideas into mathematics teaching can deepen students' understanding of overall mathematical knowledge, master and understand mathematical knowledge through modeling, and improve teaching quality and efficiency [3].

The literature [4] presents their exploration and practice on the introduction of mathematical modeling ideas in calculus teaching by exemplification study. The literature [5] classifies mathematical modeling competencies into three levels. The literature [6] suggests to integrate the mathematical modeling ideas into the applied undergraduate teaching, so as to solve the problems existing on teaching materials, students, teachers and teaching methods, expire students' interests of learning and abilities of solving practical problems by theoretical knowledge, and meet the applied undergraduate institutions' demand for talent cultivation.

In the literature [7], the former suggests that students should be given a proper subject position in mathematical modeling teaching, while the latter advocates student-centered "scenario" teaching to stimulate students' interest in learning, and suggests that mathematical modeling teaching must be carried out in stages. In the paper [8], a survey was conducted to analyze the mathematical modeling ability of first-year students, and six obstacles affecting students' ability in mathematical modeling were proposed, and a three-stage, multi-method teaching experiment was conducted to give some valuable suggestions. The literature [9] suggests applying Mathematical Modeling ideas and methods to teaching by introducing the Mathematical concept, proving theorem and explaining exercises.



This paper discusses the current situation of integrating mathematical modeling ideas into the teaching of public mathematics courses in the context of education informatization, some problems, and measures and suggestions for reform. The paper is divided into three parts for discussion. The first part explains the connotation of mathematical modeling and the grade classification of mathematical modeling ability, and illustrates the importance of cultivating mathematical modeling ability. The second part discusses the current situation of mathematical modeling teaching and the reform measures, analyzes the problems in teaching and proposes corresponding reform measures. The third part is the evaluation of the effectiveness of reform teaching practice, and discusses the effectiveness of reform measures in terms of comprehensive grade evaluation, teaching effect feedback, and curriculum suggestions.

## **2. The integration of mathematical modeling ideas into the teaching of public mathematics courses status and reform**

### **2.1. The connotation of mathematical modeling ideas**

Mathematical modeling is the construction of a mathematical structure by a specific mathematical method with a real object as the target in public mathematics teaching. The most important feature of mathematical modeling is that it simplifies complex problems and abstracts concrete problems. It focuses on solving problems from their essence, hoping to obtain the most convenient way to solve them. The process generally consists of several parts: analysis of the problem, model assumption, model solution, result analysis, result verification, and application. From this process, it can be seen that mathematical modeling is a process of abstracting concrete mathematical problems, and it can be said that it is the best medium between mathematical problems and practical problems, realizing the process of "mathematization". The introduction of modeling ideas frees students from the learning of theoretical mathematics, makes them realize the practical role of mathematics in real production and life, truly combines mathematics with the field of study, and brings the productivity of mathematical knowledge into play.

## **2.2. A three-level classification model for mathematical modeling proficiency levels**

The three-level division model of mathematical modeling divides students' mathematical modeling ability into three levels, and within each level specific requirements are made for students' analytical problem solving ability, problem solving ability, presentation ability, and communication ability, respectively. In addition to the curriculum standards promulgated by the state, many scholars also classify mathematical modeling into three levels. Table 1 shows the three-level model.

**Table 1. Three-level model**

	Level 1	Level 2	Level 3
Correctly understand the meaning of the question	Must discuss with classmates or with instructor before completing task	Can find information from real-world problems and translate it into problems that need to be solved	Be able to elucidate missing and useless information, identify conclusions and the degree of openness.
2. select the variables and find the connection between them	Must discuss with classmates or be prompted by instructor to complete	Can identify key variables and show the relationships between them	Can independently find relationships between variables and abstract them into appropriate models using formulas
3. solve mathematical models	Can solve problems after prompting	Can work with mathematical problems, but cannot optimize models	Can independently solve mathematical problems, evaluate and improve models.
4. communicate modeling results in writing and orally	Written reports are well organized and can communicate orally with appropriate encouragement	Can express results independently and clearly.	Can express results independently and clearly, and creatively
5. Simple applications	Can solve real-world problems that can be handled directly with mathematical formulas	Can translate between mathematical language and ordinary language	Can solve classical or general modeling problems.
6. Integrated application	Can transform real-world problems into mathematical problems and answer them	Can solve realistic problems using distinctive mathematical methods and interpret and test the results	Can optimize problem solving strategies based on Level 2 with some creativity.

### 2.3. Analysis of the current situation of public mathematics classroom teaching in Chinese universities

From the current situation of teaching and learning in Chinese mathematics classrooms, its situation needs to be improved. From the perspective of teaching materials and teaching methods, there is the disadvantage of being too old-fashioned; from the perspective of students and teachers, there is the dilemma of poor interaction and

communication between teachers and students. The specific performance is as follows.

(1) The content of some teaching materials lacks modernity. With the further development of higher education, college mathematics teaching has also undergone a series of reforms and changes, the majority of teachers through their own unremitting efforts, from the teaching content of continuous development, contact students the actual needs of the teaching content of the profession, hoping to broaden the horizons of students. However, there is one problem that many front-line teachers cannot solve, and that is about the content selection of the textbook itself. In terms of the current advanced mathematics textbooks for economics, some of the case problems that are behind the times can already be withdrawn from the textbooks. And another part of new research results should be added to the textbook, but this interface is not properly handled at present. The teachers, in turn, must respect the textbook when teaching, and cannot tamper with it at will, a situation that seriously affects the efficiency of classroom teaching.

(2) Some teachers' teaching methods need to be innovated to suit the needs of contemporary college students. At present, in Chinese public mathematics teaching, there exists a phenomenon that the teaching concept of teachers has not kept pace with the times. These teachers are still stuck in the traditional teaching mode, simply taking into account their position as the main speaker, but ignoring the existence of students as the receptor. In such a teaching mode, teachers do not really understand the learning situation of students, often until the time of the examination, the teacher only found that the students learn the degree of poor, but at this time the semester course is over, and mathematics is such a difficult subject, students cannot remedy the course left behind. Over time, students become more indifferent to learning mathematics.

(3) Teachers simply teach theoretical knowledge of mathematics, with less connection to the practical. Students entering higher education institutions have experienced the training of problem solving in college entrance exams, so they are very good at doing problems. But in fact their ability to combine theory with practice is often limited. However, teachers of higher mathematics in higher education

institutions do not understand this, and they often only see that students' scores in mathematics in the college entrance examination are not bad, so they start to teach them a lot of, difficult mathematical knowledge, but a large proportion of students actually do not develop high quality problem-solving ability. So much so that the phenomenon of mastering a lot of mathematical theory but still not being able to solve practical problems occurs. The current situation of public mathematics classrooms without the penetration of modeling ideas deserves profound reflections from teachers, and they should actively explore solutions to the problems.

#### **2.4. Measures to improve the application of mathematical modeling ideas in public mathematics classrooms**

Facing many problems and difficulties in the public mathematics classroom, the majority of higher mathematics teachers have made active exploration, hoping to find a suitable method to build a bridge between students and teaching materials, between students and teachers, to solve all kinds of awkward situations in the public mathematics classroom, so that teachers' classroom labor can be rewarded with teaching results and higher mathematics can no longer be a subject that makes students talk about it. With the introduction of higher mathematics modeling ideas, it has brought an opportunity for mathematics teachers in colleges and universities to revolutionize the classroom. As the application of modeling ideas in the classroom deepens, teachers are getting more and more comfortable with its study and application in the classroom.

(1) When conducting introductory lectures, modeling ideas can be applied. There is an old Chinese saying: "A good start is half of success." Many students in colleges and universities are not interested in mathematics classes because they are intimidated by the high level of mathematical knowledge when they take the first class. In order to avoid this, it is necessary for advanced mathematics teachers to have a good introductory class. Instead of dumping all the deep and difficult mathematical knowledge on students at the initial stage of the course, teachers should start from the practical aspects of life in order to stimulate students' interest in learning. For example, before teaching students definite integrals, teachers can start with problems that are related to real life, such as the area of an ellipse or

the distance of variable speed linear motion, and use this form to stimulate students' enthusiasm for knowledge exploration. In addition, when teaching some difficult concepts, teachers can also introduce some related historical background to students to arouse their curiosity.

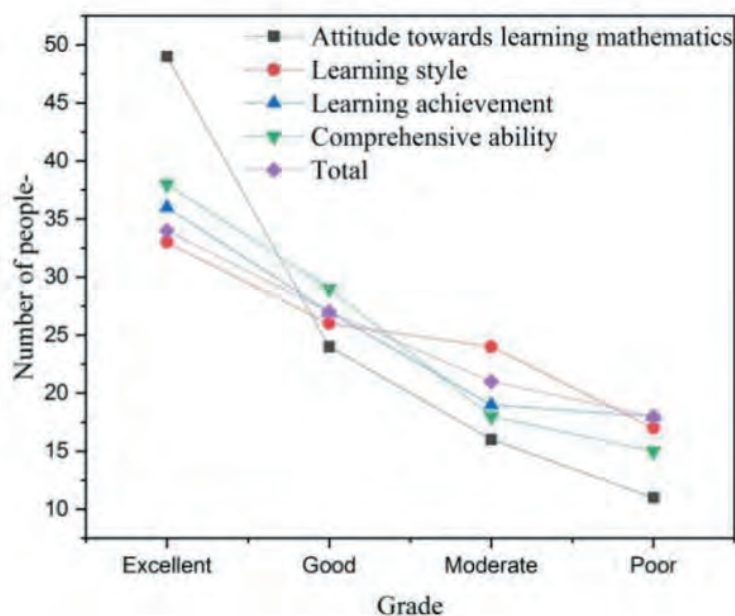
(2) When teaching abstract concepts in mathematics, modeling ideas can be introduced. In the past, when teaching concepts, it is the most headache for teachers; because of the lack of necessary life foundation, many students often have difficulty in understanding the concepts in higher mathematics, let alone carry out in-depth discussions. However, the introduction of mathematical modeling idea breaks this deadlock, it starts from the practical of students' daily life, let students understand the concepts from their familiar fields, balance the relationship between concrete and abstract, integrate the mathematical concepts that seem to be unrelated to life into actual life, let students try to apply them to solve practical problems in life, so as to deeply understand the meaning of the concepts.

(3) Modeling ideas can be introduced when teaching exercises homework. Any learning has to be consolidated by homework and exercises in order to receive good teaching effect, and this is especially true for higher mathematics learning. If there are no exercises as the consolidation of knowledge, it will become the norm that most of the knowledge learned will be forgotten. Therefore, consolidation in terms of exercises and homework after learning is a crucial part for students. Since the introduction of modeling into the public mathematics classroom, teachers often integrate some real-life problems into the exercises to help students understand the knowledge better, so that they can explore and discover them.

### **3. Evaluation of the effectiveness of teaching practice**

Since the teaching practice is targeted at two classes in Zhejiang Tongji Vocational College of Science and Technology, the teaching method incorporating mathematical modeling ideas proposed in this paper is used. After a semester-long teaching practice, we used questionnaires to conduct a survey on students to understand their evaluation of the teaching model of this paper. A total of 100 questionnaires were sent out and all of them were returned, of which 100 were valid. The questionnaire mainly investigated the students'

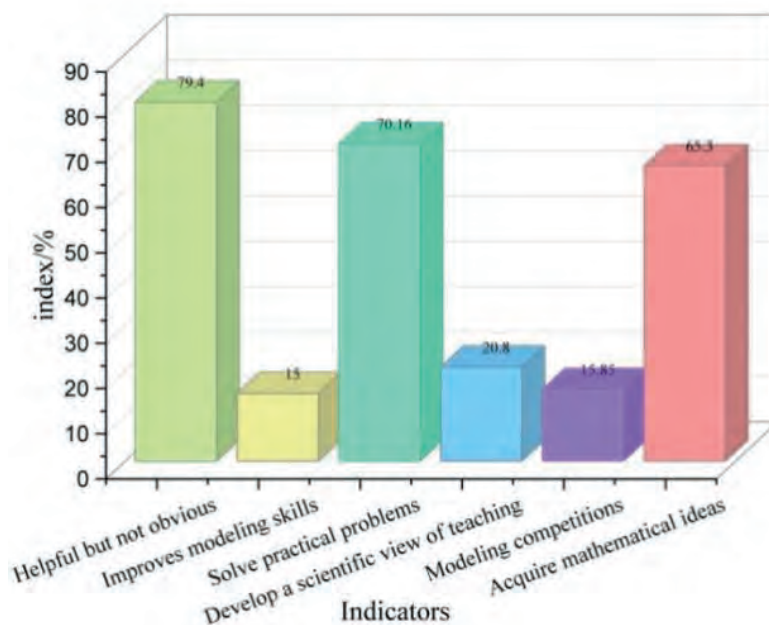
attitudes toward learning mathematics before and after the experiment, the way they learned mathematics, whether they improved their academic performance, the improvement of their overall ability, and the gap between the current teaching mode and the desired teaching mode. Through statistical analysis of the questionnaires, students' attitudes toward learning mathematics, learning styles, academic performance, and comprehensive ability all improved significantly after the experiment, and the number of excellent students in all aspects exceeded 70% of the total number of students, indicating that the teaching effect was very good. Figure 1 shows the statistical analysis of the data on the evaluation of mathematical modeling teaching methods.



**Figure 1.** Statistical analysis chart of teaching style evaluation data

Regarding the effectiveness of current teaching in teacher training colleges, 79.4% of students thought that daily mathematics classroom teaching was helpful but not obvious, and less than 15% of students thought that daily mathematics teaching could significantly improve modeling ability. Regarding the objectives of developing the mathematical modeling ability of teacher-training students, the survey results showed that the objectives were, in order, to develop the application ability to solve practical problems (70.16%), to form a scientific view of mathematics and teaching (20.8%), and to prepare for future teaching practice and to guide mathematical modeling

competitions in primary and secondary schools (15.85%). It is evident that the current mathematics teaching cannot fully meet the needs of students regarding applications, and there is a need for mathematical modeling classes to make up for this deficiency. It should be noted that when answering the question about the purpose of learning mathematics, the majority of students (65.3%) were able to realize the importance of mastering mathematical thinking and learning to think mathematically, rather than utilitarian only to solve practical problems. Figure 2 shows the feedback on teaching effectiveness.

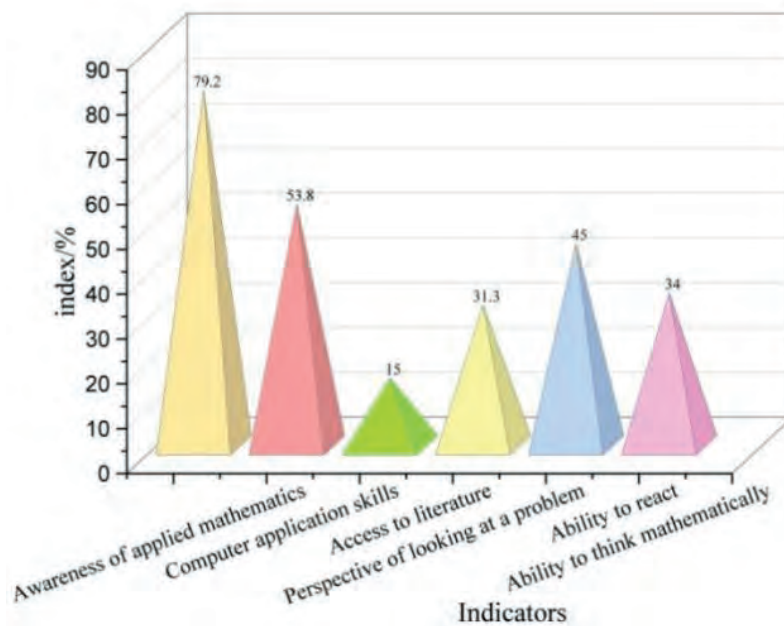


**Figure 2.** Feedback on teaching effectiveness

In terms of students' experience of participating in mathematical modeling, students generally felt that they had gained the most in terms of their awareness of applying mathematics to think about problems (79.2%) and their computer application skills (53.8%); only nearly 15% of students felt that their ability to consult literature had improved through mathematical modeling; another 34% said their mathematical thinking skills had improved; 31.3% said they saw problems 31.3% said they had more perspectives on problems; and 45% said they were more responsive. This indicates that the current mathematical modeling instruction can develop students' application and computational skills relatively well, but students do not make full use of the large amount of literature, perhaps due to too much

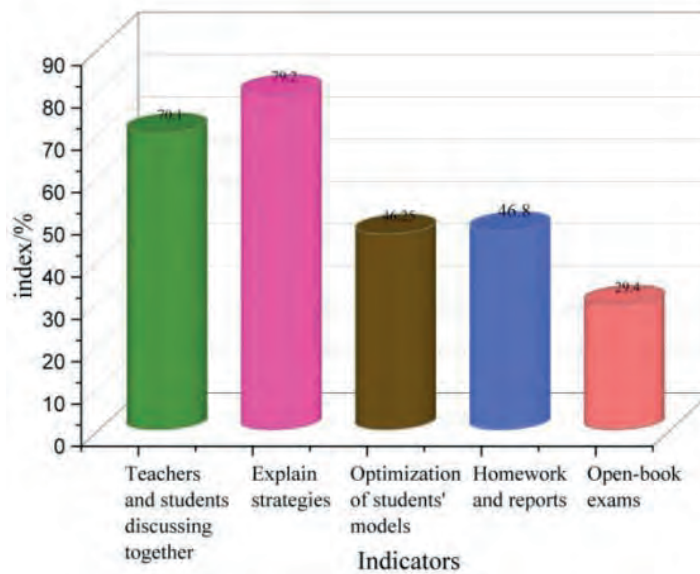


teacher guidance and narrow student modeling ideas. Figure 3 shows the students' teaching experience.



**Figure 3.** Teaching experience

In terms of suggestions regarding the mathematical modeling course, 70.1% of the students wanted the class to take the form of a joint discussion between teachers and students, with teachers giving only methodological guidance. 79.2% of the students thought that the main focus of the mathematical modeling class was to explain the modeling methods and strategies, while 46.25% thought that the modeling class should analyze and optimize students' models. As for the evaluation methods of mathematical modeling class, most of the students agreed with the comprehensive evaluation based on usual homework and reports (46.8%) and open-book exams (29.4%). The survey showed that they would like to see more advanced teaching methods and evaluation tools for a new course like mathematical modeling, which aims to improve students' mathematical quality. Figure 4 shows the students' teaching suggestions.



**Figure 4.** Teaching suggestions

#### 4. CONCLUSION

The purpose of this paper is to investigate the current situation of integrating mathematical modeling ideas into the teaching of public mathematics courses and to propose new reform measures. The following conclusions are mainly drawn.

(1) Traditional mathematics teaching is mainly based on theoretical lectures, basically full of abstract theoretical knowledge points, and students are basically in a passive learning state. Moreover, after learning, they do not understand the background of knowledge generation, nor do they know how to apply it concretely, which is not conducive to the improvement of students' ability to solve practical problems.

(2) With the introduction of mathematical modeling ideas in public mathematics classrooms, the state of teachers' lectures has changed, and the current situation of students' learning has also changed greatly. The teaching method of joint participation of students and teachers is more able to attract students' interest in learning mathematics, and it can actually improve students' ability to apply mathematical knowledge to real life, to apply what they have learned, to combine mathematical theory and practical problems, and to make mathematics really work.

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# Study on the synergy between state audit and social audit based on SFIC model

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## **ABSTRACT**

How to fully mobilize social auditing power and form audit supervision synergy in collaboration with social auditing institutions has become a real problem for grassroots auditing institutions. Based on the SFIC model, this paper firstly elaborates the current starting conditions of the synergy between national audit and social audit from the perspective of auditors. Then, it discusses the current situation of catalytic leadership of audit synergy from the perspective of audit process and audit technology, and analyzes the current situation of system design from the perspective of audit purchase service. Finally, the process and results of audit synergy are analyzed based on audit bulletins, and about 50% of the respondents indicate that they have a long-term mechanism to coordinate the work of state and social audits by carrying out information technology construction in their own units. The synergistic relationship between state audit and social audit proposed in this study has a significant role in developing the practice of synergy between state audit and social audit, so that the role of state audit can be played to a greater extent.

## **KEYWORDS**

SFIC Model; Catalytic Leadership; System Design; Audit Synergy

## 1. INTRODUCTION

As an important organ for auditing and supervising the financial and economic activities of the state, state auditing organs play an irreplaceable role in ensuring the rational use of public funds, maintaining national economic security, and preventing corruption [1-2]. As the role of state auditing has been enhanced, the scope of state auditing has expanded from the traditional outgoing audit, economic responsibility audit, and financial audit to the audit of special funds for poverty alleviation and the outgoing audit of natural resources assets of leading cadres [3-4]. The heavy audit tasks have constrained the function of state auditors to better provide public services, which is not conducive to the anti-corruption role of state audit institutions. The supervision of state-owned enterprises by state audits needs to be strengthened, which provides a good opportunity for synergy between state and social audits [5-6].

The literature [7] suggests that government auditing and oversight achieve the purpose of governing the country through "power management", "money management" and "affairs management". The literature [8] suggests that collaborative auditing is a new way to innovate government auditing, and this new way can better play the role of auditing as a way to govern the country. The literature [9] suggests that by auditing and monitoring the implementation of national policies, defects in policies can be corrected in a timely and accurate manner.

This paper studies the relationship between state audit and social audit as well as the existing central and local policies in China, on the basis of which the necessity and feasibility of synergy between state audit and social audit are analyzed, while the current situation of synergy between auditing institutions and internal audit in China is studied and summarized, and the existing problems are analyzed and the causes of the problems are identified in conjunction with the SFIC model. Finally, based on the existing path choices and existing problems, the optimized path of state audit and social audit synergy is explored.

## **2. SFIC Model**

### **2.1. Model Selection**

Generally speaking, when foreign scholars conduct research on collaborative governance, they generally do so from the following aspects. The first is the specific concept of synergy, the second is the elaboration of theories related to collaborative governance, and the last point is a comprehensive analysis of the success factors of collaborative governance. Collaborative governance is a hot topic of research nowadays, and many scholars carry out research on it from a variety of perspectives. For the field studied in this paper, which is auditing, collaborative theory plays a great role in enhancing the efficiency of conducting auditing work while helping each party audit its own strengths. However, one of the prerequisites in using collaborative governance theory to help audit work is to deeply analyze and select a technical model suitable for audit research, which is the basic condition for conducting audit collaborative work and can better combine audit and collaborative governance. In this paper, the SFIC model is finally selected as the theoretical framework.

The founders of the SFIC model used a total of 137 cases from different countries and regions for continuity analysis, and the cases cover a wide enough range of fields, covering a comprehensive and rich theoretical knowledge and practical experience, and have been a classic model in the field of synergy. Ansell and Gash, in their research on synergy-related theories, argue that the paths for carrying out synergistic work are very complex and diverse, and that the mutual cooperation between synergistic subjects is reflected at almost every stage. The SFIC model has been used in a wide range of research and practical applications, for example in modern agricultural development, in various fundraising efforts, and in auditing and business management.

### **2.2. Model Introduction**

There are four components of the SFIC model: Starting Conditions, Catalytic Leadership, System Design, and Synergistic Process.

### **2.2.1. Starting conditions**

The starting condition is extremely important in one way, because if it is handled well it will promote the cooperation between synergistic subjects, and if it is not handled well it will have some negative effects on the cooperation between synergistic subjects. Because of the special characteristics of each synergistic subject, their rights may not be symmetrical, and the resources they hold are also asymmetrical. So this is prone to some subsequent developments that affect the synergistic process between two or several of them. Specifically, if the power between them is asymmetric, the weaker party will easily become the subordinate of the other party and lose the status of the main body. The same consequence is true for the asymmetry of resources and the asymmetry of capabilities. This imbalance naturally affects mutual trust.

### **2.2.2. Catalytic Leadership**

The success of any organization or collaborative approach cannot be achieved without the effect of good leadership. Good leadership in groups is very important, and this is also true in the development of collaborative governance efforts. Good leadership can bring together the interest needs of each collaborative subject's own members, and at the same time can explore and discover how to achieve a win-win situation in collaborative governance. If each collaborative governance body feels that its own interests are not being met, the leader can play a key role in bringing his or her leadership strengths to bear to develop relevant solutions. According to scholar Weiss, being a leader must simultaneously have several qualities. The first is the ability to bring members together and promote broad participation. The second is the need to ensure that one has organizational influence. Thus, a good leader has an irreplaceable role and advantage when it comes to promoting a virtuous collaborative governance process.

### **2.2.3. System Design**

No organization can function well without a scientific institutional foundation, and the same is true in collaborative governance. A scientific system can ensure a virtuous cycle of collaborative governance. Generally speaking, there are several important issues to consider in designing a scientific system in collaborative

governance. The first point is to fully understand what the characteristics of a scientifically sound system are and what are the important factors. A scientifically sound system should be able to include all synergistic subjects, and an excellent scientific system should also cover how to enter the process of collaborative governance. Secondly, a scientific and reasonable system should be designed with clear rules related to collaborative governance and open and transparent rules. This is mainly to ensure that the whole process of collaborative governance is fair, open and transparent. Under such rules, there will be a higher level of trust among the collaborative subjects, which is more conducive to the development of collaborative governance.

#### **2.2.4. Collaborative Process**

Ansell and Gash argue that the process of collaborative governance should not be linear but cyclical. In collaborative governance, the core part should be the process that belongs to the collaborative process. The effectiveness of the core part will directly affect the overall effectiveness of the process, so understanding and studying the synergistic process will be the most important part of collaborative governance. Face-to-face communication is a relatively direct and fast way of communication, and often the seemingly simple communication is more effective. In collaborative governance, it is extremely important to reach a common goal or consensus among all collaborative subjects, which can lead to a higher level of trust and deeper communication between them. This direct and effective way of communication will promote the benign development of the collaborative process.

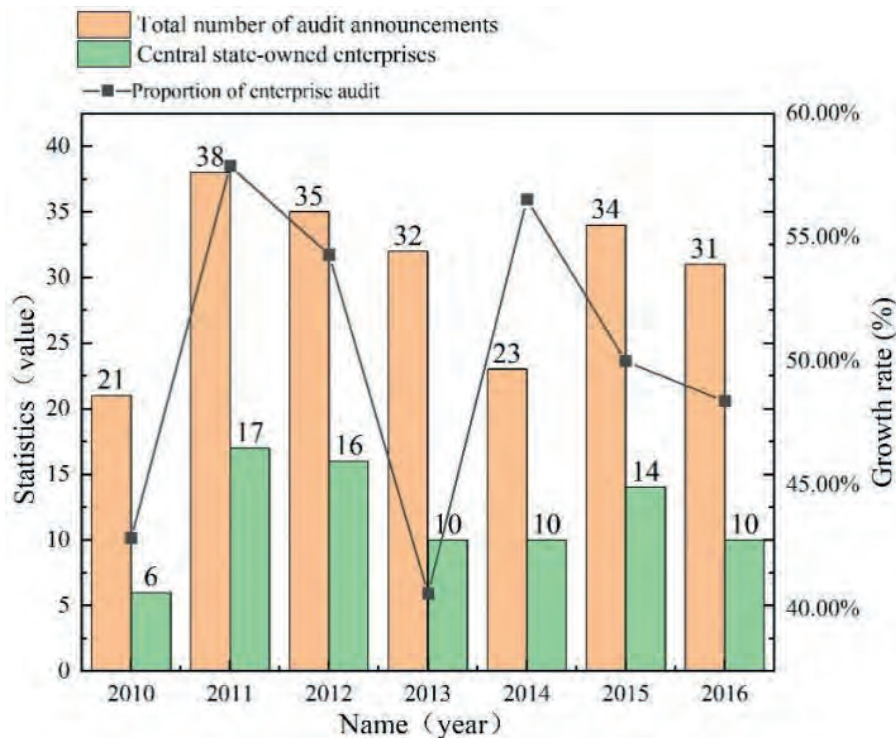
### **3. Data Analysis**

#### **3.1. Situation analysis of the number of state-owned enterprises audited by the state**

Figure 1 shows the state audited state-owned enterprises from 2010 to 2016. As of December 2016, the State Audit Office has released 267 audit result announcements on its website, of which the number of enterprise announcements involved is 125, including 73 for central SOEs and 24 for financial institutions. Since 2010, the government has fixedly disclosed the audits of state-owned enterprises to the society in the form of audit announcements. According to the Audit



Law and supporting interpretative regulations, enterprises and financial institutions in which state-owned capital occupies a controlling or dominant position should be included in the scope of state audits, specifically: those in which the proportion of state-owned capital to the total capital (equity) of the enterprise or financial institution exceeds 50%. State-owned capital accounts for less than 50% of the total capital of enterprises and financial institutions, but the main body of state-owned capital investment has effective control of the enterprise.

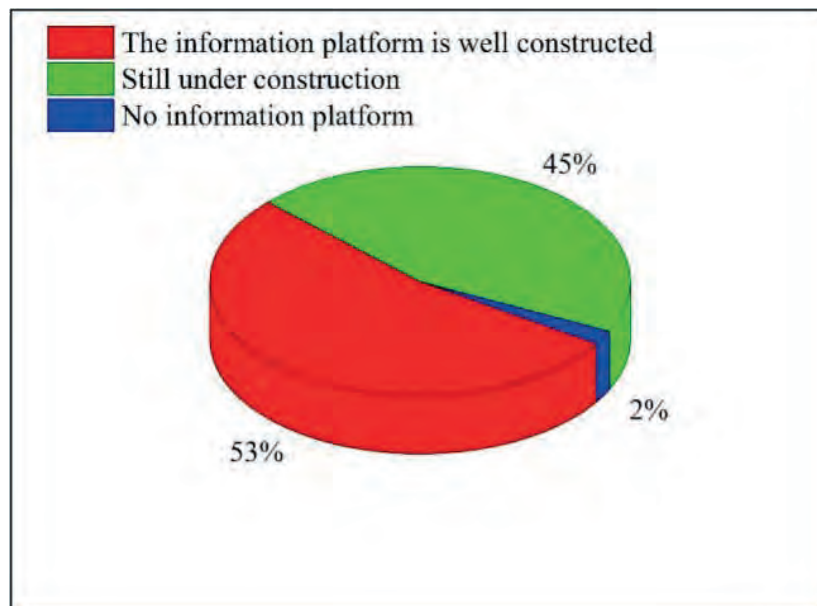


**Figure 1.** State audit of state-owned enterprises from 2010 to 2016

### 3.2. Analysis of the synergy between national audit and social audit

Figure 2 shows the construction of the information technology platform. From the perspective of two-way cooperation, the guidance and supervision of internal audit work is still being explored. At the same time, since the internal audit association is decoupled from the audit institutions in each city, for example, the Texas Audit Bureau is not decoupled from the internal audit association, it is necessary to cooperate with the internal audit association and use their work responsibilities to establish a long-term cooperation mechanism between the internal audit association, the audit institution and the audited unit. Second, in terms of the management of audit

informatization in the surveyed units, about 50% of the respondents said that their units carry out informatization construction work. Both grassroots audit institutions and internal audit currently have many problems with the use of information technology, neither the technology nor the ability to develop information technology platforms, and the ability to maintain them later is weak. They have yet to take full advantage of modern information technology to develop innovative audit methods, and also lack a long-term mechanism for coordinating government auditing and internal auditing work. the emergence of Order 11 has enabled auditing authorities to start paying attention to internal auditing work, but the intensity and time frame of attention is far from adequate. There is no long-term mechanism for internal audit, governmental audit and internal audit associations in government departments, and no guidelines for long-term cooperation in internal audit departments.



**Figure 2.** Information platform construction

#### **4. CONCLUSION**

In this paper, under the requirement of the development of society and the deepening of the concept of full audit supervision, the following conclusions are obtained based on the SFIC model to study the synergy between state audit and society.

(1) Central and local state-owned enterprises listed companies account for 31.85% of the total number of listed companies, while the above-mentioned percentage of audits of listed companies with state-

owned components is less than 5%, which is sufficient to show that the state audit is weak in the audit supervision of listed companies with state-owned components. The main reason is that the Audit Office has limited staff and limited time, and a large number of administrative and institutional financial funds as well as the supervision of the use of various special funds also require state auditing, resulting in the limited scope of auditing state-owned enterprises. Overall, the number of audits of state-owned enterprises covered by state audits is low.

(2) For the analysis of the problem of synergy between national audit and social audit, about 50% of the respondents said that their units carry out information technology construction work, whether it is the grassroots audit organization or internal audit, there are many problems with the use of information technology at present. To realize the construction of informatization, the information of auditing institutions and internal audit should be on a common platform, which can avoid many problems caused by the difficulty of information circulation between the two sides. The construction of audit informatization can provide strong data support for national audit guidance and supervision of social audit.

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# The application of big data technology in the development of music education in higher education institutions integrating local music culture industry

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## **ABSTRACT**

The integration development of music education and local music and culture industry in higher education institutions is to better inherit the local characteristic culture. In this paper, the quantitative analysis of data on the integration development of music education and local industry in colleges and universities is carried out under the big data technology. In terms of teaching methods, the percentage of focusing on music teaching evaluation is 32.12%. In terms of synergistic development, popular vocal music, ethnic instrumental music, opera singing and ethnic dance increased by 55.59%, 40.23%, 93.65% and 41.46% respectively. It shows that the integration development of university music education and local music and culture industry strongly strengthens the local music and culture industry and realizes the inheritance and development of local intangible cultural heritage.

## **KEYWORDS**

Big Data Technology; Music Education; Local Music; Cultural Industry; Higher Education Institutions; Integration Development

## **1. INTRODUCTION**

As the cradle of education and cultivation of music talents in China, colleges and universities are responsible for cultivating music talents who meet the requirements of cultural development in the new era,

and they are also an important position for the dissemination of music culture [1-2]. Therefore, under the requirements of cultural development in the era of big data, the advantages of university music education should be brought into the development of local music and cultural industries [3-4]. How to connect music education with music market and how to innovate education concept and teaching mode so as to realize the organic integration of music education and music industry will be a problem that every college music education practitioner needs to face and think about [5-6].

The deep development of music culture industry has extended it to a broader level. China is a country with many ethnic groups, and the resources of ethnic folk music culture are rich and varied, especially the local music culture resources are very precious and need to be inherited and protected by us [7-8]. But how to fully exploit the value of these cultural resources from the perspective of cultural industry is also an urgent problem [9-10]. Therefore, the development of music culture industry promotes the development of college education reform, and at the same time provides many employment opportunities for students, so that the professional skills learned in school can be recognized by society and give full play to their own value [11-12].

In order to explore the integration and development of music education and local music culture industry in higher education institutions under the big data technology, this paper firstly analyzes and explains the big data technology, the characteristics of big data and the application of big data. Then the development status of music teaching in higher education institutions is briefly explained, and the relationship between local music culture industry and music education in colleges and universities is elaborated. Finally, the data analysis of the method and synergistic development of music education in colleges and universities using big data technology is presented as a way to illustrate the influence of local music culture industry on music education in colleges and universities.

## **2. Big Data Technology**

### **2.1. Characteristics of Big Data**

Big Data is a collection of data that cannot be captured, managed and processed by conventional software tools within a certain time frame.

It is a massive, high-growth and diverse information asset that requires new processing models to have greater decision-making power, insight discovery and process optimization capabilities.

Big data has several characteristics.

First, the volume is large. People generally use "massive" to describe the huge amount of data, usually reaching the petabyte level (1PB =  $1024 \times 1024$ GB).

Second, diversity. People generate all kinds of behavioral data in all aspects of social life, including online transactions, learning and voice and video, etc.

Third, speed. This feature refers to two aspects, namely the speed of data generated and the speed of data processing through device technology. The Internet accurately records every data in the process of each person's activity, and then quickly screens, refines, and applies it through big data technology.

Fourth, authenticity. The data generated are all objective records of people's life trajectories by the Internet, without any deviation, thus more realistic and credible and persuasive.

Fifth, value. The extracted data has a very reliable reference value for the next work, which is conducive to making quick decisions and judgments. However, the density of these data is low, and there is often only a small portion of valuable information in a large data group. Some experts believe that big data also has characteristics such as timeliness and complexity.

## **2.2. Characteristics of big data applied to education**

The advent of the data era also provides new opportunities for the development of education, and people can use big data technology more quickly and easily for the selection of education and teaching methods. From the huge amount of data, we can find the data that is beneficial to education and teaching and apply it to teaching research. The following features will be found in the application of big data to education.

First, promote personalized development. For each student's learning data, exclusive teaching programs are developed, and the teacher's subjective experience judgment in traditional education is shifted to

objective data analysis and reasoning, which is more reasonable and effective.

Second, improve the problem of educational imbalance. This will make education more equitable and narrow the education gap between urban and rural areas. As long as there is a network, no matter where you are, you can enjoy first-class educational resources, and the current MOOC, micro-courses, and online courses are all better evidence.

Third, adaptive. The learning system will automatically recommend relevant learning content based on the generated data.

### **3. Music Education in Higher Education Institutions and Local Music Culture Industry**

#### **3.1. The current situation of music education in higher education institutions**

Music education in higher education institutions is also trying to develop with the continuous progress of society, but there are still certain problems in the process of development.

For one thing, the understanding of music education in colleges and universities is still at a superficial stage. Its education targets are mostly adults around 20 years old, who need to enter the society directly after graduation, use their professional skills to serve the society and create their own value. This requires colleges and universities to be different from other educational stages in terms of educational purposes and tasks, and not to be understood by the concept of music education in primary and secondary schools.

Secondly, there are problems with the curriculum of music education in colleges and universities. Among them, the curriculum is too autonomous and is set up only by school teachers according to their own ability level to offer courses, without standing in the students' perspective and offering courses according to the students' actual needs.

Thirdly, the theory and practice of music education in colleges and universities are disconnected from each other. At present, the content of the courses offered by the music majors will not be accepted by the people, and there is a suspicion of high and low, so the disconnect



between theory and practice of music education is also a more serious problem at present.

### **3.2. Local Music Culture Industry**

For the whole music culture system, local music culture industry is an important part of it and a special product under the cultural reproduction of today's society. Music education in colleges and universities, as the main form of education for musicians to learn music systematically, is inextricably linked to the industrial development of local music culture. Music culture industry is one of the current music culture phenomena, which directly responds to people's demand for music culture. The reform and development of music education depends on the reflection of the demand of music culture industry. As a branch of the whole music culture industry, the local music culture industry directly reflects what kind of music talents are needed in today's society, and determines what kind of music awareness, general music knowledge and music ability such talents need to have.

### **3.3. The relationship between music education and music culture industry**

Interaction refers to the positive mutual influence and effect of both sides of things. Specifically for music culture industry and college education, firstly, music culture industry has been booming in recent years, but behind the rapid development, there are also problems such as lack of professional talents and lack of theoretical guidance, which become bottlenecks for further development. Secondly, as a local college music education, it is itself shouldering the heavy responsibility of serving local cultural development, and is facing the real problems such as weak quality of students' art practice and difficult employment. Through the organic interaction between the two, music culture industry can provide more practice and employment opportunities for music education in local colleges and universities. In turn, music education in local colleges and universities can provide a constant supply of talents and intellectual support for the music culture industry. This is a win-win situation, so it is not only feasible but also necessary to comprehensively promote the interaction between the two.

#### **4. Analysis of the path of music education integrating local music culture industry**

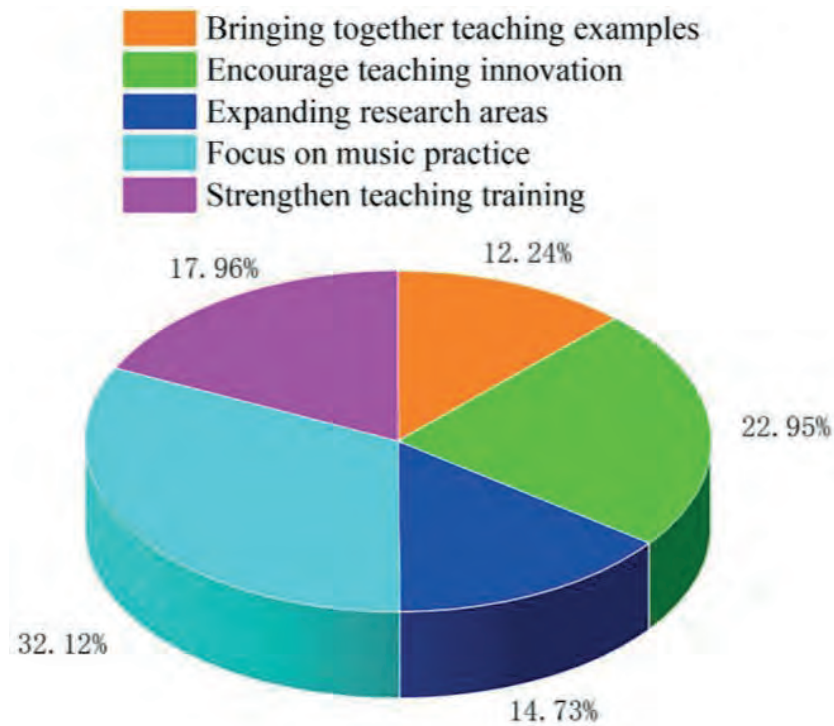
The local culture industry and colleges and universities should be closely connected, and the music culture industry should provide some necessary conditions for the development of local colleges and universities as much as possible, which can not only solve the needs of music hardware facilities of colleges and universities, but also play a certain role in promoting the development of local culture industry. This section uses big data technology to analyze and argue the path of music education in higher education institutions to integrate the development of local music culture industry, and elaborate the effectiveness of the application of local music culture industry development to integrate music education in colleges and universities.

##### **4.1. Analysis of teaching methods**

For the integration and development of college music education and local music culture industry, it is necessary to break through the original traditional teaching mode and use big data technology for the integration and development of music education and music culture industry. This section uses big data technology to analyze and demonstrate the teaching methods of college music education, so as to illustrate the innovative teaching methods of college music education. The results of its analysis are shown in Figure 1.

In terms of innovative teaching methods in college music education, the most recognized teaching method is focusing on music practice, accounting for 32.12%. This indicates that schools should actively provide students with opportunities to participate in practice, create a platform for them to realize their ideas, and focus on cultivating students' musical practice skills and their awareness of participation in practice. In addition to focusing on practice, 22.95% of students believe that it is important to encourage innovation in the process of teaching music. Music teachers in higher education should focus on creating contexts that foster students' creativity and provide them with a variety of possibilities for development. This suggests that the integration of music education and local cultural industries should be carried out by collecting various types of integration teaching cases to stimulate students' creative and innovative abilities, aiming to improve students' auditory cognitive abilities and creativity, and providing

cross-disciplinary teaching methods that integrate multidisciplinary fields into one to accommodate the synergistic development of music education and music cultural industries.



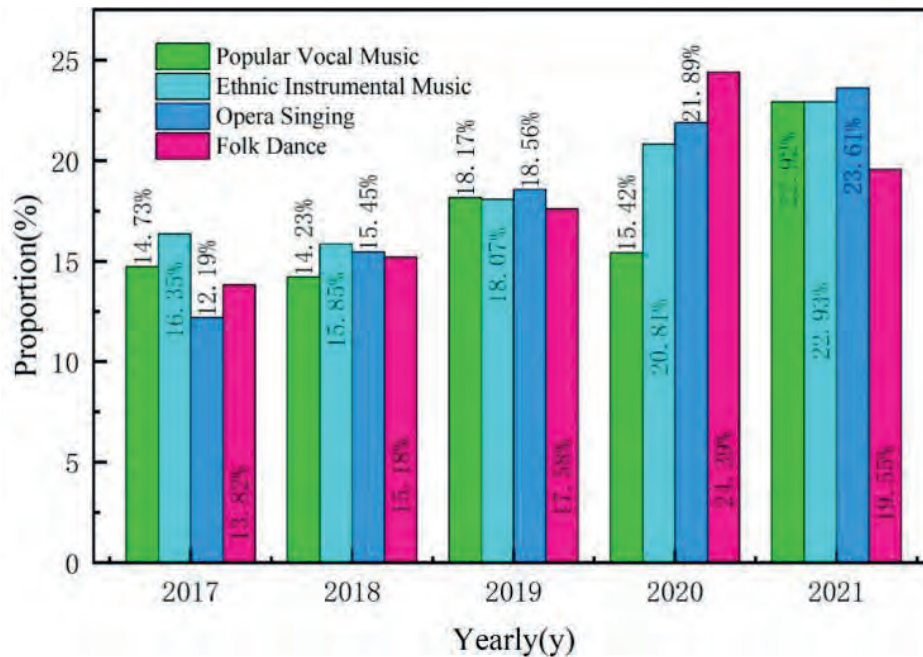
**Figure 1.** Analysis of innovative teaching methods

#### 4.2. Synergy Development Analysis

Strengthening local music culture education in college music education is not only a need for music education itself, but also a need to assist the development of local music culture industry. In this section, we use big data technology to analyze data on the synergistic development of local music culture in college music education. The results of its analysis are shown in Figure 2.

In terms of the synergistic development of university music education and local music and culture industry, both popular vocal music, national instrumental music, opera singing and folk dance are on the rise from 2017 to 2021. Among them, popular vocal music increased from 14.73% in 2017 to 22.92% in 2021, an increase of 8.19 percentage points. Ethnic instrumental music increased from 16.35% in 2017 to 22.93% in 2021, an increase of 6.58 percentage points. Opera singing increased from 12.19% in 2017 to 23.61% in 2021, an increase of 11.42 percentage points. Folk dance increased from 13.82% in 2017 to 19.55% in 2021, an increase of 5.73 percentage

points. This shows that music education in colleges and universities is making efforts to integrate local music and cultural industries and to cultivate qualified music and cultural talents for local areas, with emphasis on local characteristics. This is a bold attempt to carry out the construction of professional discipline characteristics for music majors in local universities.



**Figure 2.** Synergistic Development Analysis

## 5. CONCLUSION

In this paper, data analysis is conducted for the development of music education in higher education institutions integrating local music culture industry in the context of big data, and the following conclusions are drawn.

(1) For higher education institutions, music majors should combine with local economic development, adapt to local economic and social development, realize the professional orientation of serving local music culture, and meet the specific needs of local economic development for music talents.

(2) College music education should adopt a multi-dimensional perspective and scan the demand for music professional jobs, the interactive development relationship between college music education and local music culture industry with the vision of market, higher education, professional characteristics and local traditional music culture education characteristics. In this way, we can make

college music education go to socialization and industrialization, so that college music education can be actively and normally integrated into the urban cultural construction.

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# The application of big data technology in the owner's information self-governance management platform under the perspective of residents' life

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## **ABSTRACT**

Information technology has been integrated into all aspects of people's lives with its superb permeability and powerful advancement, so it is necessary to build information technology in all industries. In this paper, the design goal is to provide property managers with an information management platform for the owner management process, and the research and design of the property management information platform is guided by the integration of information and automation of management in the property management process. The results show that the owner management platform proposed in this paper has improved the property management efficiency by 23.62%, and the questionnaire also verifies that the owner information management platform has received high satisfaction among owners. The owner management platform system designed in this paper has significantly improved the management efficiency and service quality of the property management process, and also enhanced the owner's satisfaction with the management of the community property.

## **KEYWORDS**

Information Technology; Permeability; Property Management; Information Management Platform; Management efficiency; Service Quality

## 1. INTRODUCTION

With the increasing development of information technology, the spread of information products in society, and the increase of complicated affairs, the way property management companies manage communities can no longer meet the rhythm of modern residents' lives [1-2]. For example, traditional property management has been posting notices or making house calls to convey information, but the notices sometimes fail to reach the attention of busy residents, and the house calls are often unsuccessful. Likewise, community residents are frustrated by not being notified in real time of, for example, water and power outages. Problems such as lack of information, lack of communication channels, time-consuming and labor-intensive collection of tenants' opinions, and lack of satisfactory property management services are common problems faced by property management [3-4].

Along with the vigorous development of real estate, property companies are mushrooming like a spring and the market competition is becoming more and more intense. Literature [5] argues that the advantages brought by property management informatization make the functional modules in the process of customization with reasonable, step-by-step and milestone goals, which effectively avoid the problem of high input and low return, and also effectively ensure the orderly completion of the system. The literature [6] argues that in the informatization process, it makes it possible to make reasonable use of personnel and also to deploy them in real time to achieve maximum utilization of resources and orderly property management. The literature [7] argues that in the process of information communication, fast, correct and concise communication can be achieved to avoid disorderly and unreasonable utilization of information. The literature [8] argues that user interaction plays a good role in customization, and the selection of a reasonable property process according to the user's needs can achieve a great increase in user satisfaction as well as maximization of benefits.

This paper first develops and utilizes the owner's resources to realize the sharing and exchange of information. However, due to the many factors involved in the transformation process of old neighborhoods, the imperfect information management tools increase the



management difficulty and hinder the process of neighborhood information transformation. Then, the research design of property management informatization platform is carried out with the two goal-oriented around information integration and management automation in the property management process. Finally, the feasibility and effectiveness of the owner's informatization management platform is verified from two perspectives of owner's satisfaction and property management efficiency through the application of the owner's informatization management platform.

## **2. Owner management platform modeling and database design**

### **2.1. Property management platform design modeling**

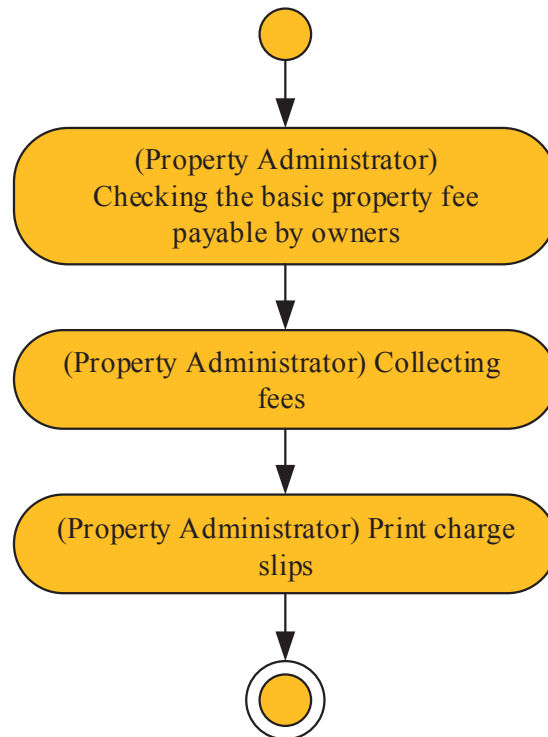
UML, also known as Unified Modeling Language, is an industry standard for modeling real objects in reality, providing a standard representation for people in different fields to communicate and understand each other. It can create models not only for static and dynamic structures and behaviors, but also for software systems, and can create different models for computer software systems, business systems, and industrial systems. Most importantly, the Unified Modeling Language is well suited for all phases of the system, from requirements analysis to final testing and system maintenance and development.

The behavioral model of an owner management system contains two categories, namely static and dynamic behavioral models. However describing the system requirements as understood by the users is the key to constructing the static structural model of the system.

The actions of the property manager can maintain property and parking information, collect various fees, handle the warranty process of the business, register the warranty tasks of the owners, record the comments and suggestions of the owners, and register the incidents that occur to the owners.

The behavior of the janitor can clean the public sanitation area, carry the trash cans, and fill out the work log. Security guards' actions can fill in the work daily report, security patrol, and register security incidents. Maintenance staff can repair public facilities, repair the owner's warranty equipment, and give feedback on the repair results. In which the property manager will process the owner's warranty task

and then feedback to the warranty clerk for repair. When the property manager collects the basic property management fees, he/she first inquires the basic property management fees that the business should pay, then collects the corresponding fees, and finally prints the bills for the fees. The process of collecting basic property management fees by the property manager is shown in Figure 1.



**Figure 1.** Basic property charging process

## 2.2. Owner management platform database design

In order to realize the informationization of the owner management system platform, 28 databases are designed in this system. Next, the process of database design is described in detail. In order to complete the database design quickly and efficiently, some database design specifications are designed before designing the database tables.

(1) The database is designed to use utf-8 format.

(2) The primary key id is always in the format of table\_id, and the corresponding primary key name of the table is in the format of table\_name. The foreign key is also always in the format of the primary table name\_id.

(3) If the number of enumeration type fields in the table is greater than 2, the data type is tinyint(2), and the enumeration value starts from 0.

(4) User, role, rights, role, \_right, user, \_role are the system-defined tables related to user rights. If there are more than one foreign key field of user-id in other tables, use user-id for the "operator" field and rename the other fields. Permission table right is the function identifier can not be repeated.

Any work is centered on the owner, and any system is also centered on the service object. The core object of this system platform is the owner. In the database design of this system platform, proprietor is the core position of the database. proprietor table includes ID, name, pinyin code, gender, cell phone number, QQ number, date of birth, work unit, marriage, ID number, education, place of origin, whether the head of the household, operator, operation date, comments and other fields. The owner table is shown in Table 1.

**Table 1. Owner's Table**

Field Name	Data Type	Length
Proprietor-id	bigint	12
Proprietor-name	varchar	30
Spell-code	varchar	15
Gender	varchar	5
Mobile-phone	varchar	11
QQ	varchar	11
birthday	datetime	8
company	varchar	30
Is-married	varchar	2
Id-card	varchar	18
education	tinyint	2

The owner table contains all the information directly related to the owner. In the database design of this platform, the tables that are connected to the proprietor table with a join key are the owner family table, the housing contract table, the parking space contract table, the receipt table, etc. The access mode used in this system is role-based access control, and the role-right table is established between the role table and the right table. role-right is connected to the role table with the foreign key role-id, and the other side is connected to the right table with right-id as a foreign key, thus forming an RBAC-based access control database.

### 3. Application results and analysis of owner management platform

#### 3.1. Owner satisfaction survey results statistics

The satisfaction percentage was calculated based on the owners' satisfaction evaluation of each secondary index, and then the satisfaction percentage of the primary index was calculated based on the proportion of the secondary index, and then the owner satisfaction of the property management company in M residential area was calculated based on the proportion of the primary index. The final results are shown in Table 2.

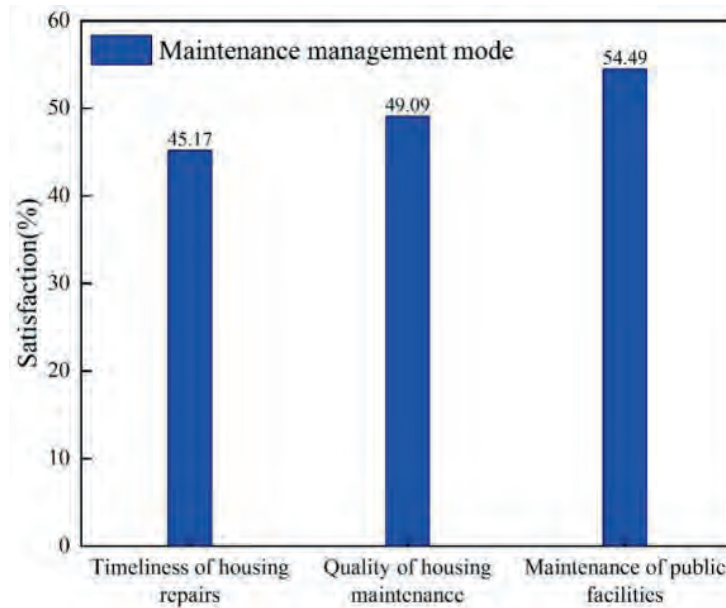
**Table 2.** Owner satisfaction statistics

Projects	Overall Service	Maintenance Manage	Environmental Manage	Safety Manage	Service Manage	Integrated Manage
Satisfaction	58.96%	47.51%	75.93%	59.82%	65.19%	36.72%
Evaluation	General	Unsatisfactory	Satisfied	General	General	Unsatisfactory

The level of satisfaction of the owners of the district with the property service is 56.87%, so it is said that the overall recognition and satisfaction of the owners with the intelligent owner management platform is high. Among them, the satisfaction level for the management of environment as well as services is relatively high, while the evaluation level for maintenance and comprehensive management is not high.

#### 3.2. Maintenance management satisfaction survey results

Figure 2 shows the survey of owners' satisfaction with the maintenance management of the district. The indicator with the highest satisfaction is the maintenance of public facilities, and the indicator with the lowest satisfaction is the timeliness of maintenance. The satisfaction levels of timeliness of housing maintenance, quality of maintenance and maintenance of public facilities were 45.17%, 49.09% and 54.49%, respectively.



**Figure 2.** Maintenance management satisfaction survey results

### 3.3. Service Management Satisfaction Survey Results

Figure 3 shows the service management satisfaction survey. The owners' satisfaction with the service management was 63.21%, where the highest satisfaction was with the uniform dress code and the lowest satisfaction was with the timeliness of problem handling. The satisfaction rate of customer service uniform dress code, promptness of problem handling and customer service reception service attitude are 75.41%, 49.36% and 64.45% respectively.



**Figure 3.** Service management satisfaction survey results

## 4. CONCLUSION

Owner management platform informatization is a platform that integrates property management process, basic information of buildings and buildings, property fee collection process sharing and maintenance management. The platform changes the traditional property management process which relies on experience, manual implementation and paper documents. The informatization platform brings into play the characteristics of working with high efficiency and processing with convenience in the current information age, making the efficiency of property managers much higher. On the information-based platform for property management, staff are able to work anywhere, anytime, 24/7, and are not limited to the old way of working where they had to be on the ground in real time. This has enhanced the work life experience for both property managers and owners.

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# Research on the integration of art elements into logistics packaging design based on artificial intelligence technology

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## **ABSTRACT**

The effective path to explore the integration of art elements into logistics packaging design is to realize the green and low-carbon logistics packaging. This paper uses the artificial neural network model under artificial intelligence technology to quantitatively analyze the data on the integration of fine art elements into logistics packaging design, and also gives the acquisition methods of fine art elements and the connotation of logistics packaging design. From the logistics packaging design method, the design method with its material accounts for 34.92%. In terms of low-carbon packaging design materials, the percentage of corrugated paper logistics packaging materials is 53.26%. This shows that the use of art elements into logistics packaging design choosing corrugated paper materials or equivalent Honeycomb cardboard material can better retain design elements and achieve sustainable development of logistics packaging.

## **KEYWORDS**

Artistic elements; Artificial Intelligence; Artificial Neural Networks; Logistics packaging; Low Carbon; Corrugated paper material



## 1. INTRODUCTION

With the advent of the industrial information age, changes in the elements of fine arts, which are closely related to the packaging industry, have been more widely used in logistics packaging [1]. With the development of science and technology, the way of application of art elements is also evolving, and this involves the effect of feelings brought by logistics packaging materials to consumers [2-3]. Logistics packaging materials can bring direct feelings or indirect feelings. The direct feeling is caused by the texture of the logistics packaging material itself, which can feel soft, smooth and so on. Through the visual and tactile sensation of material texture on the surface of packaging materials, the intimacy and allure between consumers are established [4-5].

The changes in real life and the development of the times have made people's aesthetic interests change, advancing the deformation and innovation of art elements in the application of logistics packaging [6-7]. The appropriate comprehensive use of multiple material-based art elements in logistics packaging, through certain design laws and composition methods for design performance, can bring people a pleasant spiritual feeling from culture, history, symbols and other aspects [8-9]. The reasonable application of multiple material art elements in logistics packaging can make consumers feel the spirit of the region's culture while also achieving spiritual balance and satisfaction [10-11].

In order to explore the effective path of integrating art elements into logistics packaging design, this paper analyzes and argues from three parts. The first part illustrates the artificial intelligence technology, including the connotation of artificial intelligence and the development and application of artificial neural network. The second part is the analysis of art elements and logistics packaging design, including the acquisition of art elements and the connotation of logistics packaging design. The third part is the analysis of logistics packaging design examples, using artificial neural network model to analyze the data of logistics packaging design methods and design materials, so as to understand the effective way of using art elements into logistics packaging design.

## **2. Artificial Intelligence Technology**

### **2.1. Artificial Intelligence**

Artificial intelligence is the use of computers to simulate the behavior of the human brain, including learning, reasoning, decision-making, prediction, association and other aspects, to study how to make the computer to do the past only human can do the work rich in intelligence, which is itself an interdisciplinary discipline. There are three types of artificial intelligence, namely, narrow AI (i.e., weak AI), general AI, and strong AI. All current research falls into the narrow AI category.

Due to the academic background and different views and perspectives on intelligence, AI has formed two different types of schools from the very beginning. One type is the rational school, which is based on logical procedures. They start from the perspective that both the human brain and computers are information processors and find that humans cannot really make optimal decisions rationally when making decisions. Therefore, computers are used to extend the rational thinking part of human beings. The other type is the perceptual school, which obtains artificial intelligence by simulating the synaptic connections of human brain neurons. This type of intelligent simulation is better at problems that are difficult to analyze with logic.

### **2.2. Development and Application of Artificial Neural Networks**

#### **2.2.1. Artificial Neural Networks**

Artificial neural network is different from human brain, but it is derived from human brain. It is a new neural network constructed artificially based on human knowledge of the neural network of the brain, which is capable of achieving a specific function as required. The basic components of artificial neural networks are artificial neurons, which simulate abstract biological neurons from the perspective of structure and function. The neural network in the human brain consists of a large number of interconnected nerve cells. Nerve cells, or neurons, are composed of two main parts, namely, protrusions and cell bodies, which can be further divided into axons and dendrites.

The artificial neuron is similar to the human brain neuron with multiple

inputs  $u_1, u_2, \dots, u_n$  and one output  $y_i$ .  $\omega_{ij}$  is the connection weight of the first input signal of the  $i$  neuron.  $\theta_i$  is the queue value of the  $i$  neuron.  $x_i$  is the summed net input of the  $i$  neuron.  $f(x_i)$  is the action function of the  $i$  neuron, which is also called the excitation function.

The expression of the net input  $x_i$  and the expression of the excitation function  $y_i$  are:

$$x_i = \sum_{j=1}^n \omega_{ij} u_j - \theta_i \quad (1)$$

$$y_i = f(x_i) = f\left(\sum_{j=1}^n \omega_{ij} u_j - \theta_i\right) \quad (2)$$

Different artificial neuron models consist of different action functions, and the common action functions are step function, linear function, Gaussian function, S-type function, etc. The common excitation function expressions are shown below.

(1) Linear functions:

$$y = f(x) = x \quad (3)$$

(2) Step function:

$$f(x) = \begin{cases} 1, & x \geq 0 \\ -1, & x < 0 \end{cases} \quad (4)$$

(3) Gaussian function:

$$f(x) = e^{-(x^2/\sigma^2)} \quad (5)$$

(4) Sigmoid function:

$$f(x) = \frac{1}{1 + e^{-x}} \quad (6)$$

### 2.2.2. Analysis of artificial neural network model mechanism

At present, there are many kinds of artificial neural networks, such as BP neural network, wavelet neural network, Hopfield neural network, fuzzy neural network, ELMAN neural network, convolutional neural

network, etc. According to the flow of the input signal in the network, artificial neural networks can be divided into feed-forward networks and networks with feedback.

The feed-forward neural network first obtains input information from the input layer, then transmits it to the intermediate layers, followed by a weighting process in each intermediate layer to the output layer, and is activated by the excitation function. Finally, it is output from the output layer, and there is no information feedback between the neurons in each layer.

Feedback neural networks allow information to be propagated backwards from the output layer to the hidden layer, or from the hidden layer to the input layer. The output of each neuron layer may be influenced by the feedback from the neuron's previous output or the current input, which gives the feedback neural network a "short-term memory" property similar to that of the human brain.

### **3. Artistic elements and logistics packaging design**

#### **3.1. Acquisition of aesthetic elements**

Elements in nature are a widely used category in design creation, and the basis of design should come from the truths presented by the life born in nature. This means that nature is the source of our ideas for design and creation. There are many aesthetic feelings in nature, and Chinese and foreign educators and aestheticians often refer to nature as "the book without words". The visual elements of the natural landscape are extracted from nature, so in the application of the visual elements of the natural landscape, the prerequisite is to have a basic aesthetic awareness of the natural landscape. Compared with social beauty and artistic beauty, the form factor is more decisive in the natural landscape. Generally speaking, its form includes color, shape, sound and other aspects of content. When extracting the natural landscape as visual elements, its formal beauty is mainly expressed in two aspects: color and form. Color is the color, shape is the shape, shape. At the same time, the beauty of the natural landscape is in the shape, in the selection of natural landscape visual elements is not without rules and regulations as long as the famous landscape is haphazardly selected and applied to the packaging, for the selection of this type of visual elements is a rule to follow.

### **3.2. Logistics packaging design**

Packaging decoration design, also known as packaging visual communication design, is a basic component of packaging design. There is a concept of "packaging screen" in packaging decoration design, which includes various design elements such as text, patterns and colors. As an important design element, art elements are indispensable in packaging decoration design, and there are many ways to apply them. However, we should pay attention to the principle of appropriateness of the application of art elements, the selected visual elements should be concise, and the principle of appropriateness should be paid attention to the arrangement of the picture, and the phenomenon of haphazard piling up should not occur. At the same time, logistics packaging products from different regions, as a type of product packaging with strong culture, should consider the culture and adaptability of logistics packaging in the process of art elements integration design.

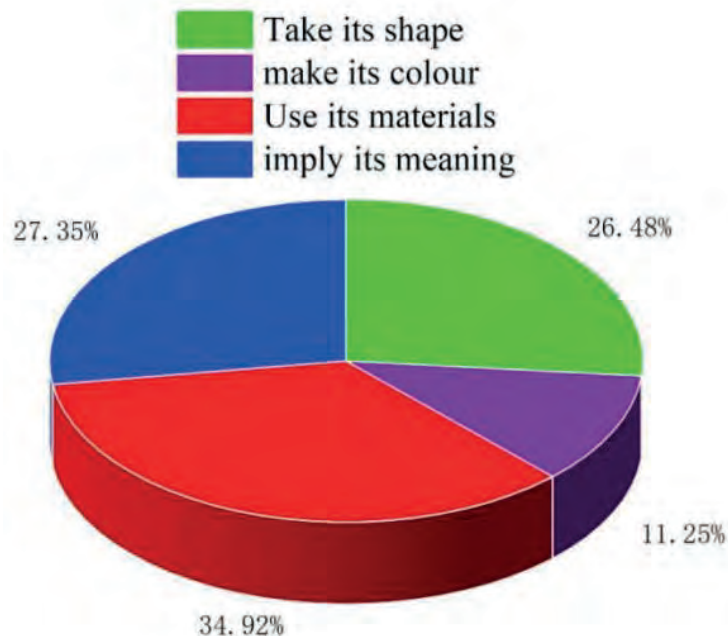
## **4. Analysis of the path of integrating aesthetic elements into logistics packaging design**

### **4.1. Analysis of logistics packaging design methods**

In the logistics packaging design, by refining the fine art elements of traditional art style and reasonably applying the laws of formal beauty, the logistics packaging becomes an effective communicator of culture. This section analyzes the method of applying fine art elements in logistics packaging design by using artificial neural network model, and its analysis results are shown in Figure 1.

In terms of the methods of integrating art elements into logistics packaging design, the four design methods of taking its shape, making its color, using its material and implying its meaning account for 26.48%, 11.25%, 34.92% and 27.35% respectively. This shows that the use of materials is more practical in the design of art-integrated logistics packaging. The logistics packaging design that is designed and created through the concept of design, thinking and handwork has practical and aesthetic creative activities. It is characterized by skilled and specialized skills, using the characteristic laws of material materials, tools, and production methods to master

and apply. The simple processing and utilization of natural materials, the inheritance of the beauty of the craft of folk art in packaging design, the focus on the use of functionality, and the perfect unity of technology and art, will be able to take packaging design to a new level.



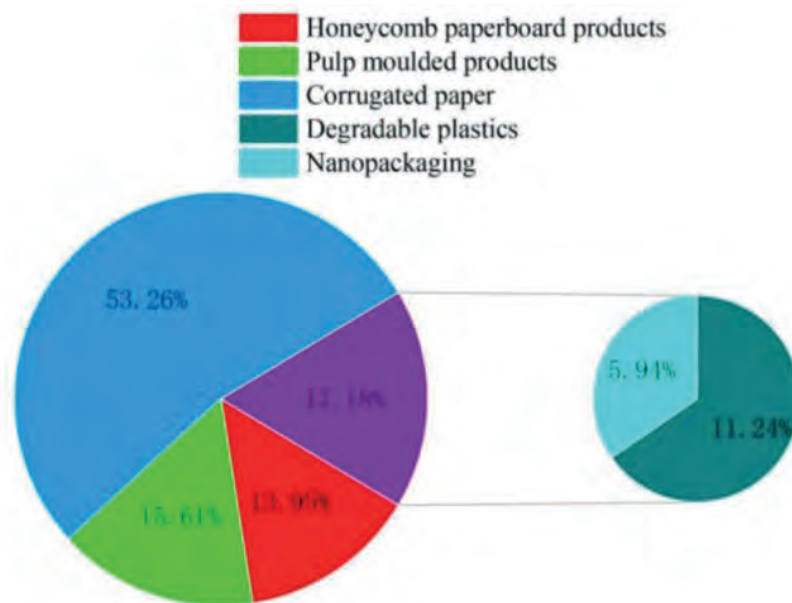
**Figure 1.** Analysis of logistics packaging design method

#### **4.2. Low carbon logistics packaging design material analysis**

The development of the Internet has made the express and logistics industry more and more, and the traditional online shopping flow packaging cannot meet the needs of China's green development. Using different art elements as well as packaging design materials to protect the environment and thus promote the sustainable development of logistics packaging industry is the inevitable way. In this section, artificial neural network is used to analyze the current commonly used raw materials for logistics packaging design, and the results are shown in Figure 2.

In terms of the low-carbon materials that art elements are incorporated into logistics packaging design, the five logistics packaging materials - degradable plastics, honeycomb paperboard products, pulp molded plastic products, nanopackaging, and corrugated paper - account for 11.24%, 13.95%, 15.61%, 5.94%, and 53.26%, respectively. It can be seen that corrugated paper material

applications account for more than half of the total. This is because corrugated paper materials have a variety of characteristics such as good cushioning performance, light weight, firmness, sufficient raw materials, low cost, ability to package a variety of items, metal usage, good printing performance, and recyclability. At the same time, good printing performance can also make the art elements remain on the logistics packaging for a longer period of time.



**Figure 2.** Logistics packaging design materials

## 5. CONCLUSION

In order to investigate the effectiveness of the application of art elements into logistics packaging design, this paper analyzes the relationship between art elements and logistics packaging design from artificial intelligence technology and analyzes the data using artificial neural network model. The conclusions are drawn as follows.

(1) In terms of the methods of integrating art elements into logistics packaging design, the four design methods of taking its shape, making its color, using its material and implying its meaning account for 26.48%, 11.25%, 34.92% and 27.35% respectively. This shows that using its material is more practical in art fusion logistics packaging design, which is designed and created through the concept of design, thinking and handwork.

(2) In terms of low-carbon materials for the integration of art elements into logistics packaging design, the percentage of corrugated paper

logistics packaging materials is 53.26%. This indicates that the integration of art elements into logistics packaging design should start in a low-carbon direction to achieve sustainable development in the logistics packaging industry.

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## **SWOT analysis of cross-border e-commerce development of agricultural products based on big data**

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### **ABSTRACT**

Associated with outmoded foreign occupation, the cross-border e-commerce (CBE) platform has incomparable advantages for agricultural products to expand domestic and foreign markets. This paper selects SWOT analysis method to effectively sort out the competitive advantages, competitive disadvantages, opportunities and threats of Zhejiang agricultural products CBE logistics system itself. The progress of China's agricultural products CBE is promoted by taking advantage of the introduction of national policies, the climbing rate of network coverage and the technical support provided by the progress of big data industry. Finally, the analysis of agricultural products imports and export volume and its growth rate in the context of big data is obtained: the growth rate of agricultural products out import and export in 2016 is 8.69% and 2.70% respectively, and is expected to fall in 2019. This study provides reference and reference for the construction and optimization of CBE logistics system, so as to better promote the progress of CBE of agricultural products in Zhejiang.

## KEYWORDS

Big Data; SWOT Analysis; Agricultural Products; Cross-border e-commerce

## 1. INTRODUCTION

cross-border e-commerce (CBE), as a novel engine to drive the growing of foreign trade, has great potential for progress. Although China's CBE started late, it has developed well [1-2]. In CBE trade, the proportion of trade in agricultural products should not be underestimated. As a large agricultural country, China, using the mode of CBE, vigorously supports the progress of foreign trade of agricultural products, while relying on the booming big data industry to solve related problems, which not only can increase farmers' income, but also encourage the progress of agricultural economy, and then encourage the healthy progress of the national economy [3-4]. Relying on the strong Chinese agricultural products supply market, cross-border agricultural products e-commerce can obtain stable sources of goods and provide consumers with rich and diverse agricultural products, thus achieving faster progress [5-6].

The literature [7] chose SWOT analysis method to effectively sort out the competitive advantages, disadvantages, opportunities and threats of Zhejiang agricultural products CBE logistics system itself, and then encourage the better progress of Zhejiang agricultural products CBE. The literature [8] makes a comprehensive analysis of the internal advantages and disadvantages, opportunities and challenges of the external environment of the CBE logistics of agricultural products in Henan Province with the help of SWOT analysis method, and proposes countermeasures for the progress of CBE logistics of agricultural products in Henan Province.

This paper firstly conducts a SWOT analysis on the progress of CBE of agricultural products, and analyzes the advantages, disadvantages and external opportunities and threats of Zhejiang in building a CBE logistics system for agricultural products. Then, to encourage the construction of "One Belt and One Road", China will spring filled play to the relative compensations of domestic regions, instrument an extra practical opening approach, reinforce the collaboration and

cooperation between the central and western regions, and expansively improve the level of exposing economy, which also brings great opportunities for Zhejiang's economic and trade progress. Finally, using SWTO to analyze the import and export growth value and growth rate of agricultural products CBE platform, the results reflect that the economic growing of agricultural products presents the problem of instability, and in response to this problem, we should make good use of the policy dividend to actively explore the progress of new trade rules, innovate the new mode of foreign trade progress, and further provide new support and progress opportunities for cultivating the logistics system of agricultural products CBE.

## **2. SWOT analysis of the current situation of CBE of agricultural products**

### **2.1. Advantages**

Diversified product supply. China is a vast country with a wide range of terrain and climate types, suitable for the growth of a variety of crops. Relying on the strong supply market of Chinese agricultural products, CBE of agricultural products can obtain stable sources of goods and provide consumers with rich and diversified agricultural products, thus achieving rapid progress. The construction of CBE platforms continues to improve, and there are more than 5,000 CBE platforms in China, which can well meet the needs of agricultural products enterprises to transport out foreign trade business. At the same time, the popularity of smartphones and the popularity of QR code payment have encouraged mobile payment facilitation, which also encourages more enterprises to participate in CBE trade, and the completion of a perfect and secure third-party payment platform is just around the corner.

### **2.2. Disadvantages**

The quality and safety of agricultural products are not high. China's agricultural products are often contaminated for three main reasons: First, the lack of a sound animal epidemic prevention system, resulting in frequent outbreaks of animal and plant diseases. For example, China's meat exports to the European Union were detected with excessive bacteria, and the poultry exports to Japan also failed to meet the access standards and requirements. Although this is also

related to the strict inspection and quarantine requirements of the relevant countries, but also illustrates the gap between the technical level of China's control of the quality of agricultural products and developed countries. Second, pesticide and veterinary drug sales are not properly regulated, and prohibited pesticides and veterinary drugs are still in circulation in the market. Third, the domestic air pollution, water pollution and soil heavy metal pollution problems are more serious. These factors have led to the frequent occurrence of quality problems in China's exports of agricultural products, hindering agricultural exports. At the same time, China's third-party temperature-controlled logistics construction is not perfect, there is a lack of hardware equipment, cold storage construction of low information technology and other problems, the complete closed temperature-controlled transport chain has not yet been built. The producers of agricultural products are mostly scattered households, and some CBE platforms lack strong supervision and management of these businesses, coupled with the lack of platform supervision, the traceability mechanism has not been perfected, so if there are problems with the quality of agricultural products, it is difficult to trace the person responsible. In terms of agricultural products information tracking, agricultural products cannot be marked, and it is impossible to trace the whole production process of agricultural products. Enterprise operators are not aware of the use of big data, at present, although many domestic enterprises through CBE to carry out foreign trade business of agricultural products, but most enterprises are weak in Internet thinking, poor ability to use big data, old-fashioned marketing methods, these are obstacles to the further progress of CBE of agricultural products.

## **2.3. Opportunity**

### **2.3.1. "Belt and Road" Strategic Opportunity**

To encourage the construction of "One Belt and One Road", China will give full play to the relative rewards of domestic regions, instrument an extra practical opening approach, strengthen the collaboration and assistance between central and western regions, and broadly expand the level of open economy, which also brings great opportunities for Zhejiang's economic and trade progress. In the context of "One Belt, One Road" strategy, by promoting the

construction of Zhejiang Ocean Economic Progress Demonstration Zone and Zhoushan Islands New Area, strengthening the construction of ports in coastal cities such as Ningbo and Zhoushan, increasing scientific and technological innovation, and forming new advantages in participating and leading international cooperation and competition, Zhejiang is gradually becoming the "One Belt, One Road" especially the 21st Century Maritime Silk Road construction of the main force. And CBE is becoming an important carrier of Zhejiang's economic transformation and upgrading, thanks to the Yangtze River Economic Belt customs integration reform and the "Yi-Xin Europe" train through the whole series of good, Zhejiang Province, "One Belt and One Road" along the import and export of countries is a better Growth momentum. At the same time, the "Belt and Road" strategy is also conducive to Zhejiang to accelerate the opening of domestic and international logistics channels to achieve the organic connection between the two, providing a rare opportunity for the better progress of CBE of Zhejiang agricultural products.

### **2.3.2. Create an upgraded version of modern agricultural park**

Zhejiang government attaches great importance to the construction of functional grain production areas and modern agricultural parks "two zones". 2016, Zhejiang was first approved to create the country's only agricultural "machine for human" demonstration province, and then approved to create the country's first demonstration province of green progress of animal husbandry. What's more, in the first three quarters of 2016, the added value of Zhejiang's agriculture, forestry, animal husbandry and fishery industry grew by more than 2.5%. At present, Zhejiang province has built 29 model agricultural whole industry chains in animal husbandry, aquaculture and bamboo, with a total annual output value of more than 100 billion yuan. In the process of promoting the construction of the whole agricultural industry chain, the Internet has played an indispensable role. 2015, Zhejiang's agricultural products network retail sales exceeded 30.4 billion yuan, an increase of 69%. During the "Thirteenth Five-Year Plan" period, Zhejiang will also deepen the construction of the "two regions" on the basis of actively creating about 30 agricultural industry clusters and about 100 special agricultural towns to encourage the integration of one, two and three industries and accelerate the progress of the whole agricultural industry chain. In addition, Zhejiang to "enterprise

as the leader, the base as the basis, the standard as the core, the brand as the leader, market-oriented", in the characteristic advantages of agricultural production base construction, based on the selection of a number of export agricultural production demonstration base, these are for the further progress of Zhejiang agricultural products CBE provides a material basis and a strong Guarantee.

## **2.4. Threats**

### **2.4.1. Lack of cooperation and low efficiency among agricultural logistics organizations**

The distribution of farmers and small and medium-sized agricultural enterprises in various cities in Zhejiang is relatively scattered, and there is a lack of large-scale operation in the transportation and marketing of agricultural products, and a lack of cooperation and win-win awareness among relevant logistics organizations. The low degree of logistics organization, single service function, less value-added services and serious homogeneous competition lead to low logistics efficiency, which not only increases the logistics cost of CBE of agricultural products, but also restricts the progress of agricultural products logistics system. At the same time, the progress of specialized CBE agricultural products third-party logistics enterprises and fourth-party logistics lags behind, with low market share and logistics specialization level to be improved.

### **2.4.2. Domestic and foreign policy risks**

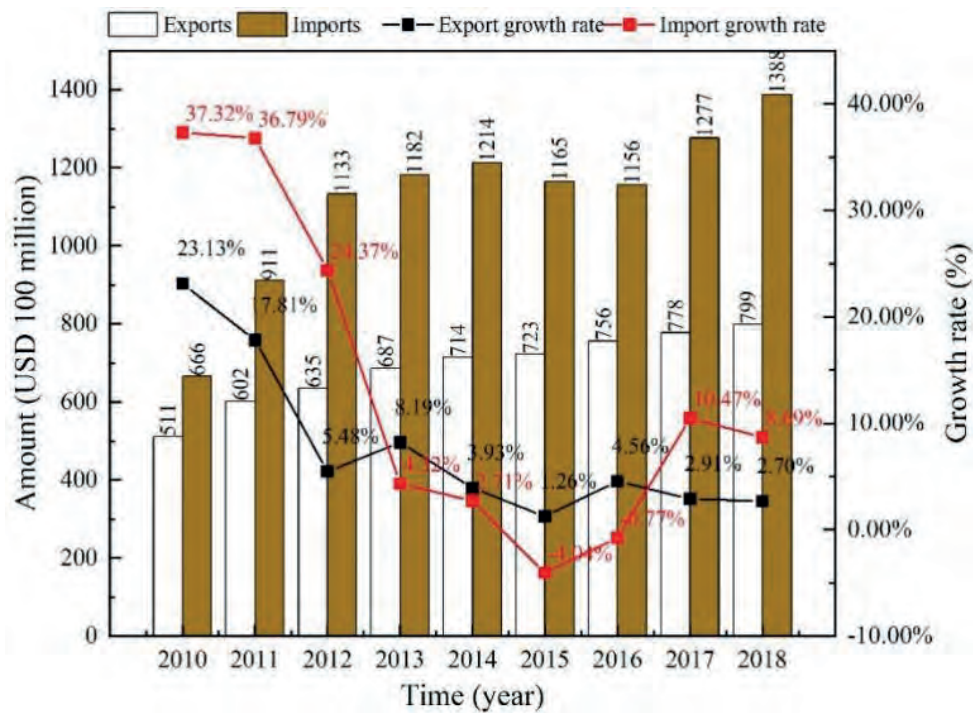
CBE of agricultural products will be affected by different domestic and foreign political, economic and trade systems, tax rates, exchange rate fluctuations, and policy changes, which will also affect the normal operation and progress of CBE logistics. CBE logistics involves domestic and overseas logistics systems, as well as customs supervision, customs clearance, inspection and quarantine in different countries. Customs policies, inspection and quarantine standards and strengths vary from country to country and are prone to change and uncertainty. This makes the cross-border logistics of agricultural products face many risks such as product quality inspection and customs clearance, which can easily cause losses to the CBE of agricultural products and related customers.

### **3. Data Analysis**

#### **3.1. Analysis of agricultural products import and export volume and its growth rate in the context of big data**

Figure 1 shows the import and export volume of agricultural products and its growth rate. The world economy has shifted from faster progress before the international financial crisis to low growth, and the economic recovery is not enough momentum, and the growth rate of international trade has dropped significantly. From the data on the IMF website, it can be seen that the growth rates of agricultural exports and imports in 2016 were 8.69% and 2.70%, respectively, and are expected to fall in 2019. The economic growth rate of developed economies, although fluctuating up, is still below 2.5%, while the growth rate of China's agricultural exports is also declining in fluctuation. The overall international economic situation is relatively sluggish, with weak external demand and weak international markets, which all bring certain difficulties for agricultural products CBE to enter the international market. Enterprises should make meticulous and multi-level division on the quality and safety of agricultural products, and produce high, medium and low-end agricultural products to meet the needs of consumers at all levels. Relevant departments should set strict inspection and quarantine standards for agricultural products, establish traceability mechanisms for agricultural products through information technology such as big data and cloud computing, strengthen the construction of agricultural product quality rating system, and improve the level of agricultural product quality supervision. The government needs to pay attention to the cultivation of talents for CBE of agricultural products, and can set up a CBE talent training base for social enrollment in order to cultivate composite talents.

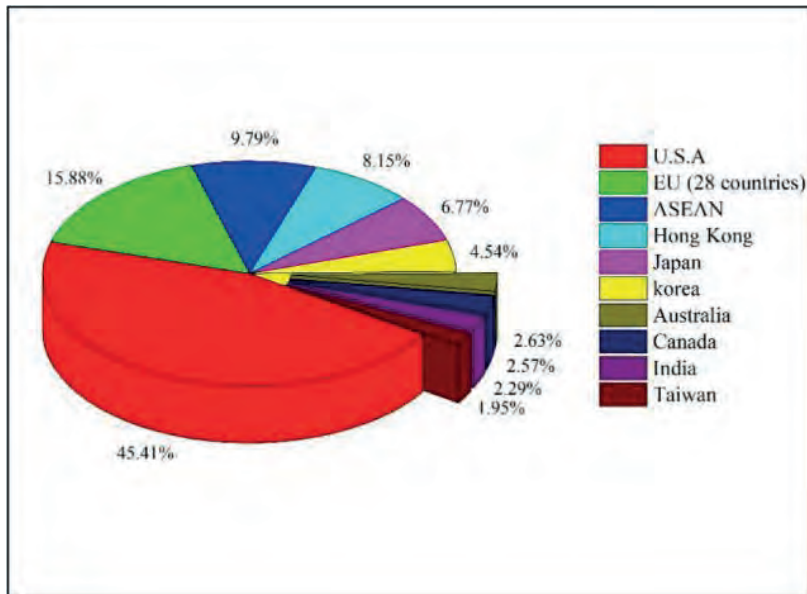




**Figure 1.** Import and export volume of agricultural products and its growth rate

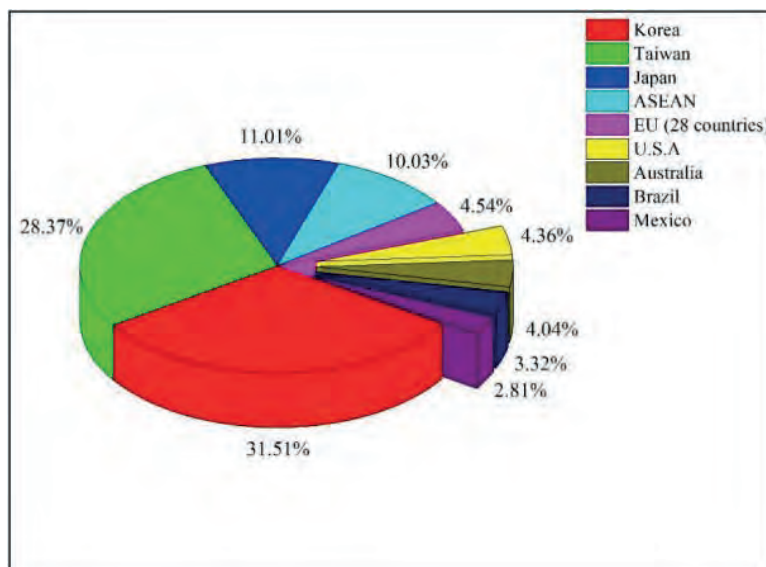
### 3.2. Flow and flow of CBE of agricultural products in Zhejiang

Figure 2 shows the proportion of major export countries in Zhejiang Province from January to December 2015. Zhejiang's exports mainly flow to North America, Europe, East Asia, Southeast Asia and other countries and regions. Agricultural products as an important part of Zhejiang's export commodities, the export flow of its agricultural products are also mainly concentrated in North America, Europe, East Asia, Southeast Asia and other countries and regions.



**Figure 2.** Proportion of export countries in Zhejiang Province from January to December 2015

Figure 3 shows the percentage of major importing countries in Zhejiang Province from January to December 2015. The imports of Zhejiang agricultural products mainly come from Southeast Asia, Europe, Australia and other countries and regions. For the statistics of the flow and flow of Zhejiang agricultural products CBE, it can be seen that the flow of Zhejiang agricultural products CBE is more stable. Meanwhile, although there are more countries and regions conducting cross-border trade of agricultural products, the flow of some countries and regions is lower.



**Figure 3.** Proportion of import countries in Zhejiang Province from January to December 2015

#### **4. CONCLUSION**

Based on the study and discussion of the present condition and difficulties of agricultural products CBE, this paper investigates the advantages, disadvantages and external opportunities and challenges of the agricultural products CBE logistics system itself using SWOT analysis, and the following conclusions can be drawn from this study.

(1) By analyzing the import and export of agricultural products and their growth rates in the situation of big data, the growth rates of agricultural products import and export in 2016 were 8.69% and 2.70% respectively, and the progress rate of China's agricultural exports also declined in fluctuations. The country needs to strengthen the construction of the quality rating system of agricultural products, expand the level of quality supervision of agricultural products, and use the mode of CBE to vigorously support the progress of foreign trade of agricultural products. This will not only increase farmers' income, but also encourage the progress of the agricultural economy, which in turn will encourage the healthy progress of the national economy.

(2) Through the analysis of the flow and flow of CBE of agricultural products in Zhejiang, the export flow of its agricultural products is also mainly concentrated in North America, Europe, East Asia, Southeast Asia and other countries and regions. And the import of agricultural products mainly comes from Southeast Asia, Europe, Australia and other countries and regions. It is believed that under the correct guidance of the government and with the active cooperation of the enterprises, China's agricultural products CBE will be settled in a long way.

#### **5. FUNDING**

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# Effects of pesticide pollution on the functional diversity of soil microbial communities based on big data environment

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## ABSTRACT

This paper focuses on the effects of pesticides on the functional diversity of soil microbial communities. Firstly, the methods of biodiversity measurement and data processing were introduced. Then the spatial and temporal patterns of changes in soil microbial AWCD of four forest types during pesticide spraying and the effects of pesticides on the diversity and metabolic functions of soil microbial communities in the ecosystem were presented. After 72 h of warming, the microbial community AWCD values of soils sprayed at 0.94, 1.88 and 4.70 kg ai Ha<sup>-1</sup> were reduced by 17%, 19.4% and 19.5%, respectively, relative to the control. The initial application of pesticides had some inhibitory effect on the carbon source utilization of the soil microbial community. The Simpson index of the three concentrations of pesticide treated soils differed significantly from the control, with 22.2%, 20.5%, and 22.9% reduction, respectively, which indicated that the dominant populations in the soil were significantly affected. Pesticide contamination had a significant effect on the functional diversity of the soil microbial community.

## KEYWORDS

Big data; Pesticide contamination; Community functional diversity; Soil microorganisms; AWCD values; Simpson index

## 1. INTRODUCTION

With the intensive exploitation of agricultural resources, solid wastes, sewage, fertilizers and pesticides accumulate in the soil year by year, resulting in explicit or latent complex pollution of the soil environment [1]. This not only affects crop diversity, but also directly endangers the diversity of soil microorganisms [2]. As an important component of soil ecosystems, soil microorganisms play an important role in promoting soil quality and plant health.

The literature [3] concluded that soil type is the main factor affecting the structure and distribution of soil microbial communities. The literature [4] investigated how the number and population patterns of soil microorganisms were affected by soil type during the tobacco growing season. The results showed a significant positive correlation between the number of soil microorganisms and soil nutrients under different soil types. The literature [5] investigated the microbial diversity of soil particles as influenced by fertilization conditions using the T-RFLP method. The results showed that the diversity of soil microorganisms was more pronounced in soils with high organic matter content and fine particles. Therefore, it can be seen that there is an extremely close relationship between the community structure diversity characteristics of soil microorganisms and soil type and soil conditions, and to accurately reflect the real situation of soil microbial diversity, it is necessary to first understand the influence of soil and bad conditions on it. The literature [6] pointed out that soil microbial carbon content is a key driver of nutrient and energy flow in subsurface soil ecosystems and contributes directly to the conversion of soil organic matter. The literature [7] concluded that there are interactive and synergistic effects of temperature and moisture conditions that can influence soil microbial diversity characteristics. The literature [8] investigated the changes in soil microbial communities after years of treatment with three alternative pulse herbicides, diquat, linuron and chlormequat. It was found that the structure and function of the soil microbial community were significantly altered by the three herbicides. The soil bacterial diversity was reduced and the microbial community structure was significantly different after treatment with the three herbicides. In the literature [9], the effect of the new insecticide acetamiprid on the soil microbial community was studied using the DGGE method.

Throughout the experiment, the effect of acetamiprid on soil microbial communities at normal field use concentrations was not significant, and there was no significant decrease in soil microbial genetic diversity. High concentrations of acetamiprid had some effects on soil microbial community gene diversity, but the effects were not long-lasting, and the differences between the soils of different treatments gradually decreased from the fourth week after incubation.

This paper mainly explores the effects of pesticides on the functional diversity of soil microbial communities. The experimental method of this experiment and the measurement method of soil microorganisms were introduced respectively, and the spatial and temporal patterns of changes in AWCD of four forest types of soil microorganisms before and after the implementation of pesticides were explored, and the effects of pesticides on the diversity and metabolic functions of soil microbial communities in the ecosystem were investigated.

## **2. Community functional diversity of soil microorganisms**

The functional diversity of soil microbial community is an important indicator to characterize the distribution of soil microbial community in the soil. By understanding the characteristics of soil microbial community, we can understand the health of soil ecosystem in time. In nature, only 1%-3% of all soil microbial species can be isolated and purified by human. Most of the soil microorganisms cannot be purely cultured by artificially simulated conditions due to the limitations of temperature, pH, nutrients, water and fertilization, and thus the life activity of all microbial populations in soil cannot be clarified by quantitative analysis. The BIOLOGECO microplate method is a means to characterize soil microbial communities by reflecting the metabolic diversity of soil microbial carbon sources. It has been widely used in the evaluation of soil microbial community diversity. Currently, the functional diversity of soil microbial communities can be characterized by the variation of different enzymatic activities in the soil and the metabolic fingerprinting of "carbon use level" based on BIOLOG ECO microplate technology. In this study, we focus on the metabolic diversity of soil microbial populations and explore the spatial and temporal variation of soil microbial AWCD in four forest types in order to correctly and comprehensively reveal the influence of different forest types, spatial and temporal succession and

pesticide application on the functional diversity of soil microbial communities.

### **3. Determination of the functional diversity of soil microbial communities**

The BIOLOG ECO microplate method was used to determine the functional diversity of soil microorganisms. First, fresh soil equivalent to 10g of dried soil was weighed and added to 100ml of phosphate buffer in a triangular flask. Then, shake at 160r/min for 10-15min, take 3ml of supernatant and add to 27ml, 0.145mol/L NaCl solution to dilute, repeatedly dilute to 1/1000 times and then aspirate 150 $\mu$ L of solution to inoculate into BIOLOG plate. Finally, the plates were incubated continuously for 10 d at 25C in an incubator, and read every 24 h at 595 nm with a VAMAX automatic plate reader. The equation for calculating the functional diversity of the soil microbial community is shown in Table 1. The mean rate of change AWCD values, species richness Shannon-Winner index SW, species dominance Simpson index SP and community evenness McIntosh index and utilization of different types of carbon sources were calculated according to Eq.



**Table 1.** Equations for calculating the functional diversity of soil microbial communities

Indicators	Evaluation purposes	Calculation formula	Note
AWCD value	Characterizing the ability of soil microorganisms to utilize a single carbon source Assessing the species richness of soil microorganisms Species richness	$AWCD = \sum (C - R) / n$	$C$ is the absorbance value of each hole, Light absorption for control holesvalue, $n$ is the number of medium wells.
Shannon-Winner Index	Assessing the species richness of soil microorganisms	$H = -\sum Pi(\ln Pi)$	$Pi$ The ratio of the relative absorbance value of the first well to the sum of the relative absorbance values of all reaction wells Ratio of
Simpson Index	For assessing the dominance of some of the most common species	$D = \sum_{i=1}^M [ni - (ni - 1) / N(N-1)]$	$N$ is the sum of the relative absorbance values of all reaction wells
McIntosh Index	For assessing the species homogeneity of soil microbial communities	$U = \sqrt{\sum ni^2}$	$ni$ is the relative absorbance value of the $i$ well

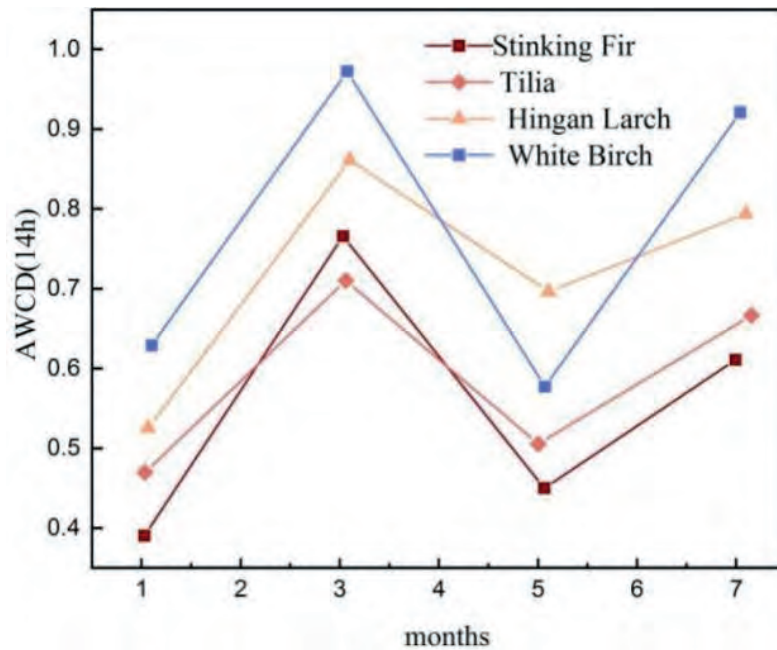
## 4. Results and Analysis

### 4.1. Spatial and temporal variation of soil microbial AWCD values

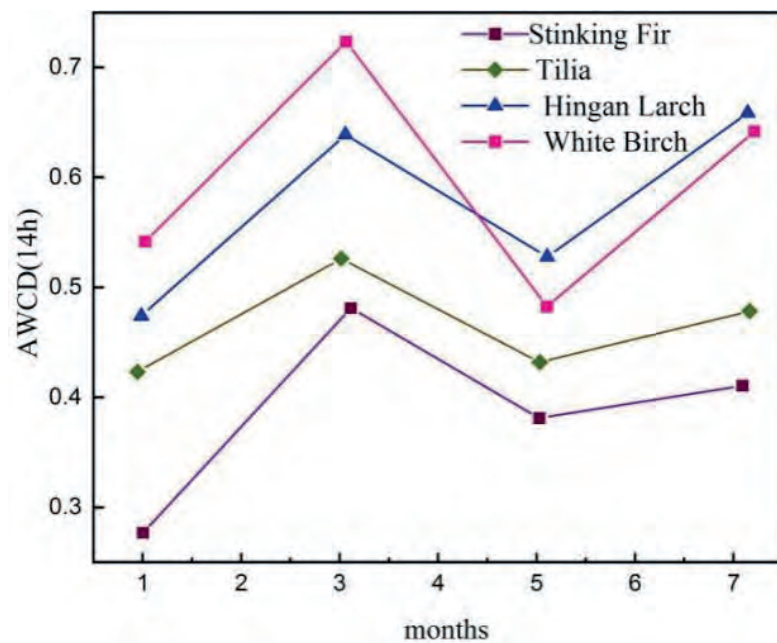
Microsoft Excel 2003 software was used to perform basic statistical processing of experimental data such as mean and standard error and to plot the pictures. One-way ANOVA analysis of variance (ANOVA) was performed using SPSS 16.0 software. The Duncan test was used to test the significance of differences in AWCD values, soil microbial diversity index, and carbon source utilization. Principal component analysis was used to analyze the diversity characteristics of soil microbial carbon metabolism. Figure 1 reflects the temporal

and spatial variation patterns of AWCD of soil microorganisms in four forest types during pesticide spraying. In the temporal variation pattern, the AWCD values of different soil layers of the four forest types showed a trend of increasing, then decreasing, and then increasing with time. The overall trend of AWCD values in the surface layer was 2 Months > 10 Months > 0 Months > 6 Months, and the overall trend of AWCD values in the 0-20cm layer was 2 Months > 10 Months > 6 Months > 0 Months, which was due to the differences in soil temperature and moisture conditions in different sampling periods.

In the spatial variation pattern, the AWCD values of soil microorganisms in the surface layer of the four forest types were higher than those in the 0-20 cm layer, indicating that the metabolism of carbon sources by soil microorganisms in the surface layer was higher, and the number of microorganisms in the surface soil was more and the life activity was vigorous. Among different forest types, the size pattern of AWCD values showed that Yew red pine forest > Stinking fir red pine forest > Xing'an larch forest > White birch forest, indicating that Yew red pine forest had the highest soil microbial AWCD values. The soil microbial community exhibited extremely high physiological activity due to its strong ability to utilize and metabolize a single carbon source. In contrast, the soil microbial AWCD value of Xing'an larch forest was the smallest, and the utilization capacity of soil microorganisms for carbon sources was weak compared with that of purple linden red pine forest. This is related to the stand conditions, soil nutrient content, and soil enzyme activity among different forest types. It can be seen that soil microbial AWCD values can be influenced by many factors such as spatial and temporal variation, soil environmental conditions and forest type. Figure 2 shows the temporal variation pattern of AWCD values in the 0-20 cm soil layer.



**Figure 1.** Temporal variation pattern of AWCD values in topsoil



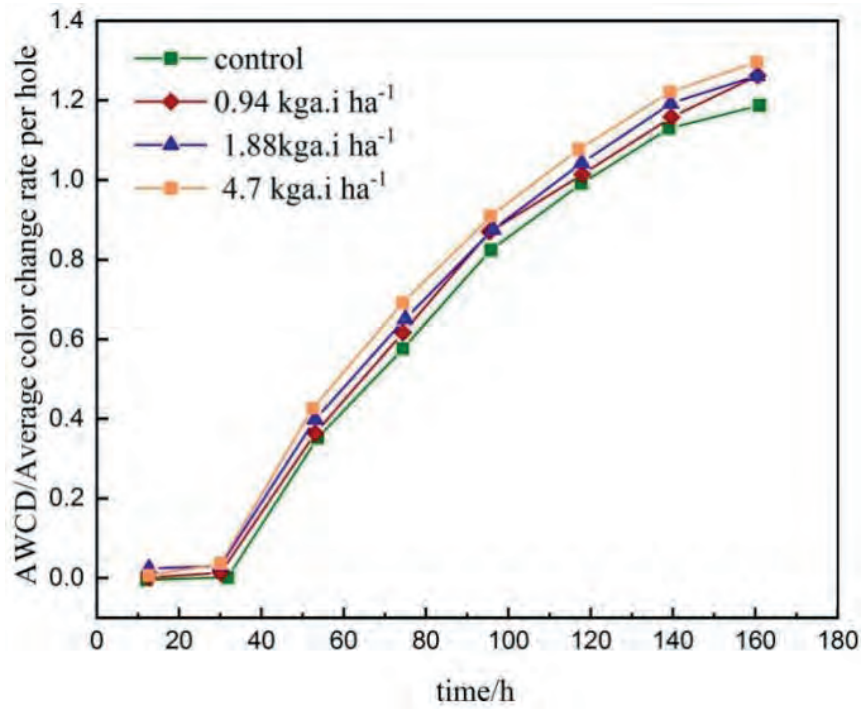
**Figure 2.** Temporal variation pattern of AWCD values in the 0-20 cm layer of soil

#### 4.2. Effects of pesticides on the diversity and metabolic functions of soil microbial communities in ecosystems

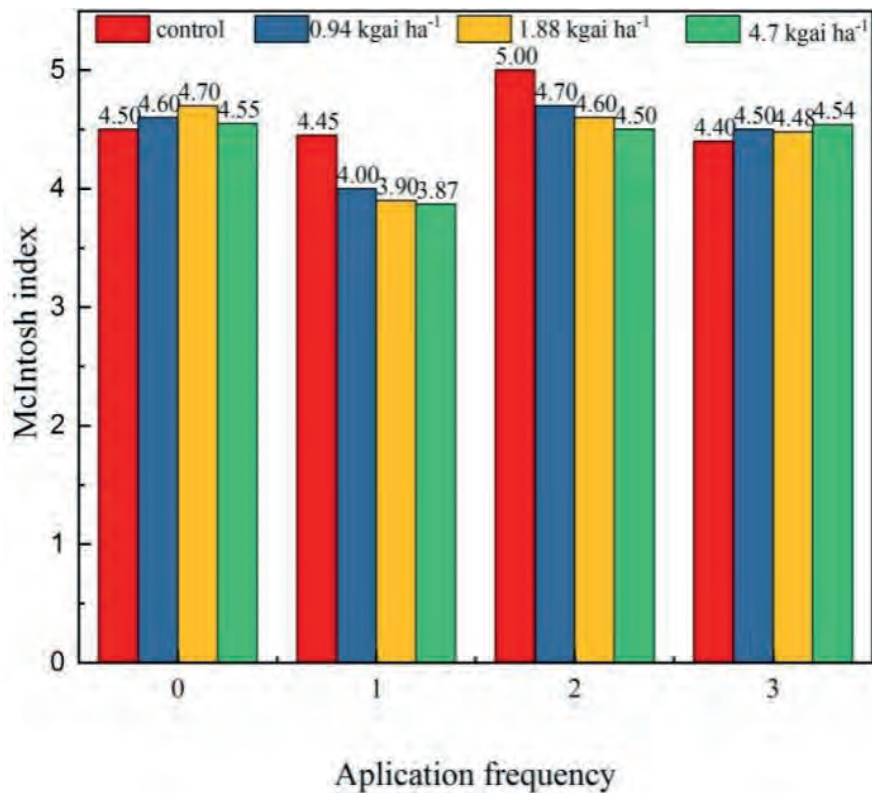
The BIOLOG technique, based on redox colorimetric reaction, is an effective means to quantitatively describe the carbon source utilization capacity of soil microbial communities. Since different microorganisms utilize a single carbon source to different degrees, making the solution in each pore also show different degrees of color

change, the change in AWCD values can accurately reflect the overall activity of the soil microbial community. The effect of repeated applications on the utilization of carbon sources by the soil microbial community is shown in Fig. 3. Before the pesticide treatment, the AWCD values of the soil microbial community in each plot did not differ significantly throughout the warming period, indicating that the activity of the soil microbial community in each plot remained basically the same. After the first application, the AWCD values of the microbial communities of the treated soils were all significantly lower than those of the control soils, and the differences were significant throughout the warming period. After 72 h of incubation, the AWCD values of the microbial communities in soils sprayed at 0.94, 1.88 and 4.70 kg ai Ha<sup>-1</sup> were reduced by 17%, 19.4% and 19.5%, respectively, relative to the control. After 168 h of incubation, the AWCD values of microbial communities in the three concentration-treated soils were still lower than the control by 17%, 19.4% and 19.5%, respectively. The above results indicated that the initial application of pesticides would have a significant inhibitory effect on the overall soil microbial activity, which was enhanced with the increase of pesticide concentrations.

The effects of repeated pesticide applications on the functional diversity of soil microorganisms are shown in Figure 4. before the first application, there were no significant differences in the three diversity indices of soil microorganisms in each plot. After the first application, all three diversity indices of soil microorganisms were lower than the control level, indicating that the dominant population, species richness and homogeneity of soil microorganisms were affected to some extent by the pesticide treatment. The Simpson indices of the three concentrations of pesticide treated soils were significantly different from the control, with 22.2%, 20.5% and 22.9% reduction, respectively, indicating that the dominant populations in the soil were significantly affected. Shannon and McIntosh indices were lower than the control level but not significantly different, indicating that species richness and homogeneity were less affected.



**Figure 3.** Changes in soil microbial community warming process after pesticide treatment



**Figure 4.** Effect of repeated applications on the functional diversity of microbial communities

## 5. CONCLUSION

In this paper, the effect of pesticides on the microbial species and microbial population of soil on different forest types was investigated by BIOLOG ECO microplate method, and the pattern of pesticide effect on the microbial species and microbial population of soil on different forest types was found. The following conclusions are drawn.

(1) Soil microbial AWCD values can be influenced by many factors such as spatial and temporal changes, soil environmental conditions and forest types.

The metabolic capacity of surface soil microorganisms for carbon sources is higher, and the number of microorganisms in the surface soil is higher and their vital activities are vigorous. Between different forest types, the size pattern of AWCD values showed that yew linden red pine forest > odorous fir red pine forest > Xing'an larch forest > white birch forest.

(2) The dominant populations, species richness and homogeneity of soil microorganisms were affected to some extent after the pesticide treatment. The Simpson indices of the three pesticide concentrations were significantly different from the control, indicating that the dominant populations in the soil were significantly affected. Shannon and McIntosh indices were lower than the control level but not significantly different, indicating that species richness and homogeneity were less affected.

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# The Application of Big Data Technology in Foreign Law Identification System in the Context of "One Belt, One Road"

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## ABSTRACT

In this paper, the performance of the SVM classification model differs by choosing different types of kernel functions in the context of "One Belt, One Road", starting from big data technology. The performance of the SVM model proposed in this paper is analyzed, and the factors influencing the implementation of foreign law identification system are quantitatively analyzed. The accuracy of the model in this paper is 89.9%, which is 5.5%, 4.2%, and 6.4% higher compared to FastText, CNN, and LSTM, respectively. In terms of influencing factors, the identification method, identification channel, and identification procedure increased by 98%, 109.72%, and 32.9% from 2016 to 2020, respectively. This shows that the main factors affecting the smooth operation of the foreign law identification system can be effectively analyzed by using big data technology.

## KEYWORDS

Big Data Technology; SVM; Kernel functions; Performance Analysis; Foreign law identification system; One Belt One Road

## 1. INTRODUCTION

Since the "One Belt and One Road" initiative was proposed, its construction has been proceeding in an orderly manner, and the interaction between countries along the route has become increasingly close. The increasing investment cooperation between China and the countries along the "Belt and Road" has led to an



increase in the number of foreign-related civil and commercial cases in China year by year, and the types of cases have shown diversified characteristics [1-2]. In judicial practice, due to the different geographical locations of the countries along the route, the legal systems and trial modes are also different. This can lead to opposite judgment results for the same disputes and unpredictable legal risks for investors [3-4]. The "Belt and Road" is an inheritance of the ancient Silk Road, and the trade among the countries along the route is becoming increasingly close, but the existing foreign laws in China are of uneven quality, and there is a need to correctly improve the content of applicable foreign laws [5-6].

Effective identification of foreign law is the prerequisite and foundation for the correct application of foreign law, and is the key to resolving overseas trade and investment disputes of Chinese enterprises. Effective identification of foreign law is conducive to enhancing the image of Chinese courts and arbitration institutions, improving the overall investment environment in China, and echoing and complementing the implementation of China's "One Belt, One Road" strategy [7-8]. Obviously, a large number of foreign-related disputes require the identification of foreign law, and the internationalization process of China also requires the identification of foreign law. The path of foreign law identification should be designed in accordance with the concept of equal treatment of domestic and foreign law in private international law [9-10]. Because of its strong procedural nature and technical requirements, foreign law has become an issue that needs to be improved in the legislation and practice of Chinese private international law and civil procedure law [11].

In order to explore the application of big data technology in analyzing the factors influencing the operation of foreign law identification system in the context of "One Belt, One Road", this paper analyzes and demonstrates in three parts. The first part is an algorithm analysis, which illustrates the SVM classification model with big data technology and explains the basic principle of the model and the choice of kernel function. The second part is the problems of foreign law identification in the context of "One Belt, One Road", including the allocation of responsibilities, negative attitudes, complex types and lack of identification channels. The third part is the data analysis,

which evaluates the performance of the SVM model proposed in this paper, and analyzes the factors affecting the smooth operation of the foreign law identification system by using the SVM classification model. The above three parts are used to demonstrate the application of big data technology in the foreign law identification system.

## 2. Big Data Technology - Support Vector Machines

SVM was first proposed by Cortes and Vapnik in 1995, and it shows many unique advantages in solving small sample, nonlinear and high-dimensional pattern recognition, and can be extended to other machine learning problems such as function fitting.

The support vector machine approach is based on the VC theory of statistical learning theory and the structural risk minimization principle, which seeks the best compromise between the complexity of the model (i.e., the learning accuracy for a given training sample, Accuracy) and the learning ability (i.e., the ability to identify arbitrary samples without errors) based on limited sample information, with a view to obtaining the best generalization ability (or generalization capability).

### 2.1. The basic principle of SVM

In layman's terms, SVM is a two-class classification model whose basic model is defined as a linear classifier with maximum interval on the feature space, i.e., the learning strategy of a support vector machine is interval maximization, which can eventually be translated into the solution of a convex quadratic programming problem.

The SVM optimal classification function is expressed as follows:

$$S(x) = \text{sign} \left[ \sum_{i=1}^n a_i y_i K(x_i, x_j) + b \right] \quad (1)$$

Where  $a_i$  is the non-negative Lagrange multiplier,  $y_i$  is the category,  $K(x_i, x_j)$  is the kernel function, and  $b$  is the classification threshold.

### 2.2. Kernel function selection for SVM

At present, there are four kinds of kernel functions commonly used in SVM, mainly Sigmoid kernel function, polynomial kernel function, radial basis kernel function, and linear kernel function. Among them, the polynomial in this paper adopts 2nd order polynomial, and all

kernel function expressions are as follows.

The linear kernel function is:

$$K(x_i, x_j) = x_i^T x_j \quad (2)$$

The polynomial kernel function is:

$$K(x_i, x_j) = (gx_i^T x_j + \gamma)^c \quad (3)$$

Where  $g > 0$ ,  $c$  are natural numbers.

The radial basis kernel function is:

$$K(x_i, x_j) = \exp(-g \|x_i - x_j\|^2), g > 0 \quad (4)$$

The Sigmoid kernel function is:

$$K(x_i, x_j) = \tanh(gx_i^T x_j + r) \quad (5)$$

### **3. Problems Identified in Foreign Law in the Context of “One Belt, One Road”**

Foreign law identification refers to the question of how to identify the provisions of a foreign law on a particular issue when the court of a country, in an international civil or commercial case, should apply a foreign substantive law in accordance with its own conflict of laws norms. This process involves both the identification of the existence of a legal provision or precedent and the true meaning of that legal provision or precedent, i.e., the "identification" and "clarification" of foreign law.

#### **3.1. Foreign law identifies the negative attitude of the subject**

In China, the attitude of the subjects of foreign law identification is relatively negative for a number of reasons. First, the most important reason is that judges are unfamiliar with foreign law and prefer to apply their own familiar domestic law as compared to foreign law. Second, language difficulties are one of the reasons for the negative attitude of judges toward foreign law identification. In foreign-related civil and commercial cases, judges must first be familiar with the foreign law involved in the case. However, there are 66 countries along the "Belt and Road", with more than 50 different languages and complicated language conditions, so it is impossible for judges to be

familiar with the laws of each country due to language difficulties. Due to the different judicial education of the judges, which leads to bias in legal concepts, this undoubtedly increases the difficulty of identifying foreign laws, and some countries' laws may also be affected by religious factors.

### **3.2. Complex types of cases to be identified under foreign law**

In the process of implementing the "Belt and Road" strategy, Chinese enterprises will take the lead in infrastructure construction and energy cooperation and development projects, and a new wave of overseas mergers and acquisitions, engineering contracts, international transportation and cross-border e-commerce transactions will emerge. The new rounds of M&A, engineering contracting, international transportation and cross-border e-commerce transactions will be the climax. The types of cross-border disputes will be more complex, and the demand for legal clarification will increase significantly. Compared with the traditional identification of corporate law, maritime law and trade law, Chinese courts will face more identification of foreign contract law, tort law, intellectual property law, merger and acquisition law, as well as foreign investment and financial regulation laws, some of which are more specialized and detailed.

### **3.3. The country of origin of the foreign law to be identified mostly lacks identification channels**

Many countries and regions along the "Belt and Road" include Russia, Kazakhstan, Vietnam, Poland and other countries belonging to the civil law system, as well as Malaysia, Singapore, India, Pakistan and other countries belonging to the common law system. Most of the countries along these routes are developing countries with which China has had infrequent civil and commercial dealings and few professionals practicing law in China, whose laws are not well known to us and are not among the countries and regions identified by the courts more frequently in practice. Moreover, many of these countries are non-English speaking, and there are language barriers and difficulties in finding legal articles, searching the internet, treatises and other resources.

## 4. SVM-based analysis of foreign law to identify operational influences

### 4.1. Performance analysis of SVM

In this section, the performance of the foreign law identified impact factor SVM analysis model is compared and the model output prediction results are provided for the impact factor analysis. In this paper, three metrics are used to evaluate the baseline model, including accuracy ACC, macro precision MP, and macro recall MR, which are widely used in classification tasks. To evaluate the performance of the model, the foreign law identified influence factor SVM analysis model is compared with FastText, CNN, and LSTM in this paper. The experimental results are shown in Table 1.

**Table 1.** Comparison of experimental results

Mission	ACC/%	MP/%	MR/%
FastText	84.4	49.7	40.5
CNN	85.7	36.4	32.7
LSTM	83.5	72.8	54.8
SVM	89.9	25.6	21.4

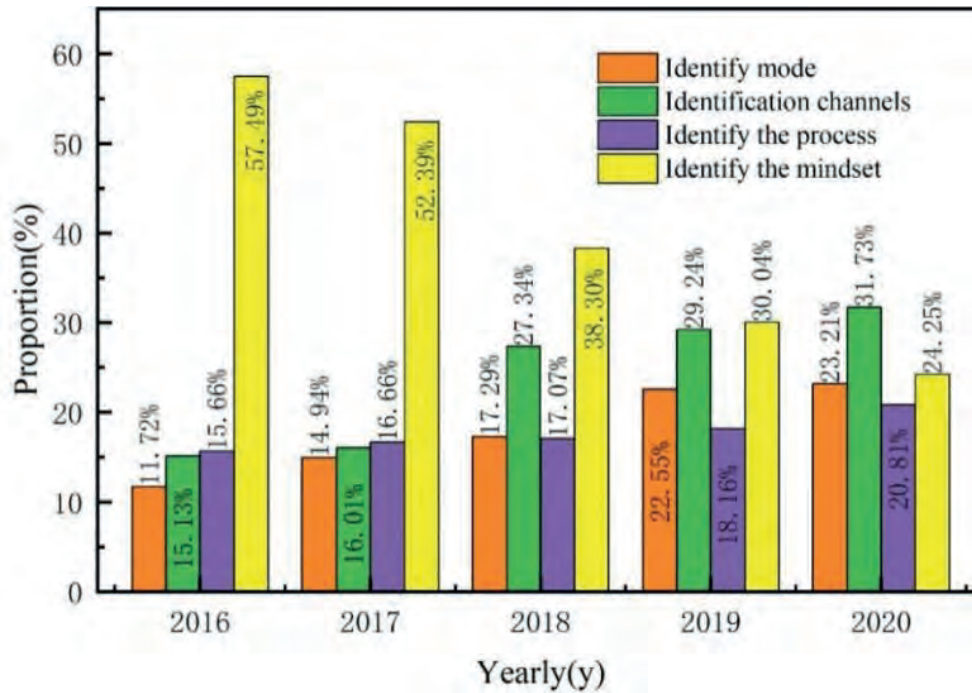
On the existing dataset, the accuracy of the model in this paper is 89.9%. Compared with the other three methods by 5.5%, 4.2%, and 6.4%, respectively, the performance of the model in this paper is significantly better than other classification analysis methods, indicating the effectiveness of the method proposed in this paper. Compared with the traditional classification task model, the method in this paper pays more attention to data pre-processing to make the data more adaptable to the model, and makes full use of the good learning ability and low generalization error rate of SVM to achieve good prediction in the analysis of the influencing factors identified by the foreign method.

### 4.2. Analysis of operational influence factors

Under the influence of "One Belt, One Road", the number of foreign-related cases is increasing, the number of countries involved is increasing, and the types of foreign-related cases are becoming more complex, and the requirements for the identification of subjects are also higher. In this section, the SVM classification model is used to classify and analyze the cases related to foreign law identification in recent years, so as to find the influential factors affecting the

operation of foreign law identification. The results of the analysis are shown in Figure 1.

In terms of factors influencing the operation of foreign law identification, from 2016 to 2020, identification methods, identification channels, identification procedures, and identification mentality become the main factors affecting the smooth operation of the foreign law identification system.



**Figure 1.** Analysis of operational influences

In terms of identification methods, the number has increased from 11.72% in 2016 to 23.21% in 2020, an increase of 11.49 percentage points, indicating that the depth of "One Belt, One Road" has made it more difficult to find ways to identify foreign law. The number of identification channels increased from 15.13% in 2016 to 31.73% in 2020, an increase of 16.6 percentage points. Identification procedures grew from 15.66% in 2016 to 20.81% in 2020, an increase of 5.15 percentage points. When a legal expert retained by the parties issues a contrary opinion or the parties disagree, the court then exercises its discretion and determines that the foreign law cannot be identified. The identification mentality decreased from 57.49% in 2016 to 24.25% in 2020, a decrease of 33.24 percentage points. This indicates that the implementation of the foreign law identification system can be effectively promoted after an exemption

system regarding errors in the application of foreign law in a way that legally supports and protects judges.

## **5. CONCLUSION**

Focusing on the legal difficulties arising from the construction of "One Belt, One Road", we found that the current foreign law identification system is not operating smoothly mainly due to the objective circumstances that make it difficult to identify, such as the unified opinion of experts to identify foreign law and the lack of detailed provisions on the identification process. There is also the subjective mentality that experts find it difficult to identify foreign law and apply it correctly. Accordingly, feasible suggestions will be made.

(1) Improving the method of identifying experts in foreign law, clarifying the criteria for experts, and compiling a roster of experts.

(2) Improve the mechanism of responsibility for the identification and application of foreign law, and clarify the responsibility for the identification of foreign law and the system of exemption from liability for errors in the application of foreign law.

## **6. FUNDING**

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# **Research on talent cultivation model of integration of science, industry and education under the concept of curriculum thinking and government**

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## **ABSTRACT**

In order to comprehensively promote the construction of "Curriculum Civics" in engineering majors of higher vocational colleges and universities under the background of integration of industry and education, based on the opportunities and challenges of promoting the construction of Curriculum Civics under the background of integration of industry and education. This paper combines the characteristics of engineering courses in higher vocational colleges and universities, and addresses the problems of course thinking politics being formal and not obvious. It explores the path of promoting the construction of curriculum thinking politics from three aspects, namely, the excavation of curriculum thinking politics resources, the determination of curriculum thinking politics goals and the integration of curriculum thinking politics resources, and devotes itself to scientifically and steadily promoting the construction of curriculum thinking politics and cultivating high-quality technical skills talents. The results show that the integration of industry-education integration into the curriculum thinking and politics can effectively improve the construction of students' ideology and morality, and the attendance rate of students increased by 23.18%. The construction of industry-education integration into curriculum thinking and politics

cultivation system proposed in this paper can effectively promote the cross-border and synergistic development of regional economic industrial chain and vocational talents value chain.

## **KEYWORDS**

Industry-education integration; Curriculum Civics; Senior Engineering Major; Resource mining; Regional Economic Industry Chain; Synergistic Development

## **1. INTRODUCTION**

Traditional engineering colleges and universities emphasize the teaching of professional knowledge and skill cultivation, but do not pay attention to value shaping, which has led to some extreme social incidents and sounded an alarm for higher education [1-2]. In the 2016 National Conference on Ideological and Political Work in Colleges and Universities, General Secretary Xi Jinping clearly pointed out that "all other courses should guard a section of drains and plant a good responsibility field, so that all kinds of courses and In 2016, General Secretary Xi Jinping clearly pointed out that "all other courses should keep a good channel and plant a good field of responsibility, so that all kinds of courses and ideological and political theory courses can go in the same direction and form a synergy effect". This has opened a new situation of the ideological education in colleges and universities [3-4].

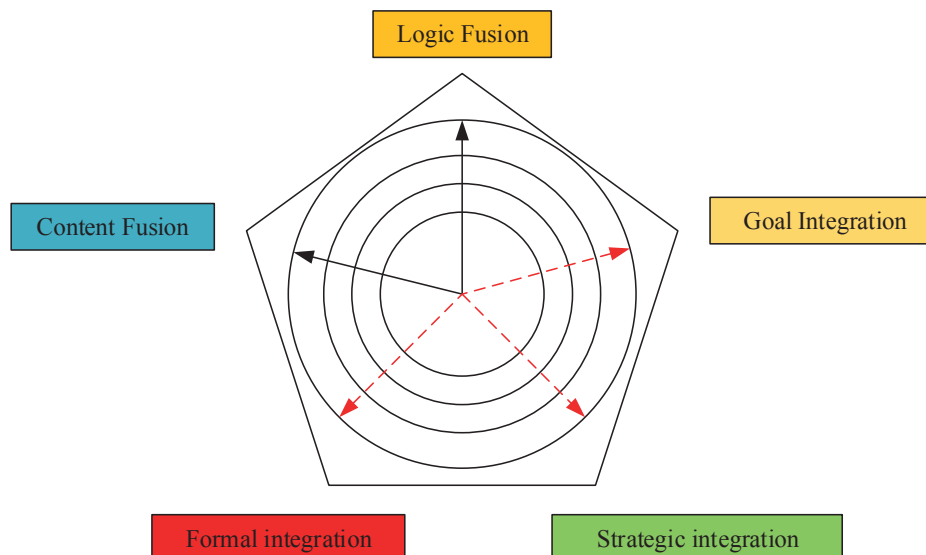
In the literature [5], it is proposed that the construction of higher vocational curriculum thinking politics should be promoted on the basis of industry-education integration, and the advantages of university-enterprise teachers and resources should be brought into play by the platform of industry-education integration. In the literature [6], it is believed that the construction of curriculum thinking and politics promotes the implementation of the fundamental task of "establishing moral education" in multiple channels and dimensions, creates a new situation of "three-wide education", and promotes the construction of high-quality curriculum thinking and politics. According to literature [7], the traditional vocational education is mainly run by administrative mode, and teachers are mainly full-time teachers, among whom there are many teachers who go from "school to

school" and lack working experience in enterprises, so they do not have a deep understanding of students' future employment positions.

This paper first explains the human orientation and inherent unity of the two co-education, and introduces the coupling, symbiosis and affinity characteristics of the co-education subject of "Curriculum Civics" + "Industry-Education Integration". The necessity of constructing a symbiotic system of mainstream values discourse and education elements is discussed. Secondly, the logic and practical path of the collaborative education model of "curriculum thinking and government" + "industry-education integration" are proposed. It is emphasized that the interdisciplinary integration and co-construction, the collaboration and innovation among education subjects and the "enterprise culture" education should be highlighted in the education practice. Finally, it is pointed out that the construction of "big data + education" and other big moral education framework system can effectively promote the cross-border and synergistic development of the regional economic industry chain and the value chain of vocational talents.

## **2. The integration of curriculum thinking and politics into industry-education integration talent cultivation model**

In order to play the role of the concept of curriculum thinking in the model of integration of education and industry, it is necessary to make the concept integrated into the model, constituting a new model with both professional skills and inner quality training. How to integrate the concept into the model is the core issue, which requires a corresponding method to achieve. Next, specific methods will be proposed to build a logic diagram of the integration of Civics and Political Science resources into the science and industry education system as shown in Figure 1.



**Figure 1.** Civic resources integrated into the science, industry and education system

## 2.1. Digging into Civic Political Elements

In order to integrate the concept of curriculum thinking and politics into the talent training model of industry-education integration, it is necessary to explore the thinking and politics elements of different courses in the model, including theoretical courses, practical training courses and industrial practice courses, which is the basic condition for the integration of the concept of curriculum thinking and politics. There are two ways to explore the elements of the curriculum, one is to explore the textbook or educational content, teachers should carry out in-depth analysis to find the elements of Civic Science and Politics in the textbook or educational content. The second is for extra-curricular content, where teachers can substitute external thinking and political elements into the course teaching, which can also achieve the purpose of course element mining. The following will analyze the common elements of Civics in both types of courses.

### 2.1.1. The ideological element of the theory course

The theoretical courses in the industry-education integration talent cultivation mode mainly work around the textbook, so teachers should use the first way of digging Civic and Political elements in this course to dig, but they can also supplement it with the second way to dig. Take the textbook of Communication Principle of Communication Engineering as an example, teachers can find out a lot of thinking political elements in the textbook through the first way of mining. For

example, for the introductory content, teachers can see the importance of communication engineering in the modern industry, with the help of communication engineering can make people's division of labor and collaboration relationship more smooth and close, and improve the efficiency and communication range of human communication. This can serve to improve efficiency and enhance the synergy of work. In that role various industries will begin to integrate and cooperate with each other, promoting the transformation of domestic industries and providing momentum for national development. This is in line with the requirements of the National Diversification Policy Initiative, a Civic Element. In addition, if the teacher uses the second type of mining in the theoretical course, he or she can substitute some extracurricular, real-life occurrences into the teaching of the theoretical course, such as the impact of the new achievements of national communication engineering on the international political status of the country.

### **2.1.2. The ideological element of the practical training course**

The practical training courses are mainly carried out after the theoretical courses, aiming to let talents master the way of applying theoretical knowledge in a simulated environment, and also initially help them accumulate experience and prepare for the practical teaching in the industry afterwards. The practical training course also has rich elements of thinking and politics in it, and teachers should also make deep excavation. In the practical training course, it is suggested that teachers mainly use the second way to dig, which can combine with extra-curricular thinking resources to raise questions and prompt talents to think during their practical training. This can make the talents' thoughts clearer and know why they learn and what they will bring to help themselves and the society after learning, and their political concepts, thoughts and consciousness are shaped in this way. For example, in the packaging industry, teachers can cite common problems in the modern packaging industry and lead talents to think about the adverse effects of these problems and how they will affect China's international political landscape if they can be solved, etc.

## **2.2. Changing the teaching model**

The teaching mode adopted by many modern institutions in the industry-education integration talent training mode is teacher-led, which will cause talents to perform passively and is not conducive to the play of their subjective initiative. They do not think about the problem, usually remember what the teacher said, and participate in practical training or practice according to the teacher's requirements, which can only cultivate employment-oriented talents and cannot play the role of thinking politics training. Therefore, under the concept of Curriculum Civics, institutions and teachers must start to change the teaching model, putting talents in the leading position and teachers working as the guide. This teaching model is the only way to make the concept of curriculum thinking and politics into the integration of industry-education personnel training mode, and give full play to its proper role.

In the changed teaching mode, because talents occupy a dominant position, they have ample room for activism and are in a position to develop their own thinking, plus the teacher's guidance can stimulate talents' initiative and prompt them to start thinking. The teacher as a guide has to raise guiding questions with the meaning of thinking, so that talents can think about these questions in order to achieve the purpose. In the case of graphic design, for example, the teacher as a guide can ask similar questions about how we should promote traditional Chinese culture in fashion design. These questions will make talents start to think and gradually try to integrate the design elements of China's excellent traditional culture in Packaging design to enhance China's international influence with the help of cultural exchange.

## **2.3. Reforming the curriculum**

For a long time, the curriculum systems of domestic institutions have been characterized by distinctive course boundaries, i.e., there are obvious boundaries between different courses. This has led to the independence of courses from each other, making it difficult to integrate the skills courses with the Civic and Political Science courses, and the concept of Civic and Political Science in the curriculum naturally cannot play its proper role. Faced with this situation, institutions must start to reform the curriculum system,

aiming to change the relationship between the courses people, so that skills courses and Civics courses are integrated with each other. So that the skills course teachers and Civics course teachers collaborate with each other to play the role of the concept of curriculum Civics.

After the reform of the curriculum system, teachers can collaborate with each other and give each other some help in their own expertise in the collaboration, i.e., the expertise of teachers of skill courses is skill education and their weakness is Civic Education. This makes it difficult for such teachers to effectively carry out thinking and political education in their own courses, and they also encounter some difficulties when tapping into the thinking and political elements. However, the expertise of Civic Studies teachers is the opposite of weaknesses, and they can help skills course teachers to effectively carry out Civic Studies education or explore Civic Studies elements, and also get professional information from skills course teachers, which can be used in Civic Studies education. It can be seen that the reform of the curriculum system makes the relationship between the skill courses and the Civics courses harmonious, and the concept of Civics in the curriculum can be smoothly integrated into the industry-education integration talent training mode, and with the help of the concept of Civics in the curriculum can cultivate both internal and external talents.

### **3. Results and Analysis of Industry-Education Integration into Curriculum Civics**

#### **3.1. Industry-education integration into the curriculum Civics evaluation index establishment**

The organization of industry-education integration, i.e., the structure built by each stakeholder to achieve the goal of industry-education integration, i.e., the professional construction, curriculum and teaching materials construction, teacher team construction and internship and training base construction carried out by both sides in the process of cooperation.

The implementation of industry-education integration means observing the intensity of information communication and the effectiveness of training and guidance in the cooperation between the two parties. The intensity of information communication includes the

number of seminars conducted and the degree of openness of information technology communication between the two sides. Training guidance considers the percentage of pre-service training provided by the school to students, the percentage of follow-up guidance provided by the school to students, and the number of employees trained by the school for the company.

The effect of industry-education integration is observed in three aspects: employment level, student satisfaction, and the gold content of the graduation certificate. The employment level examines the retention rate of students in internship, the contracting rate of students in internship, and the monthly salary of students at graduation. Student satisfaction examines students' recognition of the enterprise, recognition of the teachers, and recognition of their own ability improvement. The gold content of the graduation certificate contains the percentage of the number of dual certificates and the percentage of the professions with vocational certificates.

### 3.2. Data analysis of evaluation indicators

(1) Industry-education integration integration curriculum thinking and political resources input

University H has a more complete internship and training base, the government funds the establishment of experimental teaching centers and key laboratories, and enterprises provide practical equipment support and build educational bases with the university. The university increases the funding for practical teaching, and the average practical funding for students increases year by year. The economic investment of University H from 2019 to 2022 is shown in Table 1.

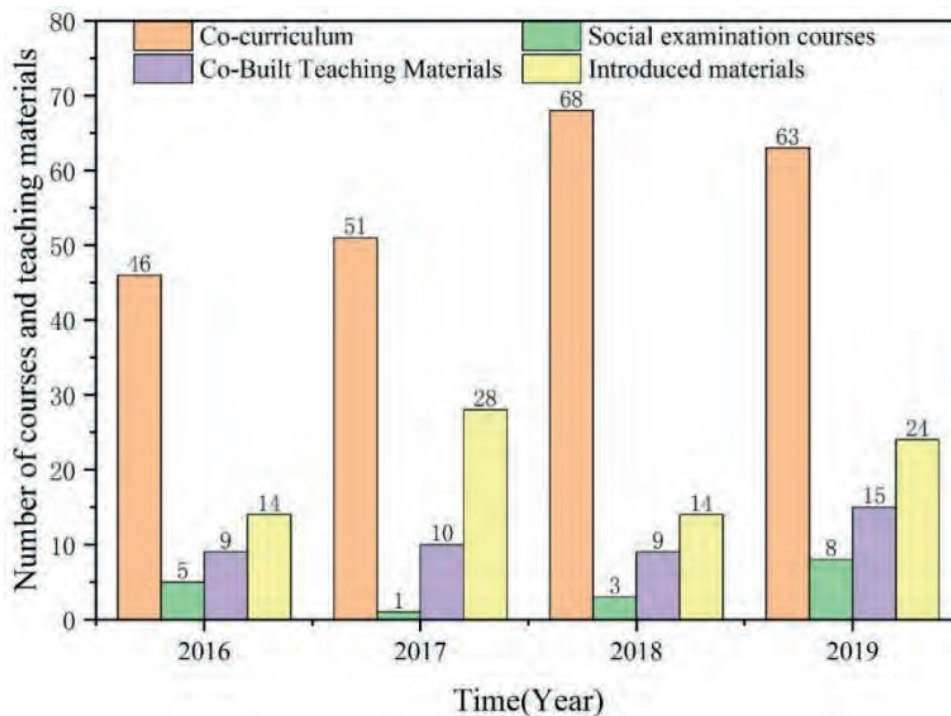
**Table 1.** University of H Stakeholder Economic Input Table 2019-2022

	2019	2020	2021	2022
Percentage of government economic input	66.21%	86.37%	68.11%	70.08%
The proportion of enterprise donated equipment	15.51%	7.98%	14.47%	11.69%
The proportion of school practice funds	9.38%	7.89%	8.89%	9.98%
Average practice expenses per student (yuan)	3516.41	3485.52	4510.59	4859.55



## (2) Industry-education integration integration curriculum thinking and government system establishment

In recent years, the government has continuously issued guiding policies on the integration of industry and education, guiding schools to establish partnerships with enterprises to cultivate applied talents. In 2017, the government issued two policies, "Several Opinions on Deepening the Integration of Industry and Education" and "Measures". Enterprises pay more attention and guidance to internship students, and implement a set of training system of pre-job training, on-the-job guidance and post-job assessment. The university will manage the assessment of students such as attendance check and practice report submission. The number of systems established in University of H 2019 to 2022 is shown in Figure 2.



**Figure 2.** Table of the number of courses and teaching materials in University H from 2019-2022

## 4. CONCLUSION

In this paper, the basic concept and importance of the concept of Curriculum Civics and the method of integrating Curriculum Civics into the model of training talents for industry-education integration are studied, and the basic concept and importance of Curriculum Civics and the method of integrating Curriculum Civics into the model of training talents for industry-education integration are explained. On

the basic concept of the concept of curriculum thinking and politics, it points out the shortcomings of the current mode of training talents for integration of industry and education, and clarifies the importance of integrating the concept of curriculum thinking and politics in this mode, so that institutions should actively reform this mode. The adoption of the method in the paper can provide some help to the institutions and prompt them to integrate the concept of curriculum thinking and politics into the training mode of industry-education integration talents, so as to cultivate talents with both internal and external merits and contribute to the development of the country.

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# The traction of experiential psychological training on teacher development model based on the background of Internet informatization

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## ABSTRACT

In this paper, we start from the shortcomings of traditional education and discuss in depth the connotation, purpose, interaction mode and transformation of an educational concept of psychological training from the new perspective of "experience", so as to construct a comprehensive, multi-level and three-dimensional model of experiential psychological training. Then the psychological analysis of teachers was conducted. The number of students in junior high school classes generally reaches 50 or more, with even larger numbers in county towns and rural areas. Among them, the class size was maintained at 50 students between 2002 and 2005. Teachers felt greater work stress and were unable to adopt positive stress coping styles, and teachers' work stress was significantly correlated with physical and mental behavior. Finally, this study explored new paths for teacher education development in the context of the information technology era, injected new energy into the new curriculum reform, and added its contemporary connotation to teachers' psychological optimization and professional growth.

## KEYWORDS

Internet; Experiential Psychology; Training Model; Educational Philosophy; Faculty Development; Work stress

## 1. INTRODUCTION

With the integration and innovation of new materials, new energy, high technology and the Internet, the third industrial revolution, named by Western scholars, is quietly arriving. With it, education informatization is developing rapidly, and the international Internet has become the world's largest knowledge carrier and the most convenient way to disseminate information [1-2]. Modern technologies such as cloud education, digital schools, satellite-delivered classrooms, and smart campuses have changed the traditional sense of teachers' superior knowledge mastery and the authority of textbooks. Students growing up in the high-tech era are more sensitive to information technology than their teachers and may be more proficient in acquiring knowledge from modern media than their teachers [3-4]. The rapid changes in science and technology have not only built a good platform for innovation in education, but also posed a serious challenge to the development of education. As the innovation of education is on the verge, it is urgent to grasp the pulse of the times, abandon the traditional educational barriers, and explore new paths of teacher development [5-6].

The literature [7] recognizes the value of teachers' mental health and should explore its role in society, education and students' development in an all-round way in order to form a conscious awareness of the need for teachers to carry out mental health education, to fully grasp the task of teachers' mental health education, to coordinate teachers' mental health development with society and school education, and to build a harmonious and unified modern school education system. The literature [8] suggests that teachers themselves should have the following basic qualities: the ability and quality to understand students in a comprehensive, in-depth and detailed manner. Have the ability and quality of self-education to constantly improve themselves and their own education and teaching. Have the ability to constantly improve their own mental health and to have a positive attitude toward their work and students.

In this paper, psychological techniques are skillfully used to promote teachers' spiritual growth and psychological maturity in the context of Internet information technology. Through communication and sharing, members are guided to improve their cognition, stimulate their inner

values and vitality, and ultimately improve their psychological quality. It is through the special charm of "experience" that we have thought more about and gained deeper insight into the optimization of school education and teaching in the process of constructing the psychological training model. Through the experiential psychological training of teachers, we can deepen their personality, improve their quality, change their teaching philosophy, and help students to transform into the spirit of personality and perfection while receiving knowledge, and promote the optimization of students' outlook. The re-education of teachers' psychology and the shaping of their harmonious personality and complete spiritual world are profound connotations of the optimization of teachers' outlook and new viewpoints and directions for traction teacher development.

## **2. Impact of experiential psychological training on teacher development**

### **2.1. Meaning of experiential and experiential psychological training**

Experience means to know the things around you through practice. In contrast, "experiential" psychological training is guided by the concept of humanistic education, which transforms psychological knowledge into inner feelings through various psychological techniques. The educated person is exposed to a carefully designed situation, and through profound experience and true perception, the educated person implicitly generates educational meaning, and eventually comprehends the difficulties and wisdom of life according to the logic of life, thus changing personal attitudes, correcting radical concepts, and improving psychological quality. It can be seen that experience is a way for individuals to participate in the world, a state of human existence, and the participation, involvement and practice of body and mind. Experiential psychological training is based on the premise of emotional experience, and in the interpersonal interaction of the group, through the application of various psychological techniques, such as empty chair technique, hypnosis technique, intentional dialogue, etc., the members can change their roles, feel deeply, rapport, heal trauma, and stimulate potential. Therefore, experiential psychological training is not only concerned with how much knowledge teachers learn and how many psychological laws they

master in the training, but more importantly, through experiential psychological training, the value of human life and the meaning of life can be enhanced and expanded through experience. Experiential psychological training has proved to be the best form of psychological education and psychological assistance for teachers in group situations, and it is also an effective model.

## **2.2. Experiential Psychological Training Situational Experience**

In reality, the teacher's own personality quality and mental health level far exceed the constraints of his teaching ability and professional knowledge on students' growth, and teachers' own bad factors bring various negative influences to students intentionally or unintentionally. However, in the past, teachers' training only focused on the improvement of teachers' business level, but neglected the improvement of teachers' spiritual level, which is a big defect in education practice. In contrast, "experiential psychological training" creates realistic situations for members to participate and experience through "psychological growth workshops", and through communication and interaction, they can change their thinking, clarify their ideas and sublimate their cognition, and eventually grow psychologically and change their behavior. Therefore, the use of experiential re-education to improve teachers' psychological abilities and psychological capital makes teachers the greatest beneficiaries of psychological education and creates practical support for the development of teachers' empathy. By changing teachers' psychological skills from vague theories to observable, operational, and "technical" practical training, we reduce the blindness of teachers' psychological learning and increase the effectiveness of psychological training. In particular, it is conducted in a group setting, where teachers can experience, analyze, and solve problems in specific situations to reflect consistent patterns in their lives, so that they can deeply feel their inner emotions, vent their repressed emotions, and understand the true meaning of life. Teachers learn, perceive and grow in the experience, thus opening their hearts and minds, accepting reality, changing their patterns, perfecting their personalities, and eventually making a real improvement in their own mental abilities and even a complete change in their values. This is the charm of experience. Because there is experience, there is feeling, and when there is feeling, it becomes vivid, and when it is

vivid, it can move and move the heart, so as to have an awakening, and finally inspire the desire to change and the passion to create. Therefore, perception and experience are also an important part of experience sublimation, mind change, psychological maturity and individual development. Through experiential training, we really touch the heartstrings of people's hearts, achieve the purpose of optimizing psychological education, and realize the reshaping of teachers' spiritual personality.

### **2.3. Innovation of the experiential psychology classroom model**

In the classroom of the digital information age, it is the new mission of the teacher to stimulate students to "move", grow in wisdom and improve their abilities. Therefore, it is imperative to reform the classroom in the traditional sense. The methods of carefully imparting knowledge and forcibly instilling ideas are clearly no longer appropriate for today's students. In its place is a new experiential classroom model that stimulates the inner world of students, develops their potential, and grows their talents. Education is rich in practical experience, and the innovation of the new model lies in the experience. Through activities that promote emotion, break through defenses, and deep experience, teachers promptly guide students immersed in their perceptions to think deeply, reflect on the past, summarize the present, and thus look forward to the future. For this reason, the new classroom is flexible, free and efficient. In the experiential psychological training, the organic combination of points, lines and surfaces of members, groups and classes is the key. The teacher sometimes leads from the front, sometimes pushes from the back, and sometimes accompanies the members, which are the means of teaching, while explaining, experiencing, and sharing are different strategies. This new concept fills the imperfections in the process of education and teaching, and provides a reference for future teaching reform.

### **2.4. Educational Philosophy**

In the past, the biggest task of students in education was to get the maximum knowledge from teachers or textbooks. How students behave and grow up healthily was neglected, and their creative potential was ruthlessly stifled. As a result, reading loses its connection with students' cultural cultivation, and reading has no

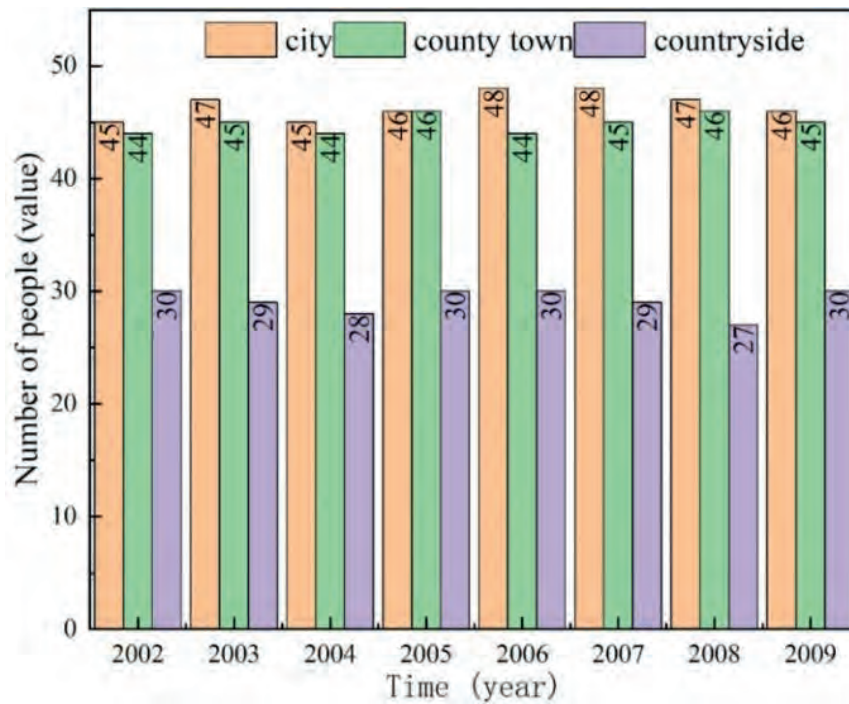
more relationship with human life experience and personal growth. Students' innermost anxiety is hollow. They have been educated for years but have become test-taking machines with no ambition, no passion, no imagination, depleted creativity, and numbness and indifference. And in the age of information technology, Internet technology and new media have become the basic means of education. How students seek, draw and use knowledge and how to improve their mental personality appears to be very prominent. Therefore, through experiential psychological education, students can have profound and extensive experiences, truly internalize knowledge and perception into unlimited potential, and maximize the creative wisdom boiling in their minds, so that they can become not only the inheritors of knowledge and culture, but also the creators of new energy of new technology, thus continuously promoting the optimization of students' outlook.

### **3. Psychological analysis of teachers**

#### **3.1. Elementary school teacher stress**

Figure 1 shows the average class size at the primary level by urban and rural areas from 2002 to 2009. Class sizes at the primary level in China are large and have not eased over the years, and have increased slightly. Class sizes are consistently distributed within the 45-person level area in county, town, and urban elementary school, and at the 30-person level in rural areas. Class size is not only a response to the way teaching is organized, but also an indicator describing the workload of teachers. Reducing class sizes and increasing the level of attention given to students also helps to improve the quality of teaching and learning. At the elementary school level, the majority of developed countries have average class sizes of around 20 students, with only Chile, Japan, and South Korea having class sizes of around 30 students. In other words, Chinese teachers are working under far more pressure than international levels.

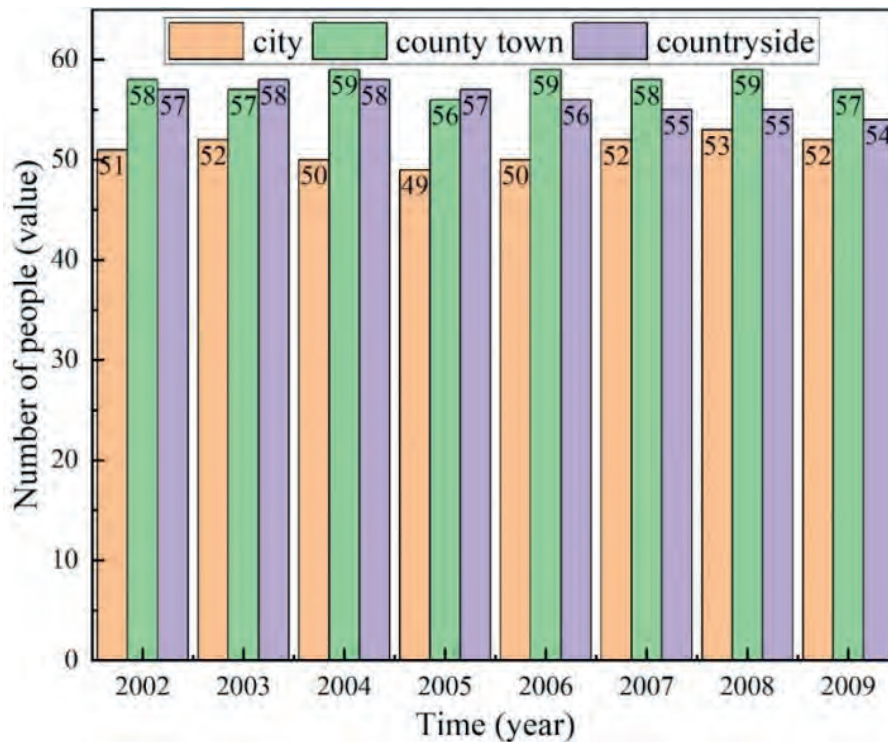




**Figure 1.** Average class size of primary school in urban and rural areas from 2002 to 2009

### 3.2. Middle school teacher stress

Figure 2 shows the average class size at the junior high school level by urban and rural areas from 2002 to 2009. Class sizes in junior high schools generally reach 50 or more students, with higher numbers in counties and towns and in rural areas. The class size in rural middle schools has changed faster than in counties and towns, and is now close to the level of urban middle schools. From these two charts, it is clear that class sizes in Chinese primary and secondary schools are generally too large, and that teachers have limited capacity to attend to every child. Coupled with the imperfection of the educational assessment system, teachers' demands on students' classwork increase in order to meet teaching goals, and with it comes a huge workload and pressure. Teachers feel greater work stress and fail to adopt positive stress coping methods, and their work stress is significantly correlated with their physical and mental behaviors. The results found that primary and secondary school teachers had an overall moderate level of stress, but more negative job stress than positive job stress, and workload was the main source of teachers' stress experience, which affected the level of teachers' mental health.



**Figure 2.** Average class size of junior high school in urban and rural areas from 2002 to 2009

#### 4. CONCLUSION

The "experiential psychological training model" comes from the exploration in practice and the real experience of the explorer's heart, and the experiential psychological training is also a new attempt of teachers' continuing education in the new curriculum reform. The following conclusions can be drawn from the study of the experiential psychology model of teacher development based on Internet information technology.

(1) For elementary school teacher stress analysis, class sizes at the elementary school level in China are large and have not been relieved for many years and have increased slightly. Class sizes in county and urban elementary school have been distributed within the level area of 45 students and in rural areas at the level of 30 students. Class size is not only a response to how instruction is organized, but also an indicator that describes the workload of teachers. Reducing class sizes improves the level of attention given to students and also contributes to the quality of teaching and learning.

(2) For the analysis of teacher stress in junior high schools, class sizes in junior high schools have generally reached 50 or more

students, with higher numbers in counties, towns and rural areas. Among them, the class size was maintained at 50 students between 2002 and 2005, and the situation decreased after 2006. Workload is the main source of teachers' stress experience, which can affect the development of teachers' mental health level.

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# RESEARCH ON THE APPLICATION OF DATA MINING TECHNOLOGY IN TEACHER EVALUATION SYSTEM

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## ABSTRACT

This paper first introduces the specifics of data mining technology and the specific process of its use in teacher teaching evaluation system, digital processing of stored data, collection of teacher teaching data, determination of data mining purpose, mining data, and evaluation model using data mining technology. Then the teacher teaching quality evaluation system was constructed, the evaluation data was extracted, and the continuous type of data in the sample was discretized. Finally, the rubrics were analyzed for fine-grained sentiment as well as for classification of attributes. The students evaluated the teachers' teaching effectiveness the best, with an overall evaluation of 931 explicit and 21,314 explicit and implicit, followed by teaching attitudes, as well as the teacher's personality, teaching language, and teaching content. Data mining technology can analyze the large amount of data generated from teacher evaluation in a deeper way, which has far-reaching implications for the development of education and teaching decisions.

## KEYWORDS

data mining technology; teacher evaluation; discrete processing; fine-grained sentiment analysis; support vector machine; teaching quality

## 1. INTRODUCTION

The supervision of the teaching process and the quality of teaching in the classroom is a proven method of ensuring the quality of classroom teaching [1-2]. Teaching evaluation is used as an effective method to detect the quality of teaching in all institutions, and through the observation and assessment of teachers' teaching in a working period, scientific and effective assessment results are formed, and based on

the results, the teaching process is continuously improved [3-5]. The literature [6] proposes a classroom observation method in line with this, i.e., the quality of teachers' effective teaching behaviors can be linearly "deduced" from the quality of classroom teaching. This paper first introduces the basic principles of data mining technology and its application scenarios, then analyzes the specific process of data mining technology in the process of teacher teaching evaluation, determines the purpose of data mining according to the known conditions, then cleans and screens the data and mines the existing data. Finally, the system of teacher teaching quality evaluation is constructed, and the evaluation data are extracted, sentiment analysis and attribute classification are performed.

## 2 APPLICATION OF SUPPORT VECTOR MACHINE SVM ALGORITHM IN TEACHER TEACHING EVALUATION

The support vector machine SVM algorithm takes the problem to be solved and solves it by a quadratic programming. For example, by assuming the existence of a hyperplane on the sample set  $\varpi \cdot x + b = 0$  can divide the existing samples into two major classes, where the training set is  $J(x_i, y_i), x_i \in R^n, y_i \in \{-1, +1\}, i = 1, \dots, n$ , then there is a hyperplane that can make the sum of the two classes of samples to their distances can reach the maximum, then the plane is the hyperplane, and the hyperplane is calculated by the formula:

$$\min \frac{1}{2} \|\varpi\|^2 + C \sum_{i=1}^n \xi_i, (\xi_i \geq 0, i = 1, \dots, n) \quad (1)$$

Where  $\xi_i$  is the relaxation variable,  $b$  is a threshold, and  $C$  is the penalty parameter. We transform the above problem of calculating the optimal plane into a quadratic programming pairwise problem by Lagrange operator, which is given by:

$$\max \sum_{i=1}^n \alpha_i - \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n \alpha_i \alpha_j y_i y_j K(x_i, x_j) \quad (2)$$

Where  $\alpha_i$  is the Lagrange multiplier, and the decision function obtained by solving this pairwise problem is:

$$f(x) = \text{sgn} \left( \sum_{i=1}^n \alpha_i y_i K(x_i, x_j) + b \right) \quad (3)$$

Although the theory of support vector machine SVM has a wide range of applications at present, it still encounters some problems in our practical applications

such as kernel function selection, induction, optimization and inner product parameter finding.

### 3. SYSTEM CONSTRUCTION OF TEACHER TEACHING QUALITY ASSESSMENT

#### 3.1 EXTRACTION OF EVALUATION DATA

In this paper, evaluation data were extracted from the evaluation data of Xinhai Middle School in the first semester of the 2019-2020 academic year and combined with teachers' personal information to form the basic structure of the rating data table. To ensure that the sample can contain each attribute characteristic that affects the evaluation grade, stratified sampling is used to randomly select 12 evaluation sample data for the five levels of evaluation data. The evaluation grades were obtained by statistically calculating the average of all student ratings for each teacher, converting them to the corresponding grades and adjusting them manually. It can be seen that the factors that may affect the evaluation grade in the table are: the teacher's gender, age, length of teaching experience, title, education, attitude, level, method and effectiveness of teaching of the four evaluated items, etc. Table 1 shows the evaluation sample data.

**Table 1** Evaluation sample data

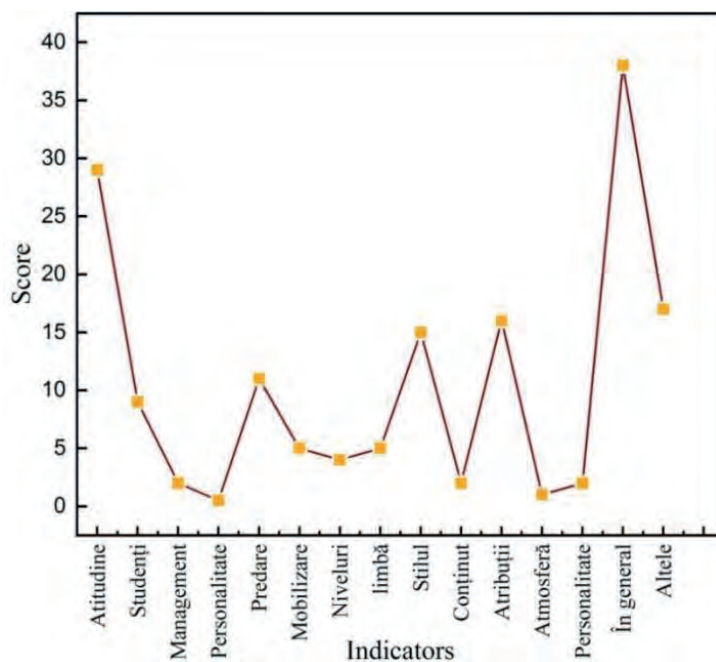
Serial number	Teachers	Gender	Age	Teaching experience	Title	Academic qualifications	Teaching Attitude	Teaching level	Teaching methods	Teaching Effectiveness	Grade
1	Teacher 1	Female	38	11	Assistant Lecturer	Bachelor's degree	21	28	18	23	Moderate
2	Teacher 2	Male	37	7	Assistant Lecturer	Bachelor's degree	23	32	21	23	Excellent
3	Teacher 3	Male	44	21	Lecturer	Bachelor's degree	24	32	22	23	Excellent
4	Teacher 4	Female	31	9	Assistant Lecturer	Bachelor's degree	21	28	19	20	Good
5	Teacher 5	Female	37	2	None	Bachelor's degree	14	20	12	14	Failing
6	Teacher 6	Female	37	10	Assistant Lecturer	Undergraduate	19	27	18	20	Moderate

#### 3.2 COMMENTARY FINE-GRAINED EMOTIONAL ANALYSIS

To analyze the rubrics, rubric pre-processing is required, which is completed in the rubric favorability analysis and fine-grained analysis. Based on the rubric classification algorithm, the system can classify each teacher's rubric into positive and negative sentiment, and give the support rate and positive and negative rating of the rubric.

Based on the data mining algorithm, the system can realize the fine-grained classification and sentiment analysis of a teacher's comments. Figure 1 shows the

fine-grained analysis results for "teacher", which shows the specific fine-grained sentiment distribution.



**Figure 1** Fine-grained sentiment analysis of the rubric

After the above fine-grained analysis, this paper conducts rubric analysis on nearly 40,000 valid rubrics, and the number and proportion of positive and negative evaluations of all explicit and implicit attributes can be derived, and it is more obvious that there are more implicit feature attributes and less explicit features in the rubrics. Therefore, this paper focuses more on the number and proportion of positive and negative evaluations after combining the explicit and implicit attributes. And the results of the implicit attributes and the combined explicit and implicit ones are compared.

To ensure the completeness of the fine-grained analysis, the number and proportion of positive and negative evaluations of the combined explicit and implicit attributes in the rubric are given in Table 2. There were not many explicit attributes expressed in the students' comments, and their proportion was small. In contrast, the proportion of the combined explicit and implicit attributes is higher; in addition, we can also find from the positive evaluations that students have the best evaluation of teachers' teaching effectiveness, followed by teaching attitude, and also pay more attention to the teacher's personality, teaching language, and teaching content. In the pejorative evaluation, some students are more concerned about the overall evaluation of teachers' teaching and the content of teaching, and they have negative evaluation of these two items. From this, it is clear that teachers should pay more attention to strengthening the teaching skills in the above aspects in order to improve the overall

effectiveness of teaching in secondary schools. Table 2 shows the comparison table of the fine-grained classification results of the rubrics.

**Table 2** Comparison of the results of the fine-grained classification of the rubric

Broad Categories of Attributes	Attribute subcategories	Explicit quantities		Corresponding percentage		Explicit and implicit quantities		Corresponding percentage	
		Positive	derogatory	Positive	derogatory	Positive	derogatory	Positive	derogatory
Teaching Attitudes	Teaching attitude	539	9	1.60%	0.01%	14912	55	36.31%	0.18%
	Treatment of students	1019	7	2.57%	0.00%	4124	28	10.04%	0.08%
	Classroom management	166	7	0.49%	0.00%	710	53	1.72%	0.16%
	Grooming	591	6	1.47%	0.00%	920	4	2.23%	0.04%
	Personality	820	21	1.99%	0.04%	5257	51	12.80%	0.14%
Teaching methods	Teaching methods	1271	14	3.07%	0.02%	1830	40	4.45%	0.09%
	Engaging Students	1636	13	3.98%	0.02%	1642	11	3.99%	0.03%
Teaching level	Teaching Level	3146	25	7.66%	0.05%	4169	31	10.15%	0.05%
	Teaching Language	952	62	2.38%	0.14%	5431	93	13.22%	0.27%
	Teaching style	250	5	0.65%	0.00%	374	3	0.96%	0.03%
	Teaching content	2182	29	5.33%	0.06%	4337	256	10.55%	0.64%
Teaching Effectiveness	Handling of assignments	228	125	0.58%	0.29%	666	214	1.95%	0.57%
	Classroom atmosphere	598	24	1.47%	0.05%	877	114	2.19%	0.28%
	Overall Assessment	931	7	2.28%	0.00%	21314	889	51.97%	2.16%

#### 4. CONCLUSION

This paper mainly uses data mining techniques to mine and analyze the rating data and rubric data of the teacher evaluation system, constructs rubric rules, and analyzes the rubric text data for positive and negative tendencies and fine-grained sentiment analysis. The following conclusions are mainly drawn.

In terms of fine-grained attribute classification, there are more implicit feature attributes and fewer explicit features in the rubric. The students were most concerned about the teachers' teaching effectiveness, followed by their teaching attitude, their



personality, teaching language, and teaching content. Some students were more concerned about the overall evaluation of teachers' teaching and the content of teaching, and held negative evaluations of these two items.

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# RESEARCH ON PANORAMIC IMAGE PROCESSING TECHNOLOGY BASED ON MULTI-OBJECTIVE OPTIMIZATION ALGORITHM

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## ABSTRACT

This paper proposes image segmentation based on decomposition strategy and multi-objective evolutionary fuzzy clustering (MOEFC), which uses a weighted sum-based decomposition strategy to decompose multi-objective fuzzy clustering into multiple single-objective subproblems. These subproblems are simultaneously optimized by MOEA and the final trade-off solution regarding detail preservation and noise suppression of the image to be segmented is obtained. To further accelerate the convergence of the algorithm, opposition learning (OBL) and hybrid population initialization are introduced into the optimization process. By comparing MOEFC with different segmentation algorithms on different types of images with AR and ARI results of 99.69 and 99.4 on SI2 and 99.77 and 99.13 on SI3, MOEFC achieves higher metrics than other comparison algorithms. The algorithm in this paper has excellent performance in image detail retention and noise removal.

## KEYWORDS

Multi-objective optimization; Image segmentation; MOEFC algorithm; Decomposition strategy; MOEA; OBL

## 1. INTRODUCTION

With the continuous development of mathematics and computer technology, digital image processing techniques have also progressed [1]. Digital image processing involves various aspects including image enhancement, image segmentation, image compression, and image fusion. In a general digital image processing system, there is a unified structure that includes the image input device, the computer that performs the processing and analysis control, the storage system and the output device [2]. Different image processing contents have different processing models and programs, which are stored in different storage systems, which not only occupy more storage resources, but also have no uniform evaluation criteria [3]. If relatively unified evaluation indexes are set for these different image processing tasks, and the

control parameters of the image processing models are used as optimization variables, and the optimal control parameters are searched by an optimization algorithm, it will be able to unify the image processing problem and achieve optimal image processing [4]. The literature [5] uses panoramic techniques for height estimation hybrid stereo vision on UAVs. Literature [6] on the use of panoramic image techniques in robot localization pathfinding.

In this paper, we propose image segmentation based on decomposition strategy and multi-objective evolutionary fuzzy clustering, which transforms the fuzzy clustering combined with image local information into a multi-objective optimization problem. In which, the standard FCM objective function to maintain image details and the image local information constraint term for noise suppression are simultaneously used as the objective function. To further improve the search capability, OBL and hybrid population initialization are introduced in the algorithm. Among them, the mixed population initialization enables the algorithm to start the search from promising initial points, and OBL helps to speed up the convergence of the algorithm.

## 2. MULTI-OBJECTIVE EVOLUTIONARY FUZZY CLUSTERING IMAGE SEGMENTATION BASED ON DECOMPOSITION STRATEGY

In this paper, MOEFC is proposed to transform the fuzzy clustering problem combining local information of images into a multi-objective optimization problem. The standard FCM objective function and the local information constraint term are simultaneously optimized as the objective function, and the final trade-off segmentation result that can maintain the image details and remove the noise effectively is obtained.

### 2.1 MULTI-OBJECTIVE FUZZY CLUSTERING MODEL CONSTRUCTION

Suppose the image to be segmented is  $X = \{x_1, x_2, \dots, x_N\}$  and  $N$  is the number of pixels of the image to be segmented.  $x_i$  is the  $i$ th pixel of the image and takes the value of the gray value of that pixel.  $\max$  and  $\min$  denote the maximum and minimum gray values of the pixels in image  $X$ , respectively. If  $c$  denotes the number of fuzzy clusters and individual  $z = (z_1, z_2, \dots, z_c)^T$  denotes a set of candidate clustering centers, then the multi-objective fuzzy clustering problem of MOEFC can be defined as:

$$\min F(z) = [f_1(z), f_2(z)]^T \quad (1)$$

$$z = (z_1, z_2, \dots, z_c)^T, x_i \in X, i = 1, 2, \dots, N \quad (2)$$

$$f_1(z) = \sum_{i=1}^N \sum_{p=1}^c u_{ip}^m D(x_i, z_p) \quad (3)$$

$$f_2(z) = \sum_{i=1}^N \sum_{p=1}^c u_{ip}^m \sum_{\substack{j \in N_i \\ j \neq i}} w_{ij}^p D(x_i, z_p) \quad (4)$$

where  $f_1$  is consistent with the standard FCM objective function and is used to maintain image details. To suppress the effect of noise on image segmentation, the local information of the image is introduced into  $f_2$ . Considering that the Euclidean distance is sensitive to images containing noise, a widely used kernel function, the Gaussian radial basis function, is used in this paper as a similarity measure for multi-objective fuzzy clustering. In MOEFC, according to the distribution of pixel gray values, the bandwidth is defined as the distance mean squared difference of pixel gray values, which is calculated as follows:

$$\sigma = \sqrt{\frac{\sum_{i=1}^N \left( dis_i - \frac{1}{N} \sum_{i=1}^N dis_i \right)^2}{N}} \quad (5)$$

For the multi-objective fuzzy clustering problem, MOEFC uses a weighted sum-based decomposition strategy to decompose it into multiple single-objective subproblems:

$$\min g^{ws}(z | \lambda) = \lambda f_1(z) + (1 - \lambda) f_2(z) \quad (6)$$

where  $g^{ws}$  denotes a subproblem and the weight vector  $\lambda = (\lambda, 1 - \lambda)^T$  is used to control the effect of two objective functions, image detail retention and noise suppression, in fuzzy clustering.

## 2.2 ALGORITHM FRAMEWORK AND TARGETED OPERATOR DESIGN

In the initialization operation of MOEFC, the weight vector and the subproblem neighborhood are generated according to the methods in the literature. The genetic operations of MOEFC include crossover and variation, where the crossover operation uses a differential evolution strategy and the variation operation uses a Gaussian variation operator. According to the differential evolution strategy, the  $k$ th clustering center of intermediate individual  $y_i$  can be generated as follows:

$$y_{i,k} = \begin{cases} z_{i,k} + F \times (z_{l_1,k} - z_{l_2,k}) & \text{if } rand \leq CR \\ z_{i,k} & \text{otherwise} \end{cases} \quad (7)$$

In the MOEFC framework, the OBL operation is introduced in both the population initialization and evolutionary main loops. In the MOEFC framework, the OBL operation is used in the population initialization and individual update steps. In the optimization process, the distance between the current solution and the optimal solution directly affects the time taken by the algorithm to search for the optimal solution.

By weighing both cost and performance factors, MOEFC employs K-means, standard FCM, and Ncut algorithms as methods for generating partial individuals. In addition, the OBL operation on the initial population further ensures that MOEFC can start the search from the initial point with potential.

## 3. EXPERIMENTAL RESULTS AND ANALYSIS

In order to verify the segmentation performance of MOEFC, MOEFC is compared and analyzed with seven segmentation algorithms. Among them, KFCM\_S1, KFCM\_S2, FLICM, RFLICM, KWFLICM, KFND, MSFCA. In addition to the comparison experiments with the above algorithms, the analysis and discussion about MOEFC algorithm itself will be given in this section. In this section of experiments, MOEFC and the comparison algorithm will be applied to segmentation of artificial images, natural images, medical images and remote sensing images, and the details of the images to be segmented are shown in Table 1.

**Table 1.** Image information to be segmented

Image name	SI1	SI2	SI3	Bern	Ottawa
Image size	128×128	256×256	244×244	301×301	290×350
Split class number	3	4	4	2	2
Image name	Italy	SM. R1	SM R2	MR1	MR2
Image size	412×300	181×217	181×217	256×256	256×256
Split class number	2	4	4	4	4
Image name	3096	14037	Flower	Coins	Cameraman
Image size	481×321	481×321	128×128	308×242	256×256
Split class number	3	3	3	3	3

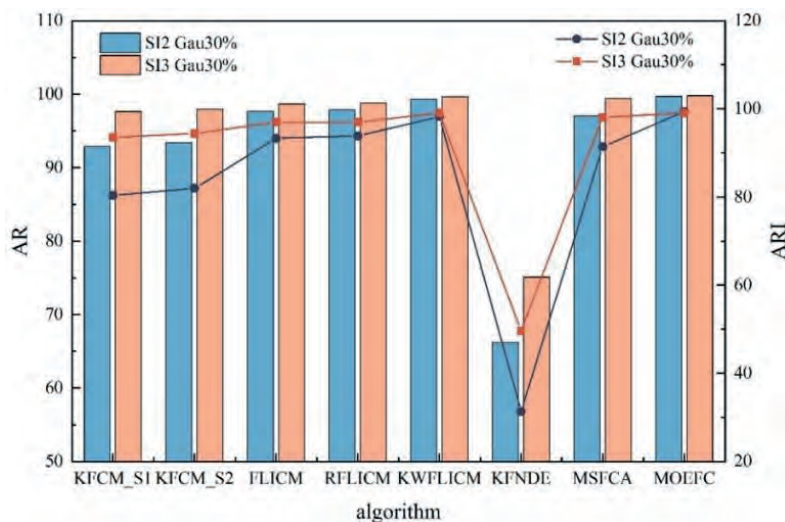
In this section of experiments, different levels of Gaussian noise and pretzel noise will be added on the three artificial images SI1, SI2 and SI3. The segmentation accuracy AR and ARI are used to measure the segmentation performance of different algorithms on the artificial images. Let  $n_{ij}$  denote the set consisting of pixels that belong to region  $i$  in the segmentation result but region  $j$  in the reference map,  $n_i$  denote the set of pixels that belong to region  $i$  in the segmentation result, and  $n_j$  denote the set of pixels that belong to region  $j$  in the reference map, then AR and ARI are defined as follows:

$$AR = \frac{\sum_{i=1}^c n_{ii}}{N}, ARI = \frac{\sum_{i=1}^c \binom{n_{ij}}{2} - \sum_{i=1}^c \binom{n_i}{2} \cdot \sum_{j=1}^c \binom{n_j}{2}}{\binom{n}{2}} \quad (8)$$

$$\frac{1}{2} \left[ \sum_{i=1}^c \binom{n_i}{2} + \sum_{j=1}^c \binom{n_j}{2} \right] - \sum_{i=1}^c \binom{n_i}{2} \cdot \sum_{j=1}^c \binom{n_j}{2} \bigg/ \binom{n}{2}$$

where  $c$  is the number of clusters and  $N$  is the number of pixels. In contrast to AR, ARI contains a statistical-based normalization component. Therefore, the more random the pixel class label distribution is, the more the value of ARI tends to 0. According to Equation (8), the larger the AR and ARI of the segmentation result, the closer the segmentation result is to the reference map.

The segmentation accuracy results of each algorithm on SI2 are shown in Figure 1, where SI2 and SI3 are disturbed by 30% Gaussian noise and 30% pretzel noise, respectively. It can be seen that MOEFC achieves higher metrics than the other compared algorithms.



**Figure 1.** Segmentation accuracy results of each algorithm on SI2

#### 4. CONCLUSION

In this paper, the image segmentation problem is modeled as a multi-objective fuzzy clustering problem. A weighted sum-based decomposition strategy is used to decompose the multi-objective fuzzy clustering problem into multiple single-objective fuzzy clustering problems. Each single-objective fuzzy clustering problem is controlled by a different weight vector to control the balance between image detail preservation and noise suppression. These single-objective fuzzy clustering problems are simultaneously optimized by the evolutionary algorithm, and the final segmentation results are obtained that can balance detail preservation and noise suppression. To speed up the convergence of the algorithm, opposition learning is introduced into the optimization process. A hybrid population initialization method for the image segmentation problem is also designed. Finally, through different types of image segmentation experiments, the segmentation accuracy of the algorithm in this paper reaches more than 99%. It is proved that the algorithm in this chapter can obtain segmentation results that maintain the image details while effectively removing the noise in the image.

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# RESEARCH ON THE APPLICATION OF TRADITIONAL CULTURAL ELEMENTS IN ANIMATION DESIGN BASED ON INFORMATION FUSION TECHNOLOGY

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## ABSTRACT

In the absence of a cultural core, an animation work is only a superficial and mediocre piece of work, and it is more important to incorporate the best local cultural elements into the creation of an animation. Information fusion technology is usually used for multi-source image synthesis, image analysis and understanding, etc. Data layer fusion is mainly applied to image processing, which can improve the degree of integration of traditional cultural elements in animation design to a greater extent. The study examines the ways in which traditional Chinese culture is used in animation design and analyses the evaluation of animation works and the selection of traditional cultural elements. The results show that only 27.05% of users were found to prefer bright and strong colours, while 69.67% of users preferred natural and soft colours. This study adds more traditional cultural elements to anime design, thus achieving a win-win effect for both anime design and traditional cultural heritage.

## KEYWORDS

Information fusion technology; Data layer fusion; Image analysis; Animation design; Traditional cultural elements

## 1. INTRODUCTION

Anime characters, i.e. the images in anime works. It can be argued that any successful and outstanding anime work that receives wide market acclaim must have achieved a deep portrayal of the characters[1-2]. Therefore, producers of anime works should make sure that the historical and cultural backgrounds of the characters are presented to every audience, so as to ensure the artistic and commercial success of the works [3-4]. In the process of designing and shaping characters, producers should also be aware that anime characters not only reflect the content of anime works, but also enhance the cultural appeal of the country [5-6].

Literature [7] proposes that ethnic culture is one of the many important components of China's culture, and in order to better promote ethnic culture and promote the development of animation design, attempts can be made to apply traditional ethnic elements to popular animation design. Literature [8] suggests that the audience of animation is wide, so domestic animation should focus on the use of elements with Chinese characteristics, so as to make China's animation industry have Chinese characteristics and improve the international competitiveness of domestic animation.

In this paper, redundant or complementary information of multiple cultural elements in space or time is fused based on certain guidelines through information fusion techniques in order to obtain a consistent description or interpretation of the object under test, while information

fusion effectively utilises cultural element resources so that a greater amount of information about the object and environment under test can be obtained. The use of traditional Chinese culture in animation design is then studied in three aspects: the character of the animation work, the subject matter of the animation work and the creation of the scene of the animation work, and the analysis of the animation evaluation and the selection of traditional cultural elements, this study thus promotes the development of the animation design industry.

## **2. INFORMATION FUSION TECHNOLOGY**

### **2.1 FUNCTIONAL MODEL OF INFORMATION FUSION**

The JDL functional model has now become the basic starting point for the study of information fusion. Information fusion is divided into four levels, and within the functional model, each level can be divided into different subsets, and the division between levels one and four is artificially divisible. The actual information fusion system is the integration and intersection of these parts, and the JDL model, which was initially created for the military domain, can be extended to the non-military domain as well. Currently, most of the work in information fusion is focused on the research of first-level algorithms. In information fusion, multi-sensor estimation and decision fusion techniques offer huge advantages in terms of survivability, reliability and robustness compared to individual sensor information processing techniques. The two main types of multi-sensor estimation and decision fusion are currently distributed and centralised.

### **2.2 HIERARCHICAL DESCRIPTION OF INFORMATION FUSION**

#### **2.2.1 DATA LAYER FUSION**

Data layer fusion is characterised by fusion directly on the detection judgement layer or signal layer in a multi-sensor distributed detection system. Data layer fusion is commonly used for multi-source image synthesis, image analysis and understanding. Data layer fusion is mainly for applications in image processing, which require high data transmission bandwidth and alignment accuracy between data. From an information fusion perspective, synthesis on the data layer is highly blind, as there is no way to check the consistency of the characteristics contained in the original multi-sensor data.

#### **2.2.2 TARGET FEATURE INFORMATION FUSION**

Target feature information fusion is the joint recognition of feature layers, which is essentially a pattern recognition problem. Multi-sensor systems provide more feature information about the target for recognition than a single sensor, increasing the number of feature space dimensions. The specific fusion method is still the corresponding technique for pattern recognition, but before fusion the features must be correlated and then the feature vectors must be classified into meaningful combinations.

## **3. WAYS OF USING CHINESE TRADITIONAL CULTURE IN ANIMATION DESIGN**

### **3.1 THE USE OF CHARACTERS IN ANIME PRODUCTIONS**

Figure 1 shows the animation character designs of *The Fisherman's Boy* and *The Three Monks*. Both *The Fisherman's Boy* and *The Three Monks* have very obvious traditional Chinese cultural elements in their character designs, which are typically Chinese in character and therefore easily remembered by the world. Anime characters are the main body of anime works. A good character has a significant impact on the whole anime work, and the success of anime characters often represents the success of anime works. When designing anime works, full consideration should be given to the positioning of the character, its period background, regional characteristics and memory of national customs and culture. Only when the



characters in anime works are consistent with the time and ethnic background of the time can they stand the test of time and withstand careful scrutiny and deliberation, so that they can be passed on for a longer period of time.



**Figure 1.** Animation character design of “Fisherman” and “Three Monks”

### 3.2 USE IN THE SUBJECT MATTER OF ANIME WORKS

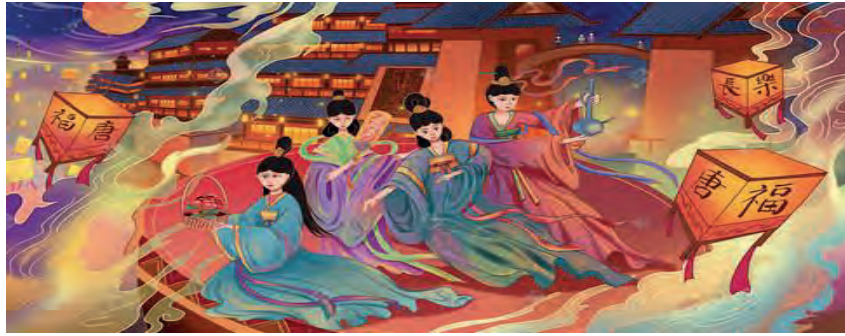
Figure 2 shows the application of the Four Great Masterpieces, Journey to the West, to an animation work. The subject matter represents the content of the animation work, and the choice of the subject matter is indicative of the content chosen for the entire animation design. The subject matter is used throughout the entire animation work. Without a good and attractive theme, the audience will be reduced to a large extent and the meaning of the design will be lost, which means that all the previous efforts are useless. In contrast, Chinese culture is profound, has a long history, and has a wide variety of traditional artistic expressions. Each era, such as the Tang, Song, Yuan, Ming and Qing dynasties, has its own cultural traditions and a variety of historical stories that are sufficient to become the main subject of animation design.



**Figure 2.** The application of Journey to the West in animation works

### 3.3 USE IN THE CREATION OF SCENES FOR ANIMATION WORKS

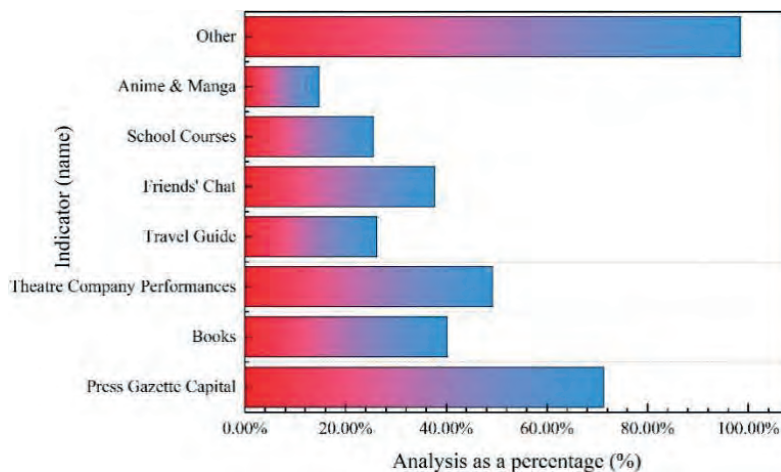
Figure 3 shows a court scene from an anime production. The success of the creation of anime scenes represents the success of the anime work. The creation of an animation work must be combined with the context of the time period in which the story takes place, the regional flavour, the ethnic identity, the cultural background, etc., in order to achieve the integrity, logic and coherence of the animation work. There are many works with traditional Chinese cultural elements, such as theatre, costumes of each dynasty, paintings, shadow puppets and erhu pipa, etc. The integration of these cultural elements with Chinese characteristics in the process of animation design will definitely attract more and more audiences and bring the audience closer to the animation works, so that people can understand the inner meaning of animation design in a deeper way. This is certainly a big step forward in animation design.



**Figure 3.** Court scenes in animation works

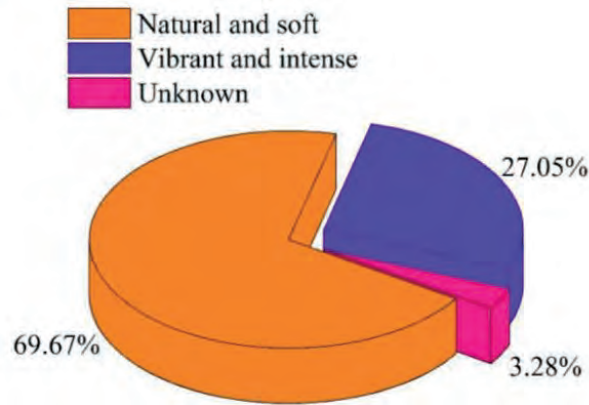
### 3.4 ANIMATION EVALUATION AND SELECTION OF TRADITIONAL CULTURAL ELEMENTS

Figure 4 shows the bar chart of “How young users learned about Quanzhou Puppets”. Young people tend to be more receptive to both old and new things. Based on the re-analysis of the questionnaire data of the target group, we can see that the perimeter of animation only accounts for 14.75% of the ways to learn about the art of Quanzhou Tideline Puppets, which indicates that this means of communication or method is less utilised, and the author has discovered the potential of the perimeter of animation in the dissemination of Quanzhou puppet culture.



**Figure 4.** “Bar chart “Young users learn about the Quanzhou Puppet Pathway

Figure 5 shows a pie chart of the colour scheme of young users' favourite cartoon images. In the above analysis of the colour elements of the Quanzhou puppets, we can find that, whether it is the face or the costume, the puppets we have seen so far are all coloured in bright colours of high purity due to the need to perform and to stand out under the stage lights, but in the user survey I found that only 27.05% of the users prefer Only 27.05% of the users prefer bright and strong colours, while 69.67% of the users prefer natural and soft colours.



**Figure 5.** Pie chart “Young users’ favourite colour schemes for anime images”

#### 4. CONCLUSION

Based on the information fusion technology, this paper starts the research from two aspects: the analysis of the application of Chinese traditional cultural elements in the field of animation character design and the analysis of the application of Chinese traditional cultural elements in the field of animation scene creation. The following conclusions can be drawn.

(1) The animation works use the oriental charm of Chinese landscape painting to shape the breathtaking animation scenes, fully reflecting the unique charm of traditional Chinese national elements. This is evident. The use of traditional ethnic elements makes the animation design truly attractive to the audience and brings the animation work closer to the audience, ultimately achieving real success.

(2) There is innovation in the form of communication, compared to the previous methods of communication there is a touch more initiative and interest that requires audience exploration, and the carriers can be more abundant and diverse.

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# AN EXPLORATION OF THE CHALLENGES OF CROSS-BORDER DATA FLOW TO INTERNATIONAL INVESTMENT LAW BASED ON FUZZY NUMERICAL ANALYSIS METHOD

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## ABSTRACT

This paper firstly introduces the basic concept of fuzzy mathematical analysis method, which applies the principle of fuzzy transformation and the principle of maximum affiliation, establishes the set of influence factors and evaluation set, analyzes multiple influence factors of the research object, and carries out multi-level evaluation grading on them. The affiliation degree of each influencing factor is determined. Then the basic concepts of cross-border data flow and the types of cross-border data flow are introduced, and finally the cross-border data risk is analyzed as well as the governance ideas of cross-border data flow are explored. In terms of cross-border data flows, the total global data volume has reached 33 ZB (33 trillion GB) in 2018 and is expected to reach 175 ZB in 2025, with a 7-year data volume CAGR of 27%. It is a general trend to regulate cross-border data flow and deal with national information security, and the legislative protection of cross-border data should be strengthened.

## KEYWORDS

fuzzy numerical analysis; cross-border data flow; international investment method; fuzzy transformation; maximum affiliation; evaluation grading

## 1. INTRODUCTION

Data resources are important strategic resources that countries wish to control, and the competition among countries has gradually shifted from commodities and materials to the management and control of data [1-2]. In response to the protection of personal information and the development of technological innovation, countries have made active explorations at the legislative level [3-4]. The literature [5] considers that the right to data specifically includes both state-centered national data sovereignty and individual-centered data rights. The literature [6] argues that data sovereignty protection should be established and strengthened based on the value of data.

Literature [7] copes with the fact that big data raises numerous problems and requires an orderly construction of a legal system related to data sovereignty.

This paper first introduces the basic principles of the fuzzy mathematical analysis method, establishes the set of influencing factors and the evaluation set, analyzes multiple influencing factors of the research object, and evaluates them in a multi-level hierarchy. The affiliation degree of each influencing factor is determined. Then it introduces the basic scale and data flow of cross-border data flow, and finally analyzes the types of cross-border data flow, data risk and the governance ideas of cross-border data flow.

## 2. FUZZY NUMERICAL ANALYSIS METHOD

The fuzzy mathematical analysis method uses the principle of fuzzy transformation and the principle of maximum affiliation. The basic idea is to establish the set of influencing factors and the evaluation set, analyze multiple influencing factors of the research object, and grade them in a multi-level evaluation. Determine the degree of affiliation of each influence factor.

The affiliation function is a function used to quantitatively describe the degree of affiliation of the influencing factors to the landslide stability grade, which is the key to determine the degree of affiliation. In this study, the linear affiliation function of "ascending semi-trapezoidal" in fuzzy fitting is used to quantify the indexes, and the standard degree principle proposed by SAATY is used to compare each influence factor with each other to determine the relative importance of each factor in the same level and the previous level, and finally the contribution degree of each influence factor is expressed by a numerical value to complete the qualitative. The final degree of contribution of each factor is expressed as a numerical value, and the transformation from qualitative to quantitative is completed. The affiliation function  $\mu(x)$  is calculated by the formula:

$$\mu(x) = \begin{cases} 1 & x_i < a_i \\ \frac{x_i - a_i}{b_i - a_i} & a_i, x_i, b_i \\ 0 & x_i > b_i \end{cases} \quad (1)$$

If each factor  $U$ , a separate judgment  $U = (u_1, u_2, u_3, \dots, u_m)$  can be considered as  $U$  to  $\nu$  fuzzy mapping  $f$ , i.e.:

$$f: U \rightarrow H^2(V) \quad (2)$$

A fuzzy linear transformation  $T_f$  from  $U$  to  $V$  can be induced from  $f$ , which is regarded as a mathematical model for the comprehensive evaluation of  $B$  obtained from the weights  $A$ . Therefore, the fuzzy mapping  $f$  can induce a fuzzy relation  $T_f \in H(U \times V)$ , i.e.,  $T_f \in H(U \times V)$  can be represented by the fuzzy matrix  $R \in u_{m \times k}$  as follows:

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1k} \\ r_{21} & r_{22} & \cdots & r_{2k} \\ \vdots & \ddots & \cdots & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mk} \end{bmatrix} \quad (3)$$

The fuzzy relationship  $R_f$ , can induce a fuzzy linear transformation from  $U$  to  $V$ , thus,  $(U, V, R)$  constitutes a fuzzy comprehensive evaluation model.

In order to synthesize the role of each indicator on employment competitiveness, this paper adopts a weighted average model for the weight  $W$  and the fuzzy matrix  $R$  for the synthetic operation, i.e., calculated by the model  $M(\cdot, +)$ , and the comprehensive evaluation formula is:

$$n \sum_{h=1}^k r_{ih} = 1 \quad (4)$$

If one weight  $W \in H(U)$  is input, a composite judgment is output:

$$B = W \cdot R \in H(V) \quad (5)$$

When the  $\sum_{h=1}^k b_h \neq 1$ , do the normalization process, and the other  $b_k = nb_v / \sum_{h=1}^k b_h$ ,

get the  $\bar{B} = (\bar{b}_1, \bar{b}_2, \dots, \bar{b}_k)$ .

### 3 CHALLENGES OF CROSS-BORDER DATA FLOWS FOR INTERNATIONAL INVESTMENT LAW

#### 3.1 CROSS-BORDER DATA TRAFFIC TYPE ANALYSIS

To identify the patterns of external factors affecting cross-border capital flows with respect to external factors affecting cross-border balance of payments, including exchange rate factors, interest rate factors, etc. Conduct group correlation analysis on cross-item transactions, such as transactions with correlation between trade in goods and transportation (freight), trade in goods and offshore financing under other investments, direct investment and profit remittance, patent and licensing fee expenses, etc., establish correlation rules and find regular factors and anomalies. Based on historical data, the level of foreign exchange transaction volume and trend of change are characterized and analyzed quantitatively using the correlation between risk events and external factors, enterprises' own characteristics and possible risk indicators, and enterprises are classified according to the analysis results to analyze and predict the risk points and probability of risk occurrence of different types of subjects under the changes of different external factors. Table 1 shows the breakdown of the 1st level correlation analysis feature bidding. Table 2 shows the indicator breakdown characteristics of the second level correlation analysis.

**Table 1** Tier 1 association analysis feature tender breakdown

Type of Indicator	Indicator Name
Overall Indicator	Date of Statistics
	Industry Attribution
	Type of Economy
	Exchange Difference
	Interest rate differential
	Remittance Car Onward Year-on-Year
	Exports (total)
	Imports (total)
	Revenue (total)
	Expenditures (Total)
	Transaction Code

	Amount of revenue
	Amount of expenditure
	Difference between income and expenditure (total)

**Table 2** Breakdown of indicators for the second level of correlation analysis characteristics

Type	Tender type
Indicators of main characteristics	Organisation Code
	Statistics date
	Whether or not to set up a business
	Trade and non-trade categories
	Type of Special Supervision Zone
	Industry Attributes
	Type of Economy
External indicators	Exchange Difference
	Interest rate differential
Subject behaviour	Country
	Currency
	Imports
	Exports
	Import/export ratio
	Income
	Expenditure
	Income and expenditure gap
	Exchange rate received
	Exchange rate paid
Abnormal Indicators	Foreign exchange settlement
	Purchase of foreign exchange
	Foreign Exchange Purchase
	Foreign exchange speculation
	Total Differential Rate
	Total goods ratio
	Loan-to-trade payment to import differential ratio
	Credit-to-Payment to Import Differential
	Multi-bank Indicators
Disparate Goods Trade Receipts and Payments	

### 3.2 CROSS-BORDER DATA RISK ANALYSIS BASED ON FUZZY VALUES

As cross-border data flow in practice usually presents two scenarios: one is the dissemination or processing of data collected in daily transactions or other activities



across national borders; the other is the access to economic or non-economic subjects in third countries although they do not cross national borders. Of course, in either case, the relevant data may be "shared" across national borders, but in the absence of a rule of law restraint mechanism, the cross-border flow of data cannot exclude the possibility of abuse and cause negative or even negative externalities, such as infringement of personal privacy, property loss or personal damage to companies and enterprises, or In the light of this, it may violate the privacy of individuals, cause property loss or personal damage to companies and enterprises, and in the heavy cases, it may leak state secrets, induce ideological crisis, disturb social order or even threaten the regime. Therefore, the establishment and improvement of the rule of law mechanism is crucial to the regulation and risk prevention of cross-border data flow.

### **3.3 CROSS-BORDER DATA FLOW GOVERNANCE AND ITS IDEAS**

First of all, the legislation related to cross-border data flow should be strengthened to establish a regulatory system for the governance of cross-border data flow. The spirit of the rule of law requires the regulation and restraint of cross-border data flow to be based on law. A scientific and reasonable regulatory system can provide the basis and guarantee for cross-border data flow. The state should adopt scientific legislation to clarify the types, scope, processing methods, protection measures, risk prevention and other elements and contents of data that can flow across the border, not only to provide a basis for judging the legality of the cross-border flow of data and enhance the predictability of its behavior, but also to provide a basis for the state to review or enforce the regulation of the cross-border flow of data and ensure the security of data sharing.

The department continues to formulate or issue laws and regulations, forming an extremely rich textual basis. On the contrary, the construction of the normative system of cross-border data flow must first make a corresponding assessment of the existing normative system to test and confirm whether laws and regulations such as civil law and administrative law can, to a certain extent, eliminate the gap of insufficient normative supply through interpretation and other legal application techniques, and on this basis, the types of data that can flow across borders, such as the scope of conditions required in the subsequent revision of the International Investment Law should be In order to build a reasonable and complete normative system for cross-border data flow, we will fill in the gaps by using the technology of interpretation and other methods.

## **4. CONCLUSION**

This paper uses fuzzy numerical analysis to analyze the interplay between

cross-border data flow and international investment law, with the following main conclusions.

In the context of the digital economy era, cross-border data is increasing, and information security is the first factor to be considered. The legislative protection of cross-border data flow should be strengthened.

Cross-border data flow has promoted the emergence of relevant legislation and a normative system for the governance of cross-border data flow, which has formed an extremely rich textual basis.

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# THE DESIGN AND PRACTICE OF THE COURSE “INTRODUCTION TO SOCIAL WORK” BASED ON THE OBE CONCEPT IN THE CONTEXT OF THE CONSTRUCTION OF A NEW LIBERAL ARTS

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## ABSTRACT

In the context of the new liberal arts, the curriculum design as well as the theoretical orientation of Introduction to Social Work lacks scientific conceptual support. This paper combines the OBE concept with the curriculum design of Introduction to Social Work, and proposes a scheme for designing the curriculum content of social work and the dimensions of the subjects of interest involved in it, based on the four issues within the OBE concept. The proposed scheme was also evaluated through the teaching practice of a medical university. The results of the implementation showed that students' professional recognition increased by an average of 12.4% and stability increased by an average of 16.8%. This study provides a general macro-dimensional framework and analytical ideas for social work curriculum design research and design practice.

## KEYWORDS

OBE concept; Introduction to social work; Curriculum design; Teaching practice

## 1. INTRODUCTION

Since the birth of social work, professionalization has been one of the main goals of its development, and professional social work education is the cornerstone and guarantee of social work professionalization [1]. Therefore, the social work curriculum, which is a core component of social work education, has been one of the focal points of concern and criticism by social work education, practice and other relevant stakeholders, especially in post-social work development countries [2-3]. Although there has been some academic exploration of social work curriculum design, two tendencies exist in existing research that have seriously constrained the development of social work curriculum design theory and practice: one is to discuss social work curriculum design in relation to social work, and not to examine social work curriculum design within the framework of more mature general curriculum theory [4-5]. The second is to discuss social work curriculum design in terms of the selection and organisation of social work curriculum content, without reflecting on and critiquing in depth the theoretical orientation of curriculum design and the values and paradigms behind it.

In the context of the new liberal arts, literature [6] discusses the design of a social work module on 'Effective Communication with Children and Adults', which aims to teach professional competency standards to M-level students. Literature [7] explores the authors'

reflections on their doctoral supervision experience through their involvement in the collaborative design, teaching and assessment of an online undergraduate course, proposes a model of collaborative teaching supervision and discusses how receiving teaching supervision can contribute to the development of trainees as social work educators. The literature [8] developed a course that responds to the stated social justice goals of the social work profession and contributes to the promotion of social justice, equitable distribution of resources and just environmental stewardship. In the literature [9], a methodology for teaching social work service course design and project management skills was developed through an analysis of the design and teaching practice of the “Social Work Project Management” course and its effectiveness. Accordingly, this paper proposes a course content design for Introduction to Social Work based on the four guiding principles of what, why, how and how to test the learning outcomes under the OBE concept, and carries out practical teaching through adequate theoretical preparation and task assignment.

## 2. CURRICULUM DESIGN BASED ON THE OBE CONCEPT

### 2.1 THE OBE CONCEPT

The OBE philosophy emphasises the following four questions: What are the student learning outcomes? Why do students want such learning outcomes? How can students be helped to achieve these learning outcomes? How to test whether students have achieved such learning outcomes? In order to meet the four connotations of the OBE concept, the reform of practical teaching is based on the following four questions to find a suitable point for the reform of practical teaching: Firstly, how to enhance students’ practical innovation ability based on the essential connotation of learning outcome orientation? Secondly, how to understand the requirements of the era of “innovation-driven” development based on the value of the era of learning outcome orientation? Thirdly, how to build a practical teaching system and put it into practice based on the ways of obtaining learning outcomes? Fourthly, how to carry out a comprehensive test in school and outside school based on the multi-dimensional assessment of learning outcomes? The framework of the OBE concept and practical teaching reform issues is shown in Table 1.

**Table 1.** Framework structure for the fit of OBE concept

OBE Concept Connotation	Fitting Point	Educational Reform Issues
Learning outcomes	4	Students’ practical innovation ability Enhancement
Why you need it	3	“Innovation-driven” development the requirements of the times
How to help	2	Practical Teaching System Construction and Practice
How to test	1	Comprehensive on-campus and off-campus Inspection

To improve students’ practical and innovative ability as the outcome of practice teaching, and to continuously improve the practice teaching system and implementation process as the path to comprehensively improve the practice teaching level of Introduction to Social Work.

### 2.2 INTRODUCTION TO SOCIAL WORK COURSE DESIGN

#### 2.2.1 COURSE CONTENT

The course content design for Introduction to Social Work under the OBE concept is shown in Table 2.

**Table 2.** Course content of “Introduction to Social Work

Module	Subject	Credit hours
Foundation Theory	Overview	4
	History of Social Work Development	2
	Social Work Value System	4
	Social Work Theory	2
Hands-on Skills	Casework	4
	Group Work	4
	Community Work	4
	Social Work Administration	2
Professional Expansion	Social Work Education and Internship	2
	Social Work Research	1

### 2.2.2 DIMENSIONS OF SUBJECTS OF INTEREST IN SOCIAL WORK CURRICULUM DESIGN

The interest of the social work curriculum design is the group or organisation whose interests are at stake in the design of the social work curriculum. Since the main sources of the objectives of the curriculum are “the development of the discipline”, “the needs of contemporary social life” and “the needs of the learners”, the relevant subjects of interest for the design of the social work curriculum are, accordingly The main stakeholders in the design of the social work curriculum are those who represent the development of the social work discipline, those who have an interest in the development of social work in contemporary society and the students. The main groups representing the development of the social work discipline are social work experts and educators, while the main organisations representing the development of the social work discipline are social work professional associations and social work educational institutions. The main groups that have an interest in the development of social work in contemporary society are service users and their carers and practitioners, while the main organisations that have an interest in the development of social work in contemporary society are social work service agencies, relevant government departments and NGOs. Service users and their carers are the clients of social work, and the needs of these clients guide the design of social work programmes.

## 3. ASSESSMENT OF TEACHING PRACTICE AND OUTCOMES IN INTRODUCTION TO SOCIAL WORK

### 3.1 TEACHING DELIVERY

Adequate theoretical preparation. Students who have not passed the examination will be allowed to enter the next stage of volunteering practice, and those who have not passed the examination will have to make up for it after a week of revision.

Adequate analysis of the learning situation. Survey students’ learning interests, learning needs, current learning situation and volunteering intentions through questionnaire star to grasp and understand the learning situation.

Active resource linkage. Field visits to social work agencies and volunteering projects through industry visits and return visits by graduates, etc., to select volunteering projects that match the academic situation and sign volunteering cooperation agreements.

Firstly, the students who have passed the theoretical assessment will be divided into groups of 5. The group will discuss fully, elect a group leader and make the division of labour and

volunteer service plan. After the grouping is completed, service dates and lengths are arranged according to the time requirements of the volunteering project, with each group following up one case in the casework project and each case having no less than four service interventions. The group work project requires each group to undertake one week of service, with a good work plan and service theme; the community work project requires each group to undertake one community volunteer service for waste separation community activities. The social work administration project requires the whole class to volunteer for the county-level charity project review meeting in the school district. At the end of the day, after each group has completed a certain methodological system of volunteering, they will summarise and discuss the project within the group, and make a PPT to share the group's achievements and feelings in the classroom, and the sharing performance will be counted as part of the usual grade. Through the PPT sharing, students will improve their oral expression skills and PPT production skills, and at the same time lay a foundation for the next stage of learning social service project roadshow skills.

### **3.2 ASSESSMENT OF RESULTS**

The model has been implemented in four classes of social work students in a medical university in the classes of 2021 and 2022 to date. Firstly, students' professional recognition and stability have increased significantly, with professional recognition increasing by an average of 12.4% and stability increasing by an average of 16.8%, maintaining a high level of professional stability. Secondly, students' professional sentiment and professional skills have increased significantly. Students have intuitively and deeply experienced the skills and techniques of social service through the volunteering project, and built up professional sentiment such as empathy and acceptance. Thirdly, the employment rate of students' precise counterparts has increased significantly. Through the docking of volunteer service projects, it is conducive to the involvement of employers in the training of talents in the industry as well as to the employment of students in internships, achieving the triple-win goal of students, schools and employers.

### **4. CONCLUSION**

The above content mainly explores the dimensions of interest subjects and their values and interest demands dimensions of social work curriculum design from a macro level, constructing a macro framework for social work curriculum design practice and providing an analytical idea for social work curriculum design research. Firstly, exploring the dimensions of social work curriculum design based on the OBE concept expands the vision of social work curriculum design research and provides a guarantee for more in-depth social work curriculum design research. Secondly, social work curriculum design is the result of social construction and the outcome of a game between various relevant stakeholders, so a viable curriculum design needs to integrate the claims and interest orientations of various relevant stakeholders as far as possible and explore the values and interest demands behind the curriculum.

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# THE CONSTRUCTION OF AN INNOVATIVE MODEL OF EMPLOYMENT EDUCATION BASED ON INFORMATION FUSION TECHNOLOGY IN THE CONTEXT OF CIVICS TEACHING IN UNIVERSITY ENGLISH COURSES

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## ABSTRACT

The innovative research of talent training model has an extremely important role in promoting the talent training activities of higher education institutions, which is not only beneficial for each higher education institution to improve the quality of talent training, but also provides important support to improve the employability of their talents. This paper firstly introduces the basic method of information fusion technology, which automatically analyzes and synthesizes the observed information of several sensors obtained in time sequence under certain guidelines to accomplish the required decision making and estimation tasks and then information processing. Then the theory of talent training model is studied and the factors influencing employability are discussed in terms of university factors, students, enterprises and society. Finally, a method of innovative model of employment education based on information fusion technology is proposed. In terms of influencing factors, the main ones are the cultivation level of colleges and universities, the quality ability of students, as well as the cultivation of enterprises and the policies of the society. The research of this paper is important for the construction of the innovative model of employment education in colleges and universities.

## KEYWORDS

English course; Civics teaching; information integration technology; employment education; enterprise cultivation; employability

## 1. INTRODUCTION

With the development of science and technology, students need not only solid theoretical knowledge and rich practical skills, but also innovative thinking and



entrepreneurial ability to meet the needs of enterprise development [1-2]. As the main site for cultivating innovative talents, colleges and universities should vigorously carry out innovation and entrepreneurship education to guide students to actively innovate, understand entrepreneurship and actively employ, which should follow the economic and social development trend [3]. The literature [4] considers that employability refers to the ability that people have to engage in a certain occupation, including basic employability and special employability. The literature [5] considers that employability refers to the ability of students to obtain a job position upon graduation, and that students obtaining a job is only a temporary state, while having employability enables graduates to obtain lasting employment and career security.

This paper first describes the process of information fusion technology to correlate, correlate, and synthesize data and information obtained from single and multiple information sources to obtain accurate location and identity estimates, as well as comprehensive and timely assessments of posture and threats and their significance. The components of the talent development model and the factors influencing employability are then explored, and finally, an innovative model of employment education with information fusion technology is proposed.

## **2 INFORMATION CONVERGENCE TECHNOLOGY**

Information fusion, also known as data fusion, which can also be referred to as sensor information fusion or multi-sensor information fusion, is an information processing process that correlates, correlates, and integrates data and information obtained from single and multiple information sources to obtain accurate location and identity estimates, as well as a comprehensive and timely assessment of the posture and threat and its significance; the process is an evaluation of its estimation, assessment, and need for additional information sources of a continuous refinement process, as well as a process of continuous self-correction of the information processing process to obtain improved results.

Information fusion technology can be summarized as: the information processing process that uses computer technology to automatically analyze and synthesize the observed information from a number of sensors obtained in time sequence under certain guidelines to accomplish the required decision making and estimation tasks. According to this definition, multi-sensor system is the hardware basis of information fusion, multi-source information is the processing object of information fusion, and coordinated optimization and integrated processing is the core of information fusion.

### 3 THEORY OF TALENT DEVELOPMENT MODEL

#### 3.1 THE CONCEPT OF TALENT CULTIVATION MODE IN HIGHER VOCATIONAL INSTITUTIONS

The concept of talent cultivation model is richly researched at home and abroad. According to the comprehensive previous research, the talent cultivation model of higher education institutions refers to the model consisting of clear cultivation objectives, high-quality cultivation specifications, real-time updated curriculum system, scientific management system and evaluation methods, which is established by higher education institutions to improve their competitive advantages and achieve the goal of effective employment of graduates in the market competition environment. It is a mode of human education. The connotation includes: first, there is a certain educational ideology to guide, educational ideology is the basis of talent cultivation activities, plays a guiding role, the "model" studied in the field of social sciences is aimed at social people, and social people have subjective motivation and purpose, different educational ideology reflects different values. Secondly, talent cultivation activities have two characteristics of wholeness and systemic, and talent cultivation model as the extension of talent cultivation activities should contain two major aspects of purposive elements and technical elements.

#### 3.2 COMPONENTS OF TALENT CULTIVATION MODEL OF HIGHER VOCATIONAL INSTITUTIONS

The components of talent cultivation model mainly involve four levels: First, what to cultivate people, which is expressed in the value level of cultivation objectives and cultivation specifications, and belongs to the purpose element. The second is what to cultivate people with, which is expressed in the cultivation system and cultivation content, and belongs to the content element. The third is how to cultivate people, which is expressed in the education method at the behavior level and belongs to the method element. The fourth is how to cultivate people, which is expressed in the quality evaluation system at the result level, and belongs to the evaluation element. Table 1 shows the components of talent cultivation model.

**Table 1** Components of the talent development model

Components of talent cultivation model in higher education institutions			
Elements of Purpose	Content elements	Elements of the Method	Elements of evaluation
What to cultivate	What to train people with	How to develop people	How to train people

#### 3.3 EMPLOYABILITY THEORY

Higher vocational education in China is both higher and vocational in nature. From the viewpoint of the attributes of vocational education, higher vocational education

belongs to "employment education" to a certain extent. Therefore, in order to study the innovation of higher vocational education talent cultivation mode under the guidance of employability, it is necessary to elaborate and understand the theories related to employability of college students.

### 3.3.1 COMPONENTS OF EMPLOYABILITY

From the research on the structure of employability conducted by domestic and foreign scholars in the first chapter of this paper, they all try to give a clear definition to the components of employability of college students, but due to the different bases of research, some views simply attribute the components of employability to the ability required to get a job without in-depth elaboration, some other views lack feasibility and start from a purely theoretical perspective, and - some views involve too many factors to highlight the priorities. Others are not feasible and are based on purely theoretical perspectives, while still others involve too many factors to highlight the priorities. Based on the innovation of talent cultivation mode, the main theme of this paper is the innovation of talent cultivation mode. Based on the previous research, this paper believes that the components of employability of talents in higher vocational colleges include four aspects: professional knowledge and skills, general skills, personal qualities and career planning ability. Table 2 shows the constitutive elements of talents' employability.

**Table 2** Components of talent employability

Employability			
Professional competencies	General skills	Personal qualities	Career planning skills

### 3.3.2 FACTORS INFLUENCING EMPLOYABILITY

At present, there is a serious structural contradiction between the employability of higher vocational students and the employment demand of the society, and it frequently occurs that "graduates cannot find suitable jobs and employers cannot find ideal talents". The vocational quality of higher vocational students is missing, their professional hands-on ability is not strong, their practical application ability is not enough, their team and cooperation spirit is not enough, their dedication and hard-working spirit is not strong, their innovation and entrepreneurial consciousness is poor, and their employability is generally not high. Therefore, to innovate talent training mode under employment orientation, we must start from the influencing factors of employability of senior vocational students. There are many factors affecting the employability of higher vocational students, such as the national employment policy, the condition of social and economic development, the quality of higher vocational education for students' training, etc. From the concept of employability, this

paper analyzes the factors affecting the employability of higher vocational graduates into four parts: universities, students, employers and society. Table 3 shows the influencing factors of employability.

**Table 3** Factors influencing employability

Factors influencing employability			
Higher Education	Students	Company	Social .
Training objectives	Overall quality	Production requirements	Employment Policy
Specialisation	Vocational Competence		
Career guidance	Career choice	Company	Social.

#### **4. AN INNOVATIVE MODEL OF EMPLOYMENT EDUCATION BASED ON INFORMATION FUSION TECHNOLOGY**

##### **4.1 BUILD A "THREE-PLATFORM" PRACTICE PROGRAM ORIENTED TO NATIONAL STRATEGIC NEEDS**

Firstly, build the service platform of school-enterprise innovation and entrepreneurship. Innovation and entrepreneurship practice education needs to continue to gather more enterprises and talent resources to help enterprises reduce labor costs and improve the efficiency of personnel matching. Both enterprises and universities need to establish precise employment service system and refine employment management service.

Secondly, build a platform for school-enterprise innovation and entrepreneurship cooperation. Relying on big data analysis, hold industry high-end forums, publish annual reports on human resources in big information industry, invite industry experts to share cutting-edge theories and development trends, and create a human resources management benchmark in big information industry. The first is the technical support platform, in which the university department in charge of innovation and entrepreneurship provides scientific and technological achievements and technical services for enterprises. Second is the pilot incubation platform, relying on science and technology parks, industrial technology research institutes, the construction of off-site parks and off-site research institutes, to provide pilot incubation services for the transformation of scientific and technological achievements. Third, the local enterprise cooperation platform, relying on local research institutes and local science and technology information network, to carry out various forms of school-ground enterprise cooperation, to promote the landing of scientific and technological achievements, to serve the regional economy.

Thirdly, build a platform to guarantee the innovation and entrepreneurship of the university and enterprises. Optimize and continuously operate the innovation and entrepreneurship talent exchange system, absorb the innovation and

entrepreneurship talent resources of the "Internet+" competition, optimize and improve the innovation and entrepreneurship talent pool, and realize the output of innovation vitality.

#### **4.2 BUILDING A COLLABORATIVE INNOVATION AND ENTREPRENEURSHIP TALENT CULTIVATION SYSTEM BETWEEN SCHOOLS AND ENTERPRISES**

Carry out a series of activities of school-enterprise in-depth docking internship experience. The school relies on the local regional science and technology park, allowing students to enter the enterprise, understand the enterprise, help the enterprise, through enterprise visits to visit, internship practice related activities, to help students familiar with the enterprise related industry prospects, corporate culture construction, the actual work environment, salary and benefits, personal position grade promotion development path, etc., so that college students set career goals. We invite employees from human resources and technical departments of enterprises to carry out career guidance, dock with school-enterprise talents during the school year, expand the cooperation model, jointly build with enterprises in multiple dimensions, introduce enterprise technical talents as student career mentors, and attract enterprises to campus for student career planning and innovation and entrepreneurship project guidance. The university provides the teachers related to innovation and entrepreneurship guidance with attachment in the science and technology park, which enables the teachers of innovation and entrepreneurship guidance and the enterprises in the science and technology park to have in-depth exchanges and learning. Continue to promote innovation and entrepreneurship competitions and related activities. The university organizes the "Internet+" innovation and entrepreneurship competition, promotes learning through competition, fully mobilizes students' enthusiasm, and brings into play students' innovation and entrepreneurship ability. Provide incubators for entrepreneurial projects, provide targeted support for start-up companies, strengthen cooperation between schools and enterprises, and promote the cultivation of students' innovative and entrepreneurial abilities.

#### **5. CONCLUSION**

This paper mainly discusses the construction of the innovative mode of employment education in the context of the Civic Education of college English courses, discusses the influencing factors affecting the employment of college students respectively, as well as puts forward new ways of employment education. The following conclusions are mainly drawn.

In terms of the influencing factors of employment, the main ones are students'

lack of vocational quality, poor professional hands-on ability, insufficient practical application ability, insufficient team and cooperation spirit, poor dedication and hard-working spirit, and poor awareness of innovation and entrepreneurship. As well as the national employment policy, the status of social and economic development, the quality of higher vocational education for students' training and other factors.

As for the innovative mode of employment education, the main measures are to set up "three platforms" practice projects and to build an innovative and entrepreneurial talent cultivation system with the cooperation of schools and enterprises.

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# EXPLORING THE TRAINING OF APPLIED TALENTS IN CULTURAL INDUSTRY MANAGEMENT IN THE ERA OF BIG DATA

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## ABSTRACT

In the new era, the cultural industry is developing by leaps and bounds under the impetus of national policies and technological innovation, and the development of big data cultural industry presents new changes and new patterns. Local applied undergraduate colleges and universities should comply with local, “industry-education integration” and “symbiosis theory, continuously adjust the training plan of cultural industry professionals, clarify the training objectives of interdisciplinary professionals, and strengthen the construction of multi-industry integrated faculty. With the help of new media and other technical means to connect with the real social needs, we cultivate constructive cultural industry composite talents and gradually form a sustainable discipline construction and talent training development mode. Four questions related to talent cultivation concept were set in the questionnaire survey to test the concept of cultivating talents in cultural industry management in universities. The results show that the combined percentage of those who think it is in line and more in line with the talent cultivation concept ranges from 55%-75%, while the combined percentage of those who think it is not quite in line and not in line with it amounts to 25%-45%. This study provides intellectual support for the development of cultural industries, thereby promoting the prosperity and sustainable development of China’s cultural industries.

## KEYWORDS

Applied undergraduate university; Cultural industry management; Integration of industry and education; Symbiosis theory; Composite talents

## 1. INTRODUCTION

The “Internet +” action plan was proposed in China’s government work report in 2015, which aims to promote the in-depth integration of the Internet of Things, mobile Internet and cloud computing big data with the manufacturing industry, thereby promoting the overall development of Internet finance, e-commerce and related industries such as the industrial Internet, with the main field of the cultural industry As a result, the main field of the cultural industry has rapidly shifted to the field of internet platforms[1-2]. At the same time, national policies and financial support for the development of cultural industries are increasing, and the demand for cultural industry professionals is also increasing [3-4]. All these have provided a good social and ecological environment for the construction and discipline development of cultural industry majors, and the development of cultural industry in the new era has ushered in new opportunities and new dynamics [5-6].

The literature [7] suggests that the first thing is to be able to grasp the direction of talent training, which should reflect both the application-oriented orientation of undergraduate talent

training and the basic requirements of the dual functions of cultural industry management. The literature [8] starts from the development of cultural industry and the demand for talents, and gives some opinions on the training mode of cultural industry management professionals.

In this paper, under the impetus of big data technology and national policy innovation, local applied undergraduate institutions should continuously improve the overall quality of education, and promote the upgrading of the structure of local cultural industries and the deep development of “industry-education integration”, which has become a necessary issue of the times. The symbiosis theory is used to analyse and explore the methods and modes of “industry-education integration”, so as to determine the symbiotic relationship between subjects formed in “industry-education integration”. Finally, according to the requirements of training talents in the cultural industry of big data in the new era, the teaching mode should be continuously innovated to achieve modernization of means and flexibility of mechanism.

## **2. CULTIVATION MODE OF PROFESSIONAL TALENTS IN CULTURAL INDUSTRY IN THE CONTEXT OF BIG DATA**

### **2.1 LOCALITY, “INTEGRATION OF INDUSTRY AND EDUCATION” AND “SYMBIOSIS THEORY”**

#### **2.1.1 INTEGRATION OF INDUSTRY AND EDUCATION**

The “integration of industry and education” has thus become an important path for the development of local applied undergraduate colleges and universities and the improvement of talent training quality. How to improve the overall education quality of local applied undergraduate colleges and universities, promote the upgrading of the local cultural industry structure and the in-depth development of the “integration of education and industry” has become a necessary issue of the times. Promoting the development of “industry-education integration” in local applied undergraduate institutions is an important measure to expand local employment and entrepreneurship and cultivate new momentum for economic development.

#### **2.1.2 “SYMBIOSIS THEORY”**

The symbiosis theory is used to analyse and explore the methods and modes of “integration of industry and education”, so as to determine the symbiotic relationship among subjects formed in “integration of industry and education”. In particular, the basic conditions for the symbiotic system among universities, enterprises and the government are formed in the “integration of industry and education”, and the main reason why the symbiotic system can be formed among the subjects of “integration of industry and education” in local undergraduate colleges and universities is that there is a possibility of coupling between them in terms of target interests. The possibility of coupling. In other words, the key to the formation of a symbiotic relationship lies in the consistency of the goals of the subjects of the “integration of industry and education”, which is also related to the ultimate effect of the “integration of industry and education”. The coupling of interests between universities, enterprises and local governments creates a cooperative relationship of mutual support and dependence between the three parties, enabling them to integrate their resources through the “integration of industry and education” in order to ultimately achieve common interests.

### **2.2 COLD THINKING ON THE INNOVATION OF CULTURAL INDUSTRY PROFESSIONAL TRAINING IN THE NEW ERA OF BIG DATA**

The cultivation of talents in the cultural industry of big data in the new era should continuously innovate the teaching mode and realize the modernization of means and flexibility of mechanism. At the same time, various teaching resources should be integrated to achieve practical construction of teaching materials, rationalisation of curriculum and construction of a



composite teacher team. At the same time, it should strengthen cooperation between schools and enterprises, create a multidisciplinary knowledge platform, and create various practice platforms for the educated through competitions and dual tutorship, so as to continuously improve their various practical abilities. Local applied undergraduate universities can strengthen cooperation with cultural enterprises and institutions through the combination of industry-university-research to optimise the teacher team of cultural industry majors. According to the demand for talents from enterprises and institutions and to cultivate the practical application ability of educated people, local units can participate in the formulation of professional talents training programmes, the provision of teachers and practical teaching, etc., carry out the cooperation between schools and enterprises in the order training mode, introduce special corporate culture and management modules into the education and teaching of local colleges and universities, so that the curriculum of cultural industry management majors can be more targeted and forward-looking to meet the needs of the times of cultural industry development.

### **3. SURVEY ON THE CULTIVATION OF CULTURAL INDUSTRY MANAGEMENT TALENTS IN UNIVERSITIES**

#### **3.1 SUBJECT AND CONTENT OF THE SURVEY**

##### **3.1.1 SUBJECTS OF THE SURVEY**

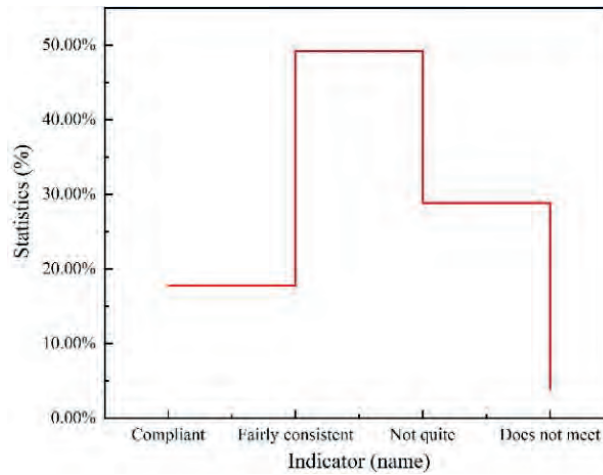
According to the actual needs of the study, 15 higher education institutions were selected, including 2 first-class universities, 7 first-class disciplines and 6 general colleges and universities, and the targets of the survey were undergraduate students and graduates of cultural industry management.

##### **3.1.2 CONTENT OF THE SURVEY**

This paper adopts the empirical research method of questionnaire survey. The questionnaire is to examine the survey respondents' feelings about the professional talent cultivation mode, mainly to understand the problems and suggestions of the survey respondents on the cultivation of professional talents in cultural industry management. In this paper, four questions related to talent cultivation concept are set in the questionnaire survey to test whether the concept of cultural industry management talent cultivation in universities promotes students' personality development and the practice of this concept.

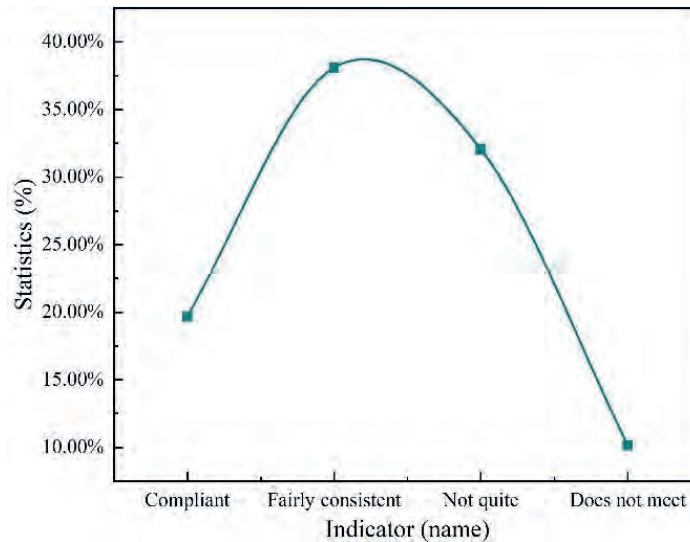
#### **3.2 QUESTIONNAIRE RESULTS AND ANALYSIS**

Firstly, the situation regarding "educational activities focus on understanding and valuing students' individual differences" is shown in Figure 1. As can be seen from Figure 1, 17.77% of the students believe that this is true and 49.2% believe that it is more true, with a total of 66.97% believing that the concept and the extent to which it is practised is good.



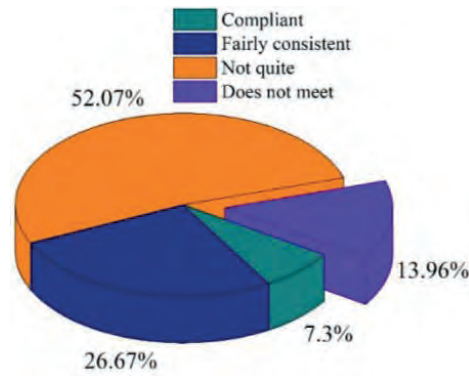
**Figure 1.** “Educational activities focus on understanding and valuing the individual differences of students”

Secondly, the survey on ‘respecting students’ subjectivity and attaching importance to the development of students’ subjectivity’ is shown in Figure 2. Figure 2 shows that 19.68% and 38.09% of the students thought that this concept and the degree to which it was practised were in line with this concept.



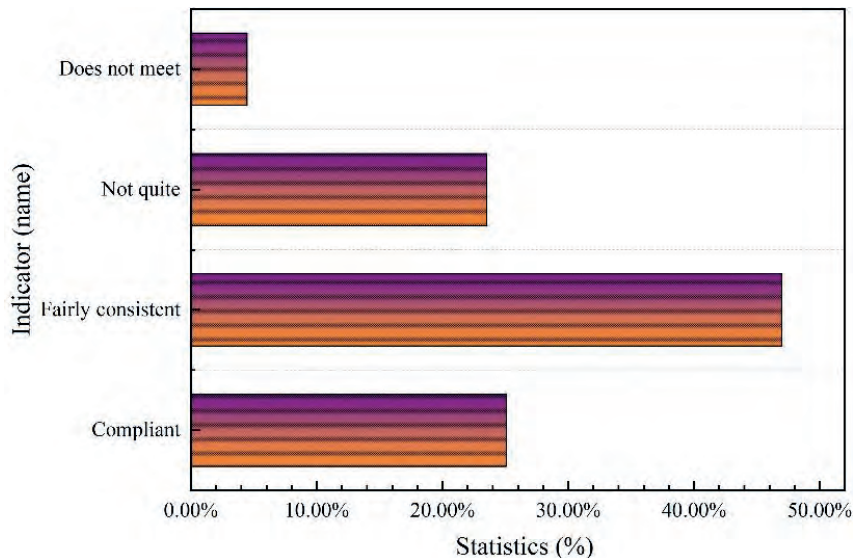
**Figure 2.** Survey on “Emphasis on the Development of Students’ Subjectivity

Thirdly, the survey on “Emphasis on the development of new competencies for professional students” is shown in Figure 3. From the results presented in Fig. 3, 7.3% and 26.66% of the students thought that the concept and its practice were in line and relatively in line respectively, and 33.96% of the students thought that the concept and its practice were better. At the same time, the proportion of those who think it is not quite compatible and not compatible is as high as 66.02%, indicating that more than half of the students have a low level of recognition of the concept and its practice of attaching importance to students’ creative abilities in the training of cultural industry management professionals.



**Figure 3.** Survey on “Emphasis on the development of new competencies for professional students”

Fourthly, the survey on “Promoting the unity of personal and holistic development of students” is shown in Figure 4. As can be seen from Figure 4, 25.07% and 46.98% of the students thought that the concept and its practice were good, with a total of 72.05% of the students believing that the concept and its practice were good. At the same time, the combined percentage of those who thought it was not quite compatible and not compatible amounted to 27.93%.



**Figure 4.** “Survey on the “Harmonization of Individual and Holistic Development of Students

Through the analysis of the above questionnaire data, it is found that there is more room for improvement in the areas of “education activities focus on understanding and respecting students’ individual differences”, “respecting students’ subjectivity and attaching importance to the cultivation of students’ subjectivity” and “promoting students’ personality development and overall development”. The unity of students’ personality and all-round development” shows that there is still much room for improvement in the cultivation of cultural industry management professionals in universities in terms of enhancing students’ uniqueness, subjectivity and harmony. In addition, “attaching importance to the cultivation of students’ innovative ability” is the talent cultivation concept with the lowest degree of compliance, which shows that there are many shortcomings in the cultivation of students’ creative thinking and innovative ability in universities.

#### 4. CONCLUSION

In this paper, under the background of big data, local applied undergraduate universities should seize the new opportunity of “Internet +” and cultural integration, actively explore new

paths and methods to cultivate composite talents in cultural industry, jointly run schools with regional cultural enterprises and institutions, build “Internet +” cultural industry composite talents cultivation system, strengthen cooperation and symbiosis with local government and relevant cultural enterprises, strengthen the construction of professional curriculum system and enhance practical ability training of educators, and continuously improve the core competitiveness of cultural industry educators. The university will also strengthen cooperation and symbiosis with local governments and relevant cultural enterprises, strengthen the construction of professional curriculum to enhance the practical ability training of educated students, and continuously improve the core competitiveness of educated students in the cultural industry so as to form an interactive and win-win development pattern, ultimately promoting the “Internet +” cultural industry complex talent training. This will ultimately promote the successful achievement of the goal of cultivating complex talents in the “Internet +” cultural industry.

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# THE CONSTRUCTION OF TRADITIONAL EDUCATION MANAGEMENT SYSTEM OF UNIVERSITIES IN THE CONTEXT OF CULTURAL INDUSTRY DEVELOPMENT BASED ON INFORMATION FUSION TECHNOLOGY

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## ABSTRACT

Undergraduate education is the foundation and core function of university organization. Driven by modern information technology, colleges and universities need to optimize information sharing channels as well as information dissemination methods through emerging technology industries such as big data and cloud computing, combined with standard processes of key technologies, to deeply analyze the different needs of audience groups. Facing the new development opportunities, how to achieve a new balance between tradition and innovation in the educational reform of local undergraduate colleges and universities, which mainly serve local cultural industries and social development needs, becomes a real challenge for their innovative development. The integration of moral and aesthetic education in colleges and universities based on cultural industries requires colleges and universities to implement core values, innovate moral and aesthetic education forms and help students establish cultural identity. In this regard, the article focuses on how to use cultural industry to promote the organic integration of moral and aesthetic education in colleges and universities.

## KEYWORDS

Cultural industry; Information integration; University education; Moral and aesthetic education integration; Big data; Cloud computing

## 1. INTRODUCTION

Traditional handicrafts and folk arts and crafts are closely related to China's social life and economic development, and once had a glorious history of development [1-2]. However, due to the development of the times and advanced technology, more and more traditional crafts have been neglected in the cold, such as jade carving, lacquerware, paper-cutting, velvet flowers and eight carvings in Yangzhou, so much so that there is a tendency of no one to succeed them, and even some traditional crafts have started to be lost [3-4]. The talent training of local universities also does not play a key role in supporting local industries [5]. In the context of the information age, the structure as well as the operation of undergraduate teaching organizations need new ideas and mechanisms, and the innovative undergraduate education organization model in the perspective of integration is an important guarantee for universities to adapt to the changes in the environment, especially for local universities to build first-class undergraduate education [6-7].

In the background of information age, the structure as well as operation of undergraduate teaching organization needs new ideas and mechanisms, and the innovative undergraduate

education organization model in the perspective of integration is an important guarantee for universities to adapt to the changes of environment, especially for local universities to build first-class undergraduate education. The development of traditional cultural industry is a very important part of local urban cultural construction and development, and the special talent cultivation of higher education lays the cornerstone for inheriting local cultural industry. The essence of integration and transformation development with tourism experience projects is also to solve the inheritance creativity and innovation development of local cultural characteristics.

## **2. OPPORTUNITIES BROUGHT BY THE DEVELOPMENT OF CULTURAL INDUSTRIES**

With the rapid development of cultural industries, cultural undertakings and cultural industries have received unprecedented attention in all sectors of society. As an important means and necessary way of cultural transmission and dissemination, education and teaching work has become one of the important driving forces for the prosperous development of cultural industry. The progress of cultural industry also brings more opportunities for the development of adult higher education in China, which not only gets the attention and support from the state, but also wins a broader and more flexible market platform, so that education and cultural industry can develop and progress together in a coordinated manner.

### **2.1 CULTURAL MARKET VITALITY ENHANCEMENT**

With the increasing importance attached to cultural construction, the flourishing development of cultural industries has brought about a favorable development environment for the cultural market, gradually improving the quality of services, making the market vitality and competitiveness significantly stronger, and creating favorable external conditions for the development of education. The improvement of the vitality of the cultural market has led to the optimization and adjustment of the structure of the cultural industry, a more reasonable distribution of cultural resources, and a more sound construction of cultural institutions, which has led to the improvement of the overall level of scientific and cultural development. The increased vitality of the cultural market has further cultivated the conscious self-confidence of Chinese culture, improved cultural creativity, added momentum to the reform of the cultural system, and provided a guarantee for the development of education.

### **2.2 INCREASED PERCEPTION OF EDUCATION FOR ALL**

The state's emphasis on science, education, culture and cultural industries will inevitably enhance the enhancement of the concept of education for all, thus mobilizing citizens' enthusiasm for participation and providing opportunities for the country to cultivate more high-quality and outstanding talents. The enhancement of citizens' education concept can also drive the development of education vitality, adjust the pace of education reform, and promote education reform to a new level. It can be seen that the development of cultural industry and the development of education are complementary, and they promote each other, influence each other and make progress together. The enhancement of the concept of education provides talent guarantee for the development of cultural construction, and also provides talent support for the realization of cultural creativity.

### **2.3 INCREASED INVESTMENT IN EDUCATION**

The development of education is inseparable from the active guidance and support of the government, which further increases investment in education as cultural construction unfolds. This provides a strong financial support and guarantee for cultural development. The further development of education reform requires a four-way linkage between the government, enterprises, schools and students, in which the government plays a pivotal role. The increased

investment in education can provide material support for the development of science and culture, ensure the perfection of educational infrastructure, and provide advanced technical equipment and devices to create good objective conditions for the construction of culture and clear the obstacles for the development of education.

### **3. THE EFFECTIVENESS AND COUNTERMEASURES OF THE INTEGRATION OF LOCAL TRADITIONAL CULTURAL INDUSTRY AND HIGHER VOCATIONAL EDUCATION IN THE DEVELOPMENT OF INDUSTRY-EDUCATION**

#### **3.1 REFORM OF TALENT TRAINING MODE WITH DEEP INTEGRATION OF INDUSTRY AND EDUCATION**

##### **3.1.1 CO-BUILD SCHOOL-ENTERPRISE PROFESSIONAL TALENT TRAINING MODE TO HELP ENTERPRISES CULTIVATE TALENTS**

We actively respond to the national policy to expand recruitment for the society, cooperate with local governments, industry associations and enterprise units, adhere to collaborative linkage and promote open sharing. Recruit enterprise employees as full-time college students for the traditional craft industry in order to improve the comprehensive quality of traditional craft practitioners and systematically train a new generation of inheritors with cultural literacy, technical literacy and business management skills. Enterprise management and marketing training is conducted for specific groups of students to train traditional craft talents in a preplanned, scaled and improved manner. Professional students are the prospective employees of the enterprises, creating a dual element and dual subject talent training model in which enrollment is recruitment and entry into the factory is entry into the school.

##### **3.1.2 CREATE A COMBINATION OF FULL-TIME AND PART-TIME FACULTY TO IMPROVE INNOVATION CAPACITY**

Through the master studio, the production line of enterprises is directly moved into the classroom, building a “school within a factory, school within a factory”, starting the construction of teaching factory projects in higher education institutions, inviting excellent Yangzhou jade carving enterprises to the campus training base, so that students can participate in practice under the joint guidance of enterprise experts and school teachers, allowing students to get out of the traditional classroom and into the project on site. Through the school-enterprise master teacher studio approach to course teaching, the core of professional teachers to lead students to practice operations. We create a team of full-time and part-time teachers to improve the comprehensive level of theory and skills of the teaching staff.

##### **3.1.3 COMBINING ENTERPRISE OPERATION MECHANISM IN THE TEACHING SYSTEM FRONT PRODUCTION PROCESS**

Reform the teaching mode, combined with the local non-foreign heritage tourism market development, through the leadership of the studio, the enterprise staff position operation mechanism combined into the teaching links, pioneering to lead students to follow the enterprise production process, according to the enterprise order requirements to design and create product samples, the teaching of the design works into intellectual investment products. Combined with the Internet + sales model, the results of their learning to the market, to generate economic returns. Cultivate a new era of new traditional craft talents who understand design, can produce and market.

### **4. THE INTEGRATION PATH OF MORAL AND AESTHETIC EDUCATION IN COLLEGES AND UNIVERSITIES BASED ON CULTURAL INDUSTRY**

Cultural industry is of great importance to promote the deep integration of moral and aesthetic education in colleges and universities, optimize the current educational configuration

and improve the educational structure. Therefore, managers of colleges and universities need to realize the integration of dual education based on cultural industry and oriented by culture. With the rapid development of information technology, the integration of information technology and education field can improve the competitiveness of the integration of moral and aesthetic education in colleges and universities, and information technology can effectively broaden the development channels of educational resources in colleges and universities, improve teaching quality and avoid homogenization of teaching contents. Building a collaborative education platform for cultural industry can provide colleges and universities with more professionally competent teaching organizations and higher quality cultural products, and also provide timely feedback according to the market operation mode, so as to guarantee teaching quality and meet the personalized needs of schools, students and related enterprises.

#### **4.1 COMBINING BIG DATA CLOUD COMPUTING TECHNOLOGY FOR CULTURAL INDUSTRY**

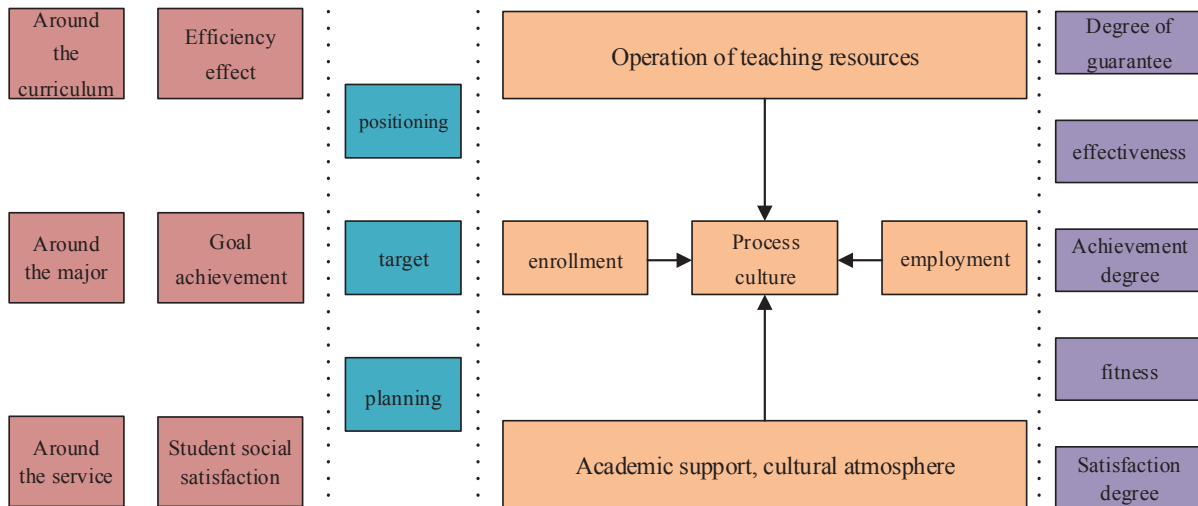
Traditional Internet technology has led to many problems in the online teaching process of higher education institutions, making it difficult to achieve the integration of moral and aesthetic education. In this regard, colleges and universities need to create a standard process of integrating moral and aesthetic education and combining key technologies through emerging technology industries such as big data and cloud computing, optimize the information sharing channels as well as the dissemination of information, and conduct a deep analysis of the different needs of audience groups. Through the emerging technology industry, it can better help teachers in higher education institutions seize the moment and provide timely guidance to students' values.

In the actual teaching process, teachers should also continue to optimize the teaching content based on students' feedback and evaluation information in the classroom as a way to better match students' thinking. Finally, teachers need to conduct regular curriculum workshops to study students' learning problems in current teaching activities, as well as to clarify which teaching methods are more conducive to the development of students' values and aesthetic skills. The school should also actively communicate and collaborate with other higher education institutions to improve teachers' professionalism by regularly assigning them to visit related institutions to learn from excellent teaching methods.

#### **4.2 PRACTICAL EXPLORATION OF UNDERGRADUATE COLLEGE ORGANIZATION REFORM IN LOCAL UNIVERSITIES**

The functions of the undergraduate student institute are shown in Figure 1. Undergraduate student college construction work idea: With the goal of improving the quality of undergraduate education and teaching cultivation, focusing on the integration of modern information technology into teaching management and student management, highlighting the resource allocation function and guarantee and supervision function, carrying out research and analysis of academic conditions, implementing the student-centered concept, conducting networked centralized examinations, strengthening the teaching process records, increasing the proportion of process evaluation, improving the classroom We will carry out progressive reform and deepening in various aspects, such as carrying out research and analysis of academic conditions, implementing the student-centered concept, conducting online centralized examinations, strengthening teaching process records, increasing the proportion of process evaluation, improving the level of "wisdom" in classrooms, optimizing educational and teaching conditions, and improving teaching and learning styles, so as to establish a nurturing environment suitable for students' growth and success, and thus achieve the goal of talent cultivation.





**Figure 1.** Function of undergraduate school

## 5. CONCLUSION

To realize the organic integration of cultural industry and college education management system. Colleges and universities need to actively develop synergistically with China's cultural industry, develop moral and aesthetic education teaching resources using emerging technologies such as cloud computing and big data, build a collaborative education platform for the cultural industry, optimize the mechanism of action, effectively improve the quality of dual education integration teaching, and then realize a region-wide education reform integrating practice and technological innovation, and promote the quality and efficiency of higher education moral and aesthetic education in the new era.

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# ANALYSIS OF THE IMPACT OF CHINESE AND WESTERN CULTURAL DIFFERENCES ON THE PERCEPTION OF BRITISH AND AMERICAN FILM LITERATURE BASED ON BIG DATA

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## ABSTRACT

In the context of the rapid development of big data technology, cultural globalization is developing rapidly and cross-cultural communication is deepening. This paper examines the cognitive impact of British and American film literature from three aspects: the difference in narrative structure between China and the West, the communication problem, and the difference in values in Chinese and Western cultures. Based on the FV-SA-SVM method to classify emotions, and based on the set-up dictionary to extract the emotional words in the review, we then get the emotional tendency expressed by the review. The results show that: "Thumping" in particular, it has a total of 93% of general positive emotion and moderate positive emotion ratings. In comparison Fast and Furious had the highest percentage of highly positive emotions of the three films. This study provides an in-depth analysis of audience perceptions of the films and draws out strengths and weaknesses to guide the film industry in a better direction.

## KEYWORDS

British and American cinema; Narrative structure; FV-SA-SVM; Affective classification; Cognitive impact

## 1. INTRODUCTION

With the widespread use of computer network technology and three-dimensional technology in film production, a number of British and American science fiction blockbusters, represented by The Hobbit, have become highly sought after by film fans worldwide[1-2]. The literary aspect of the art of cinema exists objectively, whether it is in the form of original screenplays or screenplays based on novels, plays or other literary works, all of which are composed of literary language [3-4]. Film and literature have always gone hand in hand, and the presence of literature is a natural part of film works, and the presence of literature is the basis and source of power for the brilliance of film art [5-6].

Literature [7] investigates the application of British and American films in the introduction of English language and culture. From the important role played by British and American films, it proposes measures to strengthen the cultivation of teachers' cultural literacy, select good cultural introduction materials and create a combined introduction mechanism inside and outside the classroom, taking Forrest Gump as an example to analyse its specific application. In this paper, [8] compares the effects of film adaptations of Pride and Prejudice in the UK and the US. The aim is to analyse the cultural connotations and aesthetic interests of the two countries through the visualisation of Pride and Prejudice's superficial features.

The cultural exchange between Chinese and Western films in British and American cinema

requires not only learning to grasp and skillfully switch between the two languages, but also the ability to grasp the laws of language, special history and culture, analyse the psychology of the film and the audience, understand the aesthetic orientation of the audience, and carry out cultural re-creation to achieve good cultural exchange and commercial purposes. The FV-SA-SVM model is used to score the initially classified film reviews through an emotion dictionary, to filter out the wrongly scored data for reclassification, and to gain a deeper understanding of the distribution of different emotions in the three films *The Fast and the Furious*, *Thumping*, and *Mindhunter*.

## **2. CHINESE AND WESTERN CULTURAL DIFFERENCES IN BRITISH AND AMERICAN FILMS**

### **2.1 PROBLEMS IN THE EXCHANGE OF CHINESE AND WESTERN FILMS**

Film is a comprehensive art, a harmonious unity of rich forms and means of artistic expression, a synthesis of linguistics, literature and aesthetics. Film has multiple functions such as expressing emotions, reflecting life, disseminating information and interpreting history. Through watching films, audiences can not only obtain visual enjoyment, but also satisfy their spiritual sense of belonging and the search for the unknown. Translation is an important issue in intercultural communication in a multicultural context, and is always a challenge. Film translators play an important role in bridging the gap between Chinese and Western cinema, and through them, the audience not only enjoys the foreign atmosphere but also the charm of diverse cultures.

Film translation is not only a simple conversion of language and text, but also an artistic and aesthetic re-creation. The requirements for translators are very high, not only do they need to learn to grasp and skillfully switch between the two languages, but they also need to be able to grasp the laws of language, special history and culture, analyse the psychology of the film and the audience, understand the aesthetic orientation of the audience, and carry out cultural re-creation to achieve good cultural exchange and commercial purposes. Film translation is a special form of literature, the language and theme of the film carries the connotation of the traditional culture of that nation, and through the refinement of the film theme, the characteristics of the characters in the play are reflected, and this promotes the smooth development of the plot. However, the overall level of film translation in China is still at an early stage of development, especially when Chinese films are “going global”, there is an urgent need for high-level translation.

### **2.2 DIFFERENCES IN NARRATIVE STRUCTURE BETWEEN CHINA AND THE WEST**

China and the West present different narrative models in their narratives because of their different positioning of the audience for animated films. Western animated films are positioned for an all-ages audience, and the films’ narratives present a complex pattern, with a balanced-rebalanced model. The British and American action films, on the other hand, have a tendency to be under-aged because they have long targeted their audience at teenagers, and the narrative mode is dominated by the simple structure of binary opposition. 2019’s smash hit *The Fast and the Furious* breaks away from the binary opposition mode of previous films, presenting emotion and action in one, complex and varied character. The subversion of the main characters and the intensification of drama and conflict all add to the fleshed out and tense narrative of the film. This is tense and conflicting to British and American audiences, but Chinese audiences may still prefer a complex, conflicting narrative structure. What’s more, a change in one film would hardly break the stereotypes Chinese audiences have of British and American film literature.

## **3. THE COGNITIVE IMPACT OF BRITISH AND AMERICAN FILM LITERATURE**

### 3.1 COGNITIVE INFLUENCE CLASSIFICATION THEORY

The classification of emotions is based on the judgement of words that contain subjective tendencies to determine the viewpoint and emotional orientation of the audience contained in a film review. By studying the emotional orientation of audiences in film reviews, film producers and investors can grasp the views of audiences on films and improve their productions. There are two main approaches to classifying emotions: the first is based on a sentiment dictionary: this study is based on a big data approach to classifying emotions, and the sentiment words in the reviews are extracted from the set dictionary to obtain the sentiment expressed in the reviews. Therefore, whether the sentiment lexicon is well set up will affect its final classification effect.

The second method converts the sentiment words as feature words into a matrix and then uses a classification model such as SVM, for example, to classify the comments. So the final classification effect of this approach depends mainly on the filtering of the training set and whether the sentiment is correctly labelled.

For the movie review data, this study uses a machine learning-based approach to emotional classification, using the Cat's Eye APP viewer reviews as an example, "I'd like to take the opportunity to comment on the post-viewing emotions, it's really wonderful, through the form of the film shows a variety of British and American powerful, a variety of weapons and equipment, special forces powerful previously only seen in American films, more into the British and American The movie is a great way to show the strength of the British and American military team, and it is so touching and tearful that in the near future British and American movies will be stronger. The positive words such as "touching" and "tearful" make this sentence a positive comment and mark it as 1. "It's just so-so, not very good", "not very good" and other descriptions, you can judge this sentence as "average", negative comments from the comments, mark it as 0.

### 3.2 EXPERIMENTAL PROCEDURE

The next step is to perform sentiment classification experiments using FV-SA-SVM with the experimental hardware: the operating system is Windows 10 Enterprise. Processor is Intel Pentium (Pentium) G4560@ 3.50GHz dual core, memory is Magnesium DDR42400MHz 8GB and CoreTech DDR42400MHz 8GB, 16GB in total, hard disk is Hitachi HGSTHTS721010A9E6301TB, software platform: Python 3.6.

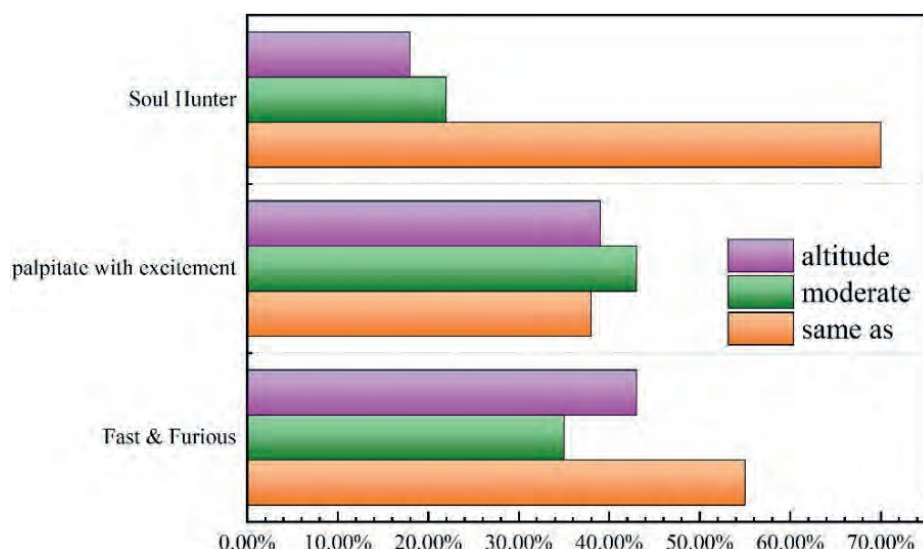
First, we want to verify whether the FV-SA-SVM model is universal and superior in classifying emotions for film reviews of different genres. In this paper, we select three representative films from the genres of action, romance, and suspense, Fast and Furious, Heartthrob, and Mindhunter, to conduct the study.

### 3.3 DATA ANALYSIS

The initial classification of the reviews was scored by means of an emotion dictionary to filter out the wrong scores for reclassification, and to gain more insight into the distribution of the different emotions in the three films, we considered positive reviews with scores falling between (0,10] to be average, (10,20] to be medium, and greater than 20 to be high, based on the scoring.

Figure 1 shows the positive sentiment segmentation statistics for the three films. Generally positive and moderately positive emotions accounted for the highest percentage of ratings, especially for 'Thumping', which had a combined total of 93% of generally positive and moderately positive emotions. In comparison, Fast & Furious had the highest percentage of highly positive sentiment among the three films, at 22%, followed by Mindhunter at 18%, while

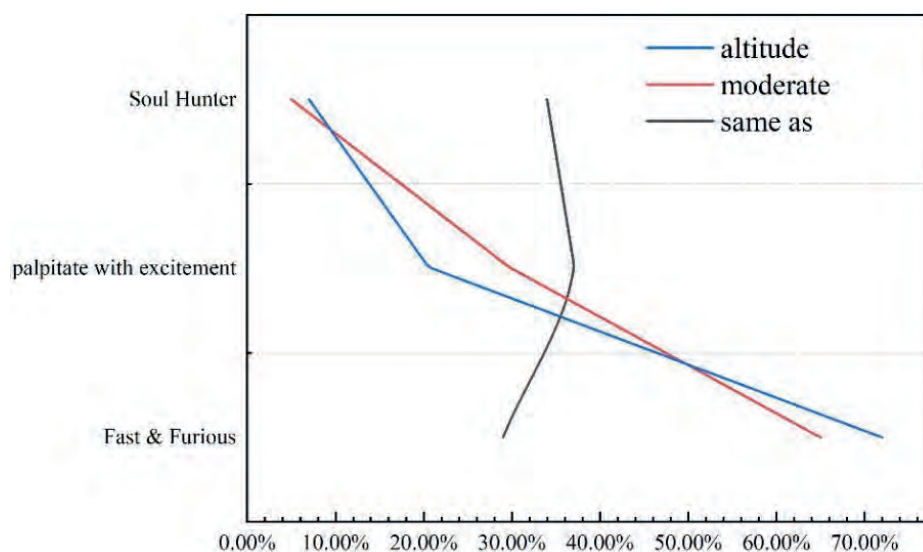
Heartthrob had the lowest percentage of highly positive sentiment, at 7%. The above figures show that audiences' viewing experience of Fast & Furious and Mindhunter is still very good compared to that of Thumping.



**Figure 1.** Segmented statistics of positive emotions in three films

Conversely, negative reviews with an affective score between  $[-10,0)$  are average, those between  $[-20,-10)$  are medium, and those below  $-20$  are high. The segmentation of the emotional tendencies of the three films is studied according to the results of the emotional scoring.

Figure 2 shows the statistical chart of the negative emotion segmentation of the three films. From the negative sentiment segmentation of these three films, the proportion of average and moderate negative sentiment in Fast and Furious and Mindhunter is greater, while the proportion of high negative sentiment is less, but the proportion of high negative sentiment in Heartthrob is the greatest, reaching 34%, far exceeding the 5% and 7% of the other two films, indicating that the audience is very dissatisfied with the This indicates that audiences are very dissatisfied with the movie-going experience.



**Figure 2.** Segmented statistics of negative emotions in three films

#### 4. CONCLUSION

In this paper, in the context of big data, the FV-SA-SVM approach is used to classify the cognitive impact of British and American film literature in terms of sentiment. Through

simulation experiments, we verify whether the FV-SA-SVM model is universal and superior in terms of sentiment classification for film reviews of different types of films. The following conclusions can be drawn.

(1) Film is an artistic reproduction of life, and the cultural differences between East and West embodied in film translation are the product of the historical development of each country, and this cultural collision is also the driving force behind the development of literature. Due to the commercial and popular nature of film works, adopting the right cultural exchange strategy plays an important role in the development of China's film industry, the interpretation of traditional Chinese texts and the shaping of China's national image.

(2) Based on the FV-SA-SVM scoring of the initially classified movie reviews through the emotion dictionary, in the positive emotion segmentation statistics of the three movies, the audience still had a good viewing experience for *The Fast and the Furious* and *Mindhunter* compared to *Thumping Heart*. In the negative emotions section of the three films, "Thumping" has the largest proportion of highly negative emotions, at 34%, far exceeding the 5% and 7% of the other two films, indicating that audiences are very dissatisfied with the viewing experience of "Thumping".

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# A STUDY ON THE CONSTRUCTION OF INTER-REGIONAL ECOLOGICAL GOVERNANCE MECHANISM IN THE HUANGHE RIVER BASIN UNDER THE PERSPECTIVE OF BIG DATA

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## ABSTRACT

Abstract: In the context of the development of big data technology, a large number of pollutants aggravate the pollution and destruction of production environment, living environment and natural environment in rural areas, and the rural ecological environment further deteriorates, while the study of cross-area ecological governance of the Yellow River Basin rural areas becomes very urgent. Based on the functional positioning of the nine provinces in the Gansu section of the Yellow River basin as an important water connotation and recharge area of the whole Yellow River basin, the cross-river basin ecological governance of the Yellow River basin is mainly achieved by building a cross-Yellow River basin governance community. Using Stata software, Tobit regression analysis was conducted on the factors influencing the efficiency of rural ecological governance in the Yellow River basin from 2008 to 2017. The regression results show that the pure technical governance efficiency of the basin is basically maintained at the level of 0.62, indicating that the increase of investment in environmental pollution management as a proportion of GDP can significantly improve the rural ecological environmental governance efficiency, and the arable land area has a positive influence on the rural ecological environmental governance efficiency. This study explores the real governance efficiency of the Yellow River Basin ecological environment and its influencing factors, and provides reference and reference for the policy measures of rural ecological watershed governance in the Yellow River Basin.

## KEYWORDS

Tobit regression analysis; Huanghe River Basin; Regional large water network; Ecological trans-regional governance mechanism; Influencing factors

## 1. INTRODUCTION

The Yellow River Basin is crucial for China's economic, social, and ecological life. It insures the environmental protection and development of the region [1-2]. The proposed strategy of the research provides precise positioning and direction for the targeted objectives of the Yellow River Basin's governance [3-4]. According to the new historical perspective, the Yellow River

Basin's management incorporates political formation, while ecological conservation and high-quality development have consistent goals and cooperate in practice. The construction in the basin includes economic, cultural, social, and ecological aspects. [5-6].

The paper [7] calculated the sand transport in the primary and tributary streams of the Yellow River Basin in Gansu. Furthermore, it analyzed current problems in its management and protection processes in light of General Secretary Xi Jinping's requirements for the Yellow River Basin. In addition, it summarized the knowledge gained by previous generations through managing the Yellow River and put forward suggestions for soil erosion management and pollution prevention. In the paper [8], the concept and progress of environmental management in the Yellow River Basin are reviewed, considering the problems in upstream source management, systemic development, integrated management of the left and right banks, compound pollution in the basin, and socialization of environmental policies in the environmental management of the Yellow River Basin in Gansu.

This paper examines the perspective of the ecological conservation and high-quality development measures of the Yellow River Basin in the Gansu section as a crucial water connotation area and recharge function for the River Basin. By eliminating random errors and outside environmental factors from the rural ecological management of the Yellow River Basin using analytical software, the efficiency values obtained can more accurately reflect the level of actual rural ecological management efficiency in the basin's nine provinces, enabling the Yellow River Basin in Gansu to experience rapid development.

## **2. BUILDING A YELLOW RIVER BASIN GOVERNANCE COMMUNITY AND PROMOTING ECOLOGICAL PROTECTION IN THE YELLOW RIVER BASIN**

### **2.1. THE PATH TO BUILD A GOVERNANCE COMMUNITY IN THE YELLOW RIVER BASIN**

#### **2.1.1 IMPROVE LAWS AND REGULATIONS**

With the continuous enrichment, development and concentration of governance affairs in China, the Yellow River Basin, as a new type of governance area, involves various social affairs closely related to the well-being of the general public, and thus needs systematic laws and regulations to regulate them comprehensively. It is necessary to innovate social governance mechanisms, improve social governance, adhere to governance by law, strengthen the rule of law, apply the rule of law thinking and rule of law to resolve social conflicts, and improve the modernization of social governance, thus providing an important guarantee for the construction of the Yellow River Basin governance community

#### **2.1.2 BROADEN THE INTERACTION CHANNELS**

Broadly speaking, the public in the Yellow River basin includes social organizations, research institutions, enterprises, and the public, who are located in different geographical locations, involved in different issue contents, supported by information behind, and pursuing different interest goals. For this reason, an interconnected information hub platform should be established within the river basin to sort out and summarize relevant governance elements and form communication and feedback channels for different subjects and contents. On the one hand, the traditional interaction channels should be consolidated by adhering to the people-oriented principle, and the frontier technologies such as big data and cloud computing should be used to break through the boundaries of relevant exchanges, seminars, hearings, forums and lectures in time and space, so as to provide an effective form carrier for public participation in governance.

#### **2.1.3 BUILDING AN INTEREST COORDINATION MECHANISM**

In this situation, the establishment of a scientific and reasonable interest coordination



mechanism is helpful to incubate a benign game of interest community and form a harmonious and balanced interest pattern, so as to finally realize the benefit sharing in the Yellow River Basin. This is reflected in three aspects: First, by promoting the institutionalization and organization of interest expressions, and actively constructing the mediation mechanism of interest conflicts in the information feedback, preventing the intensification of conflicts and maintaining social stability. Secondly, by integrating interest demands and interest goals, we can find a breakthrough to resolve interest conflicts and achieve the integration and regulation of interests between groups and regions. Third, to establish a mechanism for distributing interests with fairness, legitimacy and justice, and to create a governance environment for sharing interests while pursuing Pareto optimality. Here, benefit sharing cannot be simply understood as the equal distribution of governance results, but should give more attention to the disadvantaged groups.

#### **2.1.4 ESTABLISHING A SOUND COLLABORATIVE GOVERNANCE MECHANISM**

The spatial development of the Yellow River Basin emphasizes the basin-wide boundary and aims at ecologically sustainable development, high-quality economic development and comprehensive human development, which can ensure natural regeneration, achieve wealth increase and enable the public to enjoy the fruits of development fairly. In this sense, the spatial development of the Yellow River Basin is the eternal goal of its collaborative governance, and collaborative governance is the access path to achieve spatial development. To this end, it is necessary to strengthen the role of the Yellow River Basin as a link between east and west, to establish a basin-wide spatial development mechanism, and to realize the full coverage of the collaborative governance mechanism, so that the ecological, economic and human development of the basin can be integrated.

### **2.2 BOOSTING ECOLOGICAL PROTECTION AND HIGH-QUALITY DEVELOPMENT OF THE HUANGHE RIVER BASIN IN GANSU SECTION**

#### **2.2.1 INCREASE THE PROMOTION OF HORIZONTAL ECOLOGICAL COMPENSATION MECHANISM IN THE WHOLE FLOW OF THE YELLOW RIVER**

It is recommended that the state support the ecological protection and restoration policy of the Yangtze River Economic Zone, *mutatis mutandis*. Annual arrangement of financial funds. The 9 provinces along the Yellow River should be allocated according to the factor method. Further increase the weight of "water resources contribution", "water use efficiency" and "soil and water conservation area" indicators in the allocation of funds in the calculation factors. After the funds are issued, there is no limit to the specific scope of use. By the provinces independent arrangements for the Yellow River Basin, water pollution control, soil and water conservation, water conservation, water conservation, soil greening, sand control and other ecological protection and restoration of the Yellow River Basin to promote ecological restoration and ecosystem function.

#### **2.2.2 ESTABLISHMENT OF THE YELLOW RIVER CITY ECOLOGICAL PROTECTION AND HIGH-QUALITY DEVELOPMENT FUND**

To accelerate the development of the ten ecological industries. Gansu Province has set up the Gansu Green Ecological Industry Development Fund, but the overall scale is small, coupled with attracting little social capital. Still can not meet the demand for funds for industrial development in Gansu Province, it is recommended that the central government follow the national green development fund model. 9 provinces along the Yellow River participate in shares to attract social capital. Establish a national-level fund for ecological protection and high-quality development of the Yellow River Basin to support ecological protection and industrial development in the nine provinces along the Yellow River. Provide a capital financing

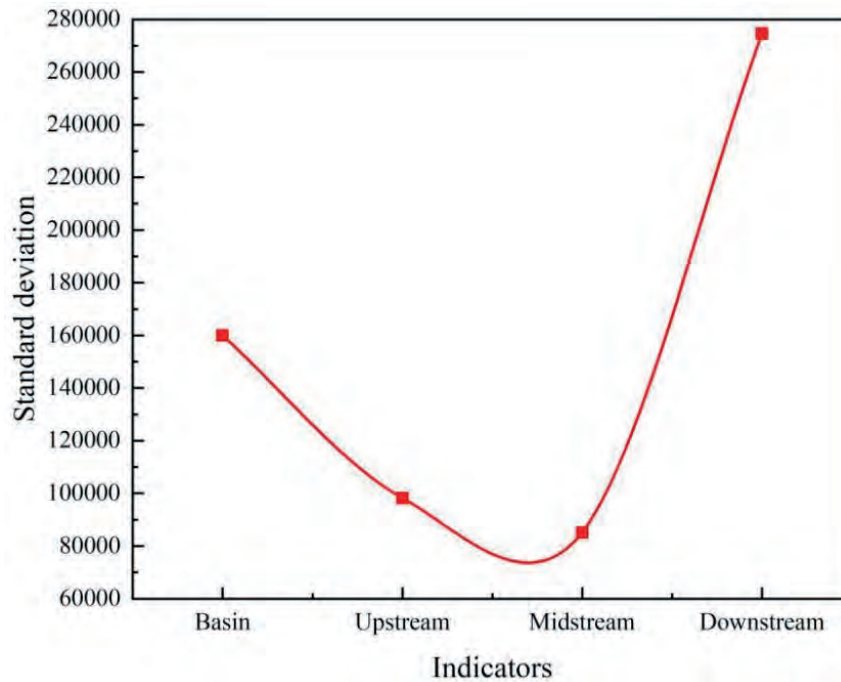
and investment platform for the ecological protection and high-quality development of the Yellow River Basin, and focus on supporting major ecological and environmental protection projects industrial projects and investment in enterprises with good growth and high yield in the Yellow River Basin in the form of equity investment, such as environmental protection, pollution prevention and control, ecological restoration and water resources protection, greening of national space, energy conservation and utilization, transportation infrastructure construction, clean energy, etc.

### **3. RESEARCH FINDINGS**

#### **3.1 FLOW DISTRIBUTION CHARACTERISTICS**

The Arc GIS software is used to visualise and analyse the above processed data through spatial analysis methods, and the tourism flow forces are represented hierarchically through the natural breakpoint method. From the whole basin, the tourism flow force is unevenly distributed, primarily in the basin's middle and lower portions, with the tourism flow in the upper reaches concentrated in Shaanxi. When compared to the upper reaches, the distribution of tourism flow is more balanced at the middle and lower regions. In terms of provinces, tourism flows vary greatly between provinces, with more tourism flows in Shandong, Henan, Shanxi and Shaanxi, which have well-developed transportation and rich tourism resources, each with its own characteristics, with an overall bias towards provincial capitals and their surrounding areas, and in terms of pairs within provinces, tourism flows are mostly distributed in provincial capitals and their surrounding areas with rich tourism resources.

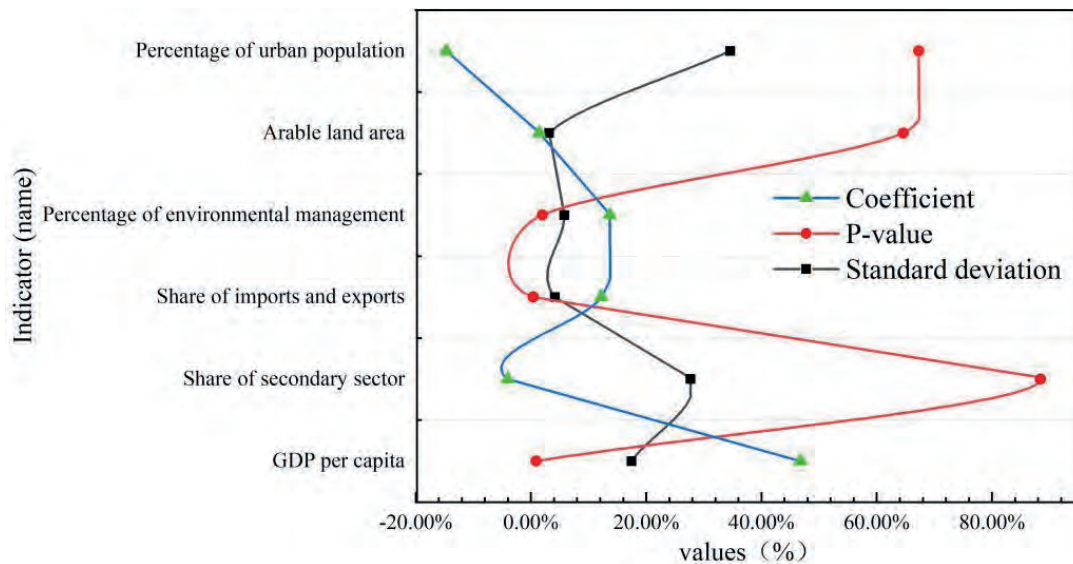
Figure 1 shows the differences in the distribution of tourism flows. The standard deviation mainly reflects the extent to which individuals deviate from the mean and reflects the absolute differences in areas. The standard deviation demonstrates that there are significant variations in how tourist flows are distributed throughout the basin. It shows the differences in tourism development between the cities in the basin, which are severely unevenly distributed, and that tourism development within the basin is not on the same horizontal line. In comparison to the basin as a whole, the dispersion of tourism flows in the upper, middle, and lower reaches differs significantly, with the higher and middle reaches exhibiting a smaller standard deviation than the lower reaches, where tourism flows are distributed rather evenly. Whereas some cities in the downstream region show a strong attraction to tourists and a clear preference for tourism flows, the concentration of tourism flows in some cities makes their role as core nodes obvious, but it can also be seen that there is little coordinated drive across the basin, leading to significant spatial differences in tourism flows.



**Figure 1.** Difference in tourism flow distribution

### 3.2 REGRESSION ANALYSIS OF FACTORS INFLUENCING GOVERNANCE EFFICIENCY

The factors influencing the effectiveness of rural eco-environmental management of the Huanghe River Basin are shown in Figure 2. Using Stata software. From 2008 to 2017, Tobit regressions were performed on the variables affecting the effectiveness of local eco-environmental administration in the Huanghe River Basin. The findings of the regression analysis reveal a considerably positive coefficient for GDP per capita, showing that this factor has a considerable impact on how effectively rural environmental protection is conducted. The efficiency of rural eco-environmental management will be greatly improved by increasing the proportion of all import and export to regional GDP in a particular region, according to the correlation of the ratio of total import and export to regional GDP. The coefficient of the proportion of financing in environmental pollution control to GDP is also optimistic, implying that a rise in the proportion of financing in environmental pollution control to GDP will also markedly enhance the effectiveness of rural eco-environmental management. The coefficient of the relationship between investment in the prevention of environmental pollution and GDP is positive, implying that increasing the connection between investing in the prevention of environmental pollution and GDP can markedly improve the effectiveness of exurban eco-environmental control. In contrast, the region of agricultural land has a positive but minor impact on this relationship.



**Figure 2.** Factors Affecting the Efficiency of Rural Ecological Environment Control in the Huanghe River Basin

#### 4. CONCLUSION

This paper use Arc GIS software to visualize and perform spatial analysis on the previously processed data, and it employs the Tobit model to perform regression analysis on the variables affecting the effectiveness of rural eco-environmental governance. One can infer the following conclusions.

(1) The distribution of tourism flows in the upper, middle and lower reaches varies greatly relative to the whole watershed, with a smaller standard deviation in the middle and upper reaches compared to lower reaches, where tourism flows are relatively evenly distributed. The concentration of tourism flows in some cities makes their role as core nodes obvious, but it is also clear that the basin as a whole is not well coordinated and driven, resulting in significant spatial differences in tourism flows.

(2) The Huanghe River Basin's rural eco-environmental management's detailed technical efficiency, pure technical efficiency, and scale efficiency have all changed significantly, and their respective mean values have all increased significantly. This suggests that possible errors and external conditions have a major effect on the efficacy of rural eco-environmental management.

#### FUNDING

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# A SIMULATION STUDY ON MODELLING THE DEVELOPMENT OF VOCAL MUSIC TEACHING PATHS IN UNIVERSITIES BASED ON BIG DATA ANALYSIS

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## ABSTRACT

The aim of this analysis of the development path of vocal music teaching in colleges and universities is to better inherit Chinese vocal music culture. In this paper, with the help of big data technology, the requirements for the development and cultivation of vocal music culture in colleges and universities are explained, and an online teaching mode of vocal music based on big data technology is given. Data analysis is conducted for the online teaching mode of vocal music. From the comparative analysis of the teaching modes, the satisfaction of the online teaching mode is increased by 15.5% compared to that of the traditional teaching mode. In terms of practical advantages, 31.79% and 24.29% of the respondents said, respectively, that the use of online vocal teaching mode could better update the teaching content and diversify the teaching knowledge. This shows that big data technology can be used in effectively analyzing the development path of vocal music teaching in universities.

## KEYWORDS

Big data analysis; Universities; Vocal music teaching; Development path; Satisfaction; Online teaching model

## 1. INTRODUCTION

From ancient times to the present, education has always been one of the most important topics of concern, and with the continuous development in China's socio-political and economic fields, education in China has entered a wholly new stage [1-2]. Vocal education has an unshakeable position in the field of music education, and it is important to avoid being left unnoticed by those who work in this field. The current era is one of data, and the combination of Internet technology and traditional vocal teaching is increasingly recognized and welcomed by educators in current vocal teaching, and this new teaching mode follows the trend of modernizing vocal teaching [3-5].

Inheritance of national music culture can maintain the diversity and national characteristics of Chinese culture and set the tone for the innovative development of Chinese music culture, for which reason vocal music teaching courses are offered to music majors in universities [6-7]. However, with the development of the technological era and the deepening of China's policy in reform and opening up, various kinds of information and vulgar cultures have flooded students' lives, and the inheritance and development of efficient vocal music teaching has been impacted [8-9].

In order to analyze the development path of vocal music teaching in colleges and universities, this paper has offered arguments in three parts. The first part is the development of the traditional teaching mode of vocal music, including the incipient exploration period, the

development and progress period, and the full-scale prosperity period. The second part is an analysis of the online vocal teaching mode, including the advantages and limitations of the online teaching mode, which serves as the basis for the quantitative analysis of the data in the later part. The third part is the application analysis, which analyzes the online and traditional modes of vocal music teaching, and also gives an analysis of the advantages of online vocal music teaching. The analysis of the development path of vocal music teaching in universities is achieved through the above three parts.

## **2. DEVELOPMENT OF THE TRADITIONAL TEACHING MODE OF VOCAL MUSIC IN COLLEGES AND UNIVERSITIES**

### **2.1 INITIAL EXPLORATION PERIOD**

In the 1920s, the early Chinese vocal art pursued the "art of American singing". After the May Fourth Movement, a number of outstanding Chinese students who had studied vocal music in the West returned to China with the ambition of making contribution to the vocal career of the motherland, and the Western art of American singing was thus introduced on the stage in China. In terms of vocal music, vocalists and foreign vocal experts were employed as vocal teachers, and the teaching mainly copied from a Western model, which also laid the foundation for the development of vocal teaching models later on.

### **2.2 PERIOD OF DEVELOPMENT AND PROGRESS**

The founding of New China on 1st October, 1949 brought endless vitality to the development of vocal education in China, and Chinese music thus entered a phase of continuous development and progress. Music academies sprang up all over the country, and vocal teaching in general distinguished between American singing and Chinese folk singing.

### **2.3 FULL BOOM PERIOD**

In 1977 when the university entrance examination system was restored after a ten-year hiatus, a wave of education revival swept in and the number of applicants for music majors continued to increase. The development of vocal music teaching after the reform and opening up has shown an unprecedented prosperity. To date, a systematic, standardized and unique traditional mode of teaching vocal music has gradually been formed, which is mainly divided into three aspects: professional teaching, theory teaching and practical teaching.

## **3. ONLINE TEACHING MODE OF VOCAL MUSIC BASED ON BIG DATA TECHNOLOGY**

With the development of the times, the education model should keep up with the times and meet the diversified requirements in learning. In vocal music teaching courses, teachers should focus on the development of the art and carry out efficient course teaching in response to students' learning characteristics. The online teaching mode of vocal music with the addition of big data technology takes students as the main subject of the class and presents the course in a diversified way through the online platform, fully mobilizing students' learning enthusiasm and prompting them to actively engage in vocal music learning.

### **3.1 ADVANTAGES OF THE ONLINE TEACHING MODEL**

#### **3.1.1 SHARING EDUCATIONAL RESOURCES**

The sharing of educational resources, which were previously limited to the classroom and knowledge only offered in textbooks and some reference books, is the greatest advantage of online teaching. Nowadays, the above-mentioned limitation is broken by online teaching, which enables the flow of resources between different disciplines and different regions. With online teaching, teaching breaks the boundaries of time and space.

### 3.1.2 MORE FLEXIBLE COMMUNICATION

All teaching activities require the participation of both teachers and students, and the effectiveness of vocal music teaching can be guaranteed if there is harmonious communication and rapport between them. Compared to other subjects, vocal music teaching is unique in itself, which, to a certain extent, requires a high degree of interaction between teachers and students in the vocal music classroom. In the current era of rapid development of big data technology, both teaching tools and teaching contents and teaching methods are networked and modernized.

## 3.2 LIMITATIONS OF THE ONLINE TEACHING MODEL

### 3.2.1 WEAK TEACHER-STUDENT INTERACTION

The fact that students and teachers are not face-to-face in online teaching makes it impossible for teachers to quickly grasp the learning situation and psychological state of students. There is no direct emotional interaction between teachers and students, and it is difficult for students to feel the teacher's teaching status and adjust their learning in time. One of the difficulties that cannot be solved in online teaching is that emotional communication still needs to be achieved through face-to-face conversations between teachers and students.

### 3.2.2 OVER RELIANCE OF HARDWARE CONDITIONS

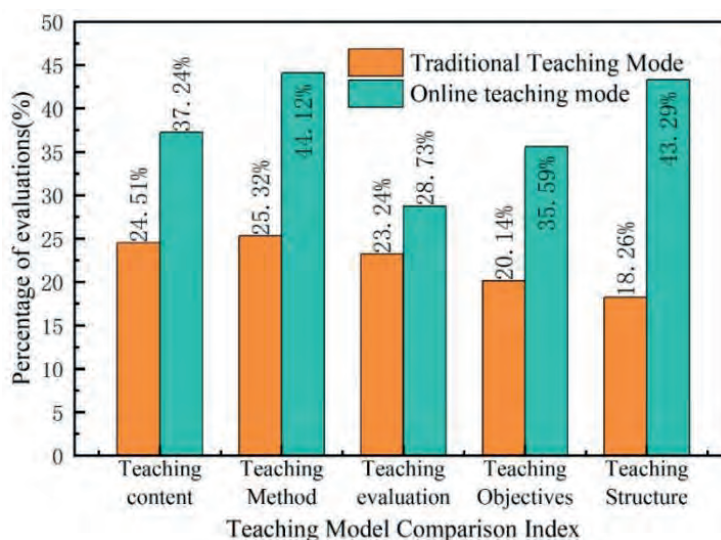
Online courses rely on electronic devices for teaching, which means that teachers and students must have one or more mobile phones or computers. This increases the cost of learning. Teachers need to spend a lot of time and effort in recording their courses, and the lack of equipment and environment for audio and video recording can also affect the effectiveness of teaching. In the case of live courses, there can also be problems with signal or radio system failure, which can seriously affect the effectiveness of online teaching.

## 4. APPLICATION ANALYSIS

This chapter focuses on the innovative cultivation strategies of big data technology for students in the development of vocal teaching in colleges and universities as a way to help provide effective directions for the development of vocal teaching in China.

### 4.1 COMPARATIVE ANALYSIS OF VOCAL MUSIC TEACHING MODES

For the online teaching mode based on big data technology, the data of vocal music teaching in S University is taken as an example, and the evaluation data of teachers and students on the two teaching modes of online and traditional teaching is collected as the object of comparative analysis. The results of this comparative analysis are shown in Figure 1.





### Figure 1. Comparative analysis results

In terms of the two modes of vocal teaching, the overall popularity of the online mode of vocal teaching is higher among teachers and students, with an overall rating of 37.79% for the online mode compared to 22.29% for the traditional mode, and an increase of 15.5% for the online mode compared to the traditional mode. This shows that the online vocal teaching mode can help teachers to tailor their teaching to students' characteristics, and the online teaching database consists of a corresponding syllabus repertoire list, leaving students free to learn.

#### 4.2 ANALYSIS OF THE ADVANTAGES OF THE APPLICATION OF THE ONLINE TEACHING MODEL

Based on the previous comparative analysis of the online teaching mode and the traditional teaching mode, this section argues for the analysis of the specific advantages of the application of the online teaching mode in vocal music teaching. The quantitative analysis of the data is carried out using the satisfaction level of teachers and students with the advantages of the application of the online teaching mode, and the results of its application analysis are shown in Figure 2.

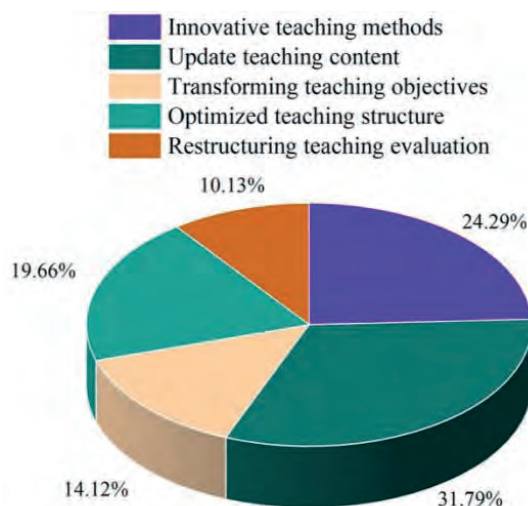


Figure 2. Application Analysis Results

The results of the analysis of the advantages of the online teaching mode show that the online teaching mode based on big data technology can attract the interest of teachers and students in vocal music teaching to a greater extent, whether by means of mobile internet or online teaching platform, which can effectively help vocal music teaching to achieve the innovation of teaching methods and update of teaching contents. In particular, 31.79% of the students and teachers believe that the online mode of teaching uses internet information technology to update the teaching content in real time. In the process of teaching, multimedia is used as a medium for students to receive vocal knowledge more quickly and intuitively, and abstract music knowledge is transformed into the form of videos or pictures, making their music lessons more vivid and interesting. 24.29% of students and teachers believe that the use of mobile internet for vocal music curriculum design can make vocal music teaching more diversified and create a broader and more open learning environment for students.

#### 5. CONCLUSION

This paper analyzes the effective path of vocal music teaching development in colleges and universities with regard to big data, and draws the following conclusions after quantitative analysis of the data:

- (1) In vocal music teaching, build a network platform and innovate teaching methods.

It is necessary to make full use of network resources, and schools must establish better network teaching platforms for vocal music, such as establishing micro-lessons and other network teaching platforms.

(2) Make use of Internet information technology to update teaching content. Computer technology is the core support of modern technology, and this technology can be applied to vocal music teaching and supplementary teaching to enrich the students' artistic world.

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# PRACTICE AND INNOVATION OF INFORMATION-BASED TEACHING IN UNIVERSITIES IN THE CONTEXT OF BIG DATA

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## ABSTRACT

With the continuous development of big data technology and the accelerating pace of life, the informatization of college teaching is becoming faster and faster. The innovation of information technology-based teaching means and teaching mode of college Civic Studies mainly focuses on three aspects of MOOC teaching, VR teaching and micro-class teaching. Through big data analysis, we can understand the ideological dynamics of college students and implement multi-dimensional teaching evaluation. The multi-dimensional, multi-object and process evaluation methods are applied throughout the teaching process. In the analysis of the frequency of Civic Studies elements in the university curriculum, the frequency of Civic Studies elements in the compulsory textbooks is greater in the level of “family and nation feeling” than in the other four levels<sup>16</sup>. The frequency of “personality qualities” in the optional compulsory materials was 25 more than the other four levels. This study resolves the contradiction between large-scale learning and personalized, differentiated and customized learning, and promotes the practice and innovation of information-based teaching in universities.

## KEYWORDS

Big data technology; MOOC teaching; VR teaching; Micro-learning; Civics elements

## 1. INTRODUCTION

In the current era of rapid development of information technology, all kinds of thinking trends are communicating, intermingling and exchanging with each other under the means of information technology media[1-2]. To do a good job in ideological and political work in colleges and universities, we need to make good use of the main channel of classroom teaching, especially the Civics class [3-4]. Especially in the current Internet era, diversified values and ideologies are more likely to disorient young students who lack the ability to make accurate judgments, and the Civics class is charged with a more difficult historical mission [5-6].

The literature[7] uses information technology to innovate the mode and method of teaching and learning, which is an important way to accelerate the deep integration of information technology and education teaching. The literature[8] analysed in depth the six core elements of information technology teaching innovation in basic education, and followed the general process of scale development to develop a measurement tool for information technology teaching innovation in basic education with high reliability and validity. Literature[9] In the

context of information-based teaching reform, higher education institutions attach great importance to the construction of information technology and integrate it with music education to explore the optimal way to reform traditional music teaching.

This paper uses big data technology to promote the traditional strengths of ideological and political work in colleges and universities with a high degree of integration with information technology, enhancing the sense of modernity and attractiveness. The traditional classroom teaching mode and the MOOC teaching mode have complemented each other, and the hybrid teaching mode of “online” + “offline” has come into being. Another important significance of MOOC for Civics courses is to promote the popularisation of Marxism, so that more people can understand, know and come into contact with Marxism. Through VR simulations of the geographical environment and climatic conditions during the Red Army’s Long March, students can be immersed in it through scene reproduction and interactive experiences, feel the hardships of the Red Army’s encounter with the siege, life and death, understand the spirit of the Long March, and learn the noble qualities of the Red Army’s bravery and courage in going forward against all odds. Micro-teaching videos are the main teaching vehicle, and after the teacher has refined the content of each chapter this teaching method is not only clear in its objectives, but also very relevant and easy for students to understand. Finally, through the big data analysis, to understand the understanding of the ideological dynamics of college students, and the analysis of the Civics elements in the college curriculum, so as to achieve the practice and innovation of information-based teaching in the college Civics classroom.

## **2. INNOVATION OF INFORMATION TECHNOLOGY-BASED TEACHING METHODS AND TEACHING MODES IN UNIVERSITY CIVICS COURSES**

### **2.1 MOOC TEACHING**

The Civics course in higher education is not only a basic course, but also a core course that inspires the mind and touches the soul. Civics courses have always been the focus and difficulty of teaching, the difficulty of which is how to truly touch the hearts of college students and effectively stimulate their initiative in learning theory. The MOOC is a new model of course born in the era of big data, after which the wave of MOOC has spread from the United States to the whole world. It makes use of the virtual space of the Internet and the modern mobile world. It uses the virtual space of the Internet and modern mobile information technology to achieve instant learning anywhere, anytime, breaking the limits of time and space. In terms of classroom organisation and management, the ‘flipped’ classroom is a disruptive innovation that solves the contradiction between large-scale learning and personalised, differentiated and customised learning. In terms of curriculum implementation, the online platform covers the entire process of teaching, feedback, assignments, assessment, examinations, certificates and employment. In terms of teaching content, cloud technology is used to realise the big data storage function. Before class, Civics teachers post course tasks and quizzes on the platform, which students need to complete in a timely manner. Teachers can understand students’ mastery of knowledge points through the data fed back from the platform. This allows teachers to base their teaching design, corresponding case presentations, discussions, lectures and arrange deeper seminars in the classroom. The MOOC course online learning mode lacks teacher leadership and supervision, making the teaching effect deviate from expectations to a certain extent. Therefore, traditional classroom teaching mode and MOOC teaching mode to achieve complementary advantages, “online” + “offline” hybrid teaching mode came into being. Another important significance of MOOC for Civics courses is to promote the popularisation of Marxism, so that more people can understand, get to know and come into contact with Marxism, which is also the goal that educators are constantly pursuing.

## **2.2 VR TEACHING: FIRING UP STUDENTS' CONFIDENCE IN THEORY IN AN IMMERSIVE EXPERIENCE**

The emergence of virtual reality technology has made the teaching tools more scientific, efficient and colourful, and can provide visual and auditory materials that are intuitive, visual and multi-stimulating. The integration of virtual reality technology with the Civic Studies course is both an exploration of the educational and teaching reform of the Civic Studies course and an attempt to integrate the science and engineering disciplines with the humanities. In the process of using VR technology, students can learn about the corresponding content through offline field visits and online learning, and learn about the school's history, famous people and red stories, creating an ecology of Civic Education that combines reality and imagination. Through VR simulation of the geographical environment and climatic conditions during the Red Army's Long March, students can feel the hardship of the Red Army's encounter with the siege, life and death, understand the spirit of the Long March, and learn the noble qualities of the Red Army's courage and courageousness through scenes of reproduction and interactive experience.

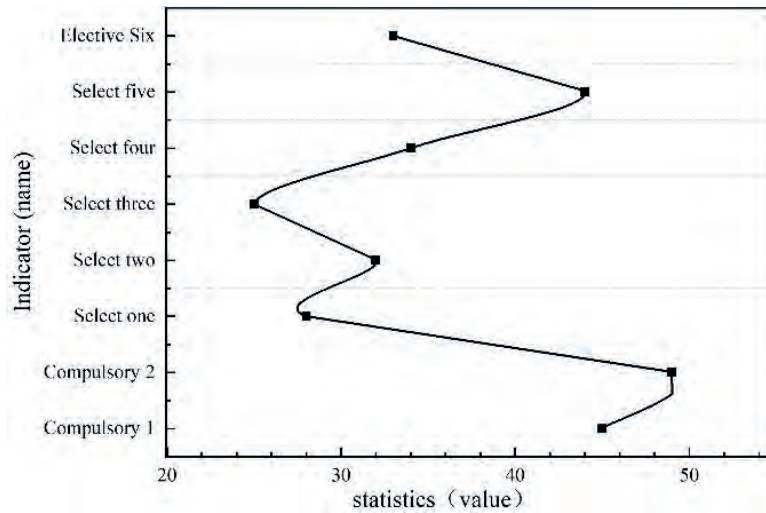
## **3. BUILD A MOBILE LEARNING ENVIRONMENT AND VIGOROUSLY PROMOTE SMART TEACHING**

### **3.1 BIG DATA ANALYSIS TO ACCURATELY GRASP THE PULSE OF YOUTH THINKING**

Through big data analysis, we understand the ideological dynamics of university students and implement multi-dimensional teaching evaluation. The multi-dimensional, multi-object, process evaluation approach is used throughout the teaching process, combined with the teaching content, from the student learning process, before and after learning, mid-term and end-term personal development progress, class learning statistics, carry out school assessment, enterprise feedback, family interaction and other point-to-point matrix links to form a student online and offline growth record booklet, a comprehensive analysis to promote the overall development of students. There are many factors that influence a Civic Education class that is popular with students, including the content of the course, the level of teachers and teaching methods. The content of Civic Education should be changed according to events, advanced according to the times and new according to the situation, and teachers should work harder to cultivate their internal skills and strengthen the affinity and relevance of Civic Education. The severe challenges posed by information technology to the construction of the teaching team have further triggered deeper thoughts on the reform and development of the teaching of Civics and Political Science in universities.

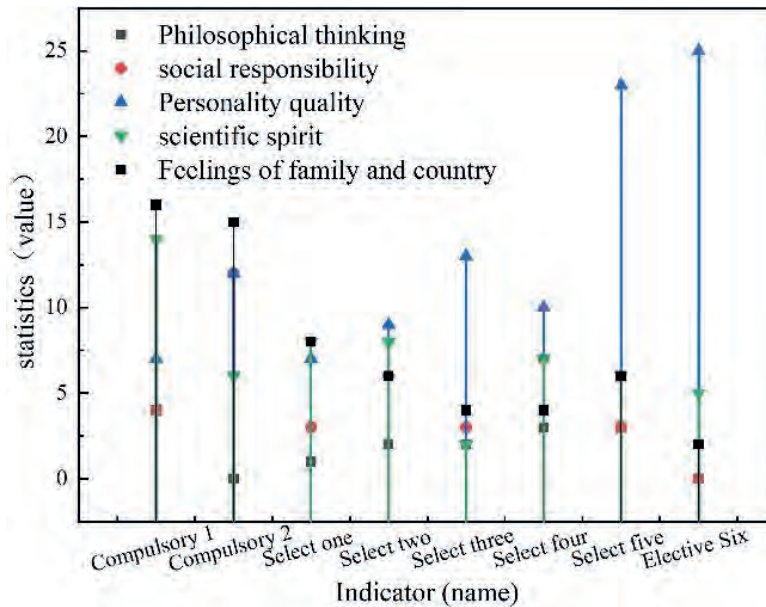
### **3.2 ANALYSIS OF THE IDEOLOGICAL ELEMENTS IN THE UNIVERSITY CURRICULUM**

Figure 1 shows a line graph of the frequency distribution of the Civics elements. Data and Computing and Information Systems and Society (Compulsory 2), as basic teaching materials for the overall enhancement of students' information literacy, emphasise the cultivation of core literacy, which should also contain rich resources of thinking politics. Through a summary of the Civics elements in each textbook, it is found that Compulsory 2, Information Systems and Society, has the most Civics elements tapped, at 49 times, followed by Compulsory 1, Data and Computing, 45 times, Selective Compulsory 5, 3D Design and Creativity, 44 times, and Selective Compulsory 3, Data Management and Analysis, has the least Civics elements tapped, at 25 times. Overall, the compulsory materials have more Civics elements than the optional compulsory ones.



**Figure 1.** Line chart of frequency distribution of ideological and political elements

Figure 2 shows a line graph of the frequency distribution of the Civics element categories. The frequency of the “family feeling” dimension of the compulsory textbook is greater than that of the other four dimensions. The frequency of the “personality qualities” element in the optional compulsory textbook is greater than that of the other four levels. “The optional compulsory subjects, on the other hand, are designed to educate students in areas such as patriotism and national identity. The optional compulsory courses, on the other hand, are designed after students have completed the basic courses and are based on further education and personal development, so there are more elements of “personality qualities”, which is in line with the original design of the materials. In short, the compulsory textbooks focus on the emotional development of students, while the optional compulsory textbooks focus on the development of personal excellence and character development.



**Figure 2.** Line chart of frequency distribution of ideological and political elements

#### 4. CONCLUSION

The development of big data has brought a severe test to traditional ideological and political work. Compared with traditional teaching, information-based teaching has the distinctive features of wide coverage, large amount of information, fast dissemination, strong virtualization and high interactivity. The only way to do a good job of “big data + ideology and politics” is to use the laws of network communication, improve and innovate the content and form of online

publicity. There is a clear bottom line and correct direction for the reform and innovation of the teaching of Civics. Only with continuous “innovation”, the university’s Civics course can better take up the educational mission of adhering to the right path, spreading positive energy and guarding the main position as a microcosm, we must follow the laws of ideological and political work, the laws of teaching and education and the laws of student growth, and constantly improve our working ability and level.

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# RESEARCH AND PRACTICE OF IDEOLOGICAL POLITICAL EDUCATION IN UNIVERSITY PHYSICS UNDER THE BACKGROUND OF BIG DATA

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## ABSTRACT

Ideological and Political Education in Curriculums is an important part of the teaching reform of universities in the new era. The university physics course is characterized by strong scientificity, wide audience and rich ideological and political education resources, and is responsible for the historical task of strengthening moral education. In this paper, according to the characteristics and teaching contents of the physics course, the teaching process integrates the ideological and political elements of scientific thinking, national sentiment, dialectical materialism education, craftsmanship, scientific and technological strength, etc., to explore the specific paths to improve the ability of teachers in the ideological and political education, improve the teaching methods and improve the practical ability of students. The results show that through the practice of the teaching mode of Physics Course + Curriculum Ideology and Politics, the overall teamwork ability of students in physics experiments has increased by 23.15%, effectively improving the learning effect of students in physics courses. The Physics Course + Curriculum Ideology and Politics not only serves the educational purpose of strengthening moral education, but also has a better promotion effect on students' pursuit of scientific spirit, scientific attitude and team spirit.

## KEYWORDS

Ideological and political education; Physics courses; Ideological and political elements; Scientific thinking; Physics experiments; Teamwork

## 1. INTRODUCTION

In the new era, the state has put forward new requirements for curriculum construction, both the series of speeches of General Secretary Xi and the series of meetings and documents of the Ministry of Education have made clear the importance of ideological and political education [1-2]. the Ministry of Education's "the guidelines for ideological and political education in colleges and universities" proposes to comprehensively promote the construction of ideological and political education is a strategic measure to implement the fundamental task of strengthening moral education, and clarifies the target requirements and content focus of the construction of the curriculum [3-4]. The literature [5] argues that how to better shape students' scientific character in experimental teaching while carrying out ideological and political education is an issue worthy of deep consideration by physics laboratory teachers in their teaching. The literature [6] argues that through clever and scientific content design ideological and political elements such as socialist core values, patriotism and struggle spirit are incorporated into teaching in a subtle form in order to achieve ideological and political education in physics experiments.

In this paper, firstly, depending on the characteristics of different experimental projects, love



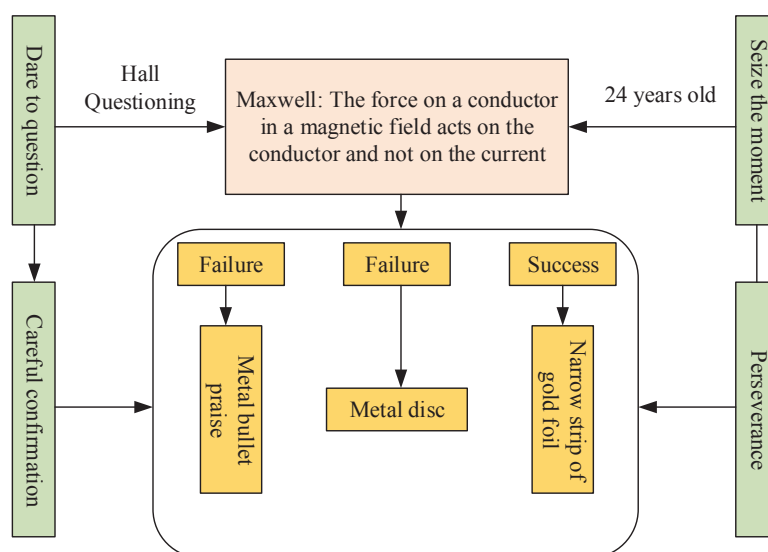
for the Party, love for the country, love for socialism, love for the people and love for the collective are the main lines to guide students to strengthen their ideals and beliefs, establish scientific values and enhance their comprehensive literacy. Secondly, in the background of physical experiments, experimental principles, experimental purposes, experimental operations and other aspects, through clever and scientific content design of the core values of socialism, patriotism, the spirit of struggle and other ideological and political elements into the teaching in a subtle form, to achieve the ideological and political education in physics experiments by moistening things silently. In the end, the concept of ideology and politics is integrated into the actual teaching of University Physics, trying to find the footing of the theory in the process of actual teaching and then reflecting on it for improvement.

## 2. PHYSICS COURSE + CURRICULUM IDEOLOGY AND POLITICS TEACHING MODEL

### 2.1 METHODS AND APPROACHES TO CURRICULUM IDEOLOGY AND POLITICS

The physics laboratory course teaches students basic physics knowledge and basic laboratory skills, enabling them to master physical concepts, learn to think scientifically, solve practical problems through scientific investigation, cultivate their scientific attitudes and responsibilities, and gradually form a scientific character that benefits them for life.

Using the thinking of curriculum ideology and politics to design a good experimental background and tell the story of scientists can better achieve the effect of nurturing people. For example, the Hall effect experiment, which is offered in almost every school, can incorporate rich ideological and political elements when telling the background of the experiment as shown in Figure 1.



**Figure 1.** Teaching design in the discovery of the Hall effect

After several failures Hall did not give up but changed his experimental ideas and eventually used narrow strips of gold foil to obtain scientific experimental data, successfully confirming the Hall effect phenomenon. By explaining the process of the discovery of the Hall effect, students are inspired to form a good scientific character on the road to scientific research, to seize the moment and learn diligently, not only to have the courage to question, but also to have innovative thinking and persistent efforts.

### 2.2 DISCOVERING THE IDEOLOGICAL AND POLITICAL ELEMENTS IN THE PHYSICS CURRICULUM

The nature and characteristics of the physics curriculum, as well as the cognitive characteristics and receptiveness of students, should be taken into account when exploring

the ideological and political elements of the curriculum. The selection of elements is based on the principles of authenticity, orientation and methodology. In this paper, physics is divided into two knowledge modules, and three elements are selected from each section to explore the ideological and political elements. In the process of explaining physics knowledge, these elements are subtly explored and integrated into the modules to guide students in the formation of relevant beliefs, sentiments, cultivation and spirituality.

A selection is used to explore the ideological and political elements in the optics section as shown in Table 1.

**Table 1.** ideological and political elements embedded in optics

Physics Knowledge Points	Bridging Points	ideological and political Elements
Reflection of light	Insert the story of Mr. Gao Yin, the father of fiber optics, in the video	Both down-to-earth and far-sighted, not looking for glory and profit open-mindedness.
Diffraction of light	China's sky eye, the 500-meter spherical radio telescope	The strong strength of the country's science and technology
Interference of light	An optical instrument company in Shenyang provided nearly 2,000 pieces of filters in an emergency.	Embodying the unity of strength and family sentiment that one side is in trouble and all sides are supported.

### 3. EMPIRICAL RESULTS AND ANALYSIS OF THE PHYSICS COURSE + CURRICULUM IDEOLOGY AND POLITICS TEACHING MODEL

In this paper, two lessons from the internship teaching, The Discovery of Electromagnetic Waves, are selected as teaching examples. The lesson is from University Physics 2 and the specific case design is as follows. The physical knowledge of this lesson includes electromagnetic waves, Maxwell's electromagnetic field theory and the concept of electromagnetic field. The content of this lesson is based on Maxwell's mathematical talent and his research into Faraday's laws of electromagnetic induction until he made his prediction about the existence of electromagnetic waves and eventually established a complete theory of electromagnetism. The content of the course reflects the approach to scientific enquiry, the invisibility of innovative thinking and the role of scientific development in driving the world.

#### 3.1 TEACHING OBJECTIVES

(1) Knowledge and Skills: Know the historical background of the discovery of electromagnetic waves and Maxwell's important contribution to electromagnetism; know the concept of electromagnetic waves, Maxwell's electromagnetic field theory, etc.

(2) Processes and Methods: Through the study of Maxwell's electromagnetic field theory, students will learn to use scientific thinking and reasoning methods such as association, inference and so on.

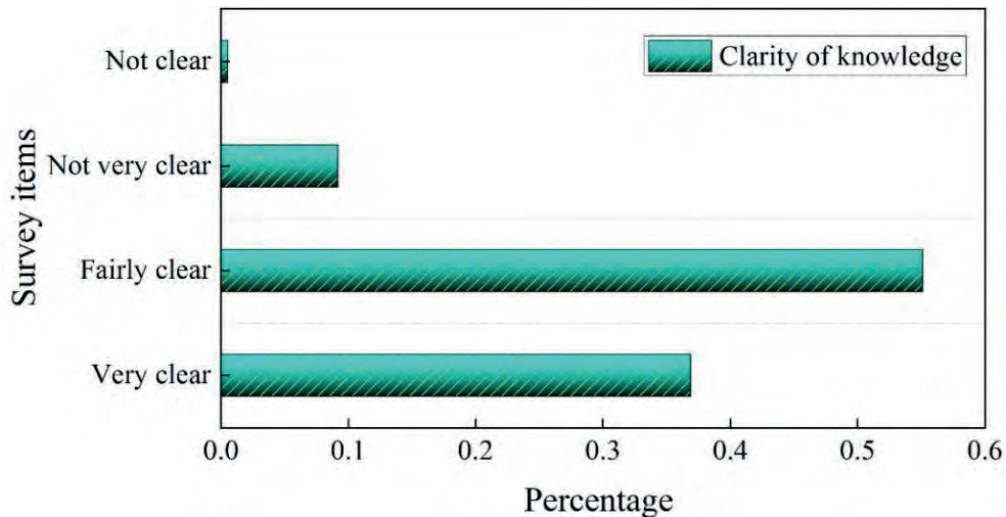
(3) Emotional and Attitudinal Values: Using the example of the pioneers in electromagnetism research, students will develop scientific qualities and scientific thinking methods to help them enhance their patriotism and establish a dialectical materialist world view. Using knowledge of electromagnetism as an entry point and historical examples of applied research on electromagnetic fields as a portrait, students will cultivate the scientific spirit of pursuing truth and exploring creativity.

#### 3.2 TEACHING EFFECTIVENESS

(1) Clarity of knowledge

Question Q2 was set in the questionnaire: "In this physics class, do you think that the teacher explained relevant physical concepts, such as the law of electromagnetic waves and

the law of conservation of energy, clearly?" The results of the survey are shown in Figure 2.



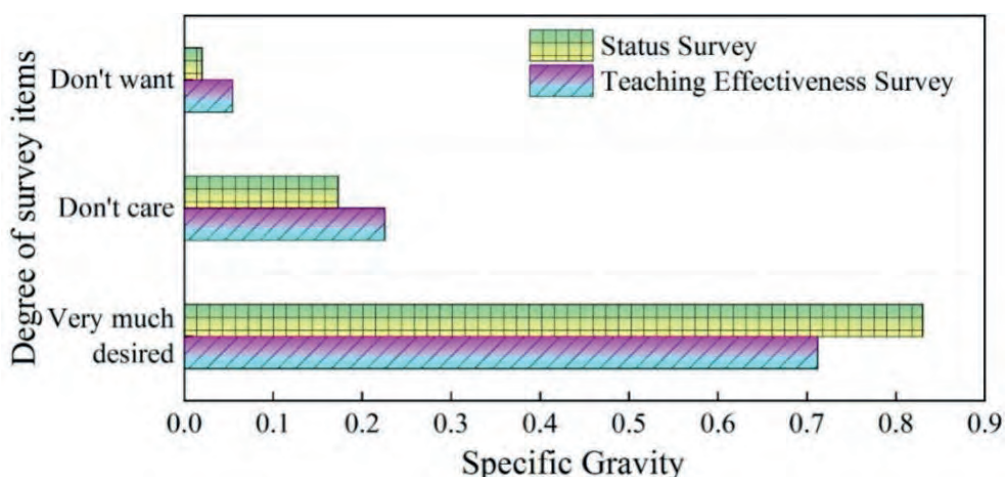
**Figure 2.** Clarity of electromagnetic wave knowledge

It can be seen that 36.87% of the students thought that the teacher explained the relevant physics concepts very clearly, 55.11% thought it was relatively clear, only 9.18% of the students were not very clear about the knowledge points and no students were not clear about the knowledge points.

At the same time, after checking the students' post-lesson exercises, I found that most students performed well in the exercise tests, which can be a good indication that the teaching of this lesson met the requirements of the objectives of the physics curriculum without reversing the priorities.

(2) Level of demand for curriculum ideology and politics

In the survey on the degree of demand for curriculum ideology and politics, the results of this survey were compared with the degree of demand of students in the previous survey on the status of curriculum ideology and politics in University Physics, and the results obtained are shown in Figure 3.



**Figure 3.** Comparison of the degree of demand for curriculum ideology and politics

It can be seen that the proportion of those who "very much hope" has increased by about 12 percentage points from 71.21% to 83.04%, while the proportion of those who "don't care" has dropped from 22.54% to 17.31%, and the proportion of those who "don't want to" has remained more or less the same. This indicates that after experiencing the

teaching of "curriculum ideology and politics", students do not reject the teaching of "curriculum ideology and politics" and can continue to teach "curriculum ideology and politics" in the future.

#### **4. CONCLUSION**

In this paper, the content of the university physics course is divided into modules to explore the content of the university physics course, and then select the elements that are suitable for a particular lesson to be infiltrated into the teaching process, so as to cultivate students into moral and talented successors of socialism. The teaching methods of physics classes are diverse and can be divided into two ways: classroom teaching and experimental teaching, both of which are complementary to each other. The two approaches are complementary and mutually supportive. By enriching the resources for ideological and political education, improving the teaching methods and elaborating the curriculum design, the students can implicitly achieve political and cultural identity and realise the purpose of collaborative education in the ideology and politics curriculum.

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# ANALYSIS OF OPERATIONAL RISKS AND FINANCIAL MANAGEMENT OF CLOUD ACCOUNTING MODEL BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

Under the influence of the rapid development of Internet technology, the reliance on big data and information technology in the operation of more industries has also grown significantly. In this paper, the sharing of data and information and the optimisation of accounting models are achieved through cloud processing in the process of accounting information processing in enterprises, and a more efficient and secure cloud accounting model is established. The paper discusses in detail the effective countermeasures to control the application risks of cloud accounting, taking into account the needs of enterprises for accounting information technology and the operational risks of cloud accounting. The results show that the cloud accounting model increases the prediction accuracy of operational risks by 13.15% and the analysis efficiency of financial management by 21.36%. The cloud accounting model proposed in this paper improves the financial management concept of enterprises and enhances the comprehensive quality of their financial personnel, with a view to further promoting the stable development of enterprises.

## KEYWORDS

Big data; Cloud processing; Cloud accounting model; Accounting information technology; Operational risk; Financial management

## 1. INTRODUCTION

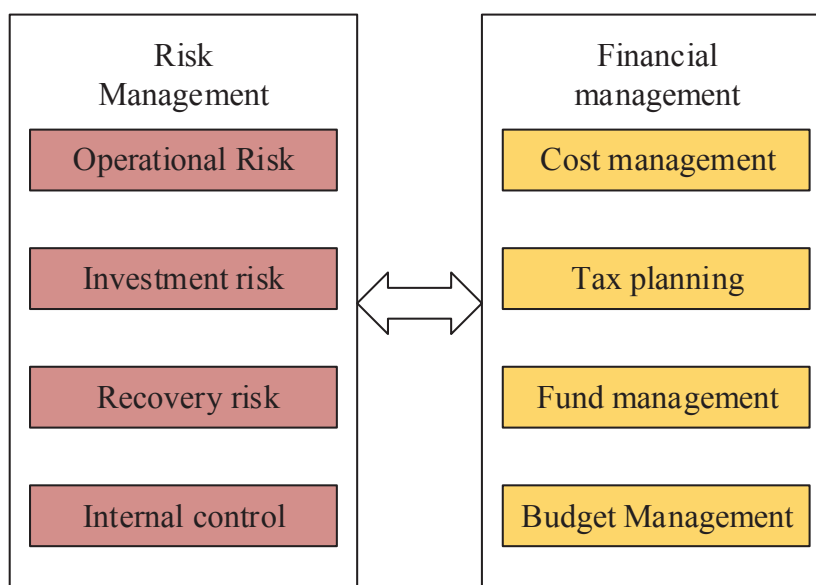
In recent years, due to the development of electronic information technology, accounting has also embarked on the development of information technology, such a model breaks the silo barriers of the old manual accounting model, reduces the competitive pressure of enterprises in the same industry in the era of big data, and the timeliness of information helps enterprise decision-makers to manage and make decisions more scientifically [1-3]. The implementation of accounting informatization in the era of big data helps to integrate various information resources and handle various economic operations in a highly intelligent manner through modern network technology, enriching the financial processing tools and enriching the operational processes of enterprises [4-5]. The means of implementation become more diversified, simplifying the financial accounting steps and enabling automatic processing of business, targeting the shortcomings of the traditional manual bookkeeping model on information sharing, accounting efficiency and accounting quality [6-7]. Literature [8] cloud computing technology and financial accounting by professional service providers, providing software and hardware effectively combined with a kind of accounting information processing

system.

This paper firstly applies information technology and network technology to financial management, realising the sharing of data and information and the optimisation of the accounting model through cloud processing. Secondly, the financial budgeting, application, profit and loss and other issues will be involved in the outgoing process, which is divided into different information modules and different authority levels for business convergence, and scientific calculation co-ordination is carried out on the basis of mastering detailed underlying financial data. Finally, the sharing features of enterprise finance and cloud technology are combined together, with multiple end-users logging in and uploading together, to better enhance the richness and timeliness of financial information sources, and to achieve dynamic data and information monitoring through a combination of embedding with cloud technology.

## 2. OPERATIONAL AND FINANCIAL RISKS OF THE BUSINESS

Today's situation shows that some enterprises have not yet realised the importance of integrating information management into financial accounting, and that the construction of an information platform has a positive contribution to controlling the quality of internal controls and promoting business reforms. Enterprise asset risk management and financial management are intrinsically linked in some way as shown in Figure 1. At other levels, enterprises have not established risk awareness and clear plans in terms of asset control, financial model business security, etc. If you want to establish a prevention system and further analysis, you should focus on the following aspects.



**Figure 1.** Diagram showing the linkage between asset risk management and financial management

### 2.1 PROJECT BUDGET MANAGEMENT RISKS

The increasing complexity of the market environment is an objective incentive for companies to strengthen their risk control capabilities in the production and operation process and to develop detailed project budget management measures to avoid the occurrence of 'grey rhinoceros' events. The integration and efficient use of resources is an important means of avoiding wastage of resources in the course of operations. In addition, every step of the way, guidance documents are put forward and product prices are set according to the needs of the market, so that the risks and challenges posed by market factors can be better addressed. Business processes and financial activities are closely linked, and financial industry integration offers new ways to improve the efficiency of departmental communication and to deal with

business and financial issues.

## 2.2 ACCOUNTING RISKS

In the project completion progress and maintenance process, should refer to the relevant guidance, focus on the process of project costs and the main source of funding, the need for timely financial occurrence risk assessment and the way in which funds are delivered to check, and have a clear record of the record. In the course of field infrastructure audits, it is often easy to revert to the completion date of the project as well as unexpected conditions that result in cost losses, and failure to account for the return on investment in the project assets will result in uncontrollable impacts on project funding.

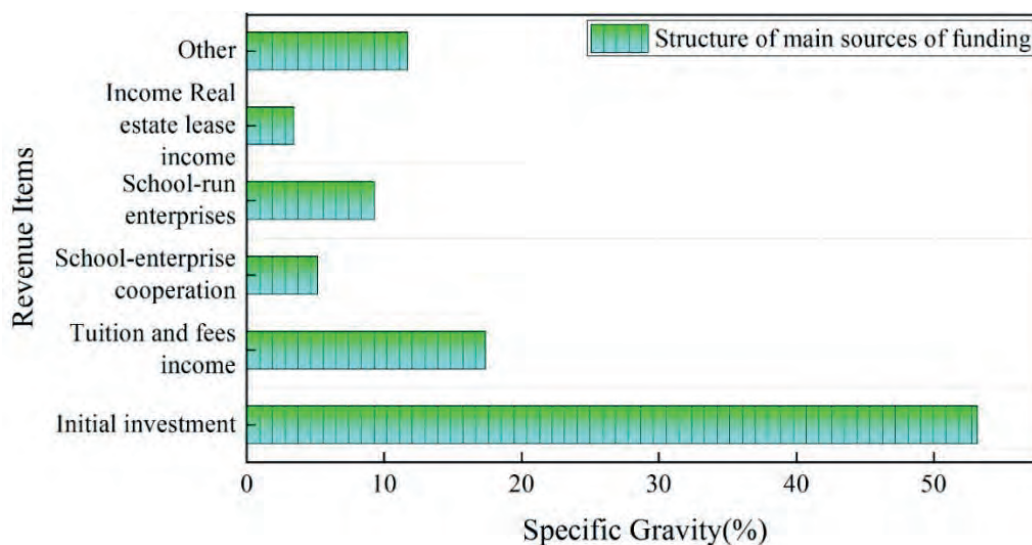
## 2.3 RISKS IN THE MANAGEMENT OF PRODUCTION MATERIALS

The collection and labour costs of some of the relevant raw materials and the production and sales capacity of each region can have an impact on the asset performance and operational control model of production. Some production departments do not have detailed financial control measures based on the characteristics of the business and market demand, and the inefficient use of funds indirectly leads to a reduction in the overall efficiency of production. In addition, the control of raw material costs has a significant impact on the effectiveness of production operations, and traditional financial management usually uses an annual summary to account for the entire activity of production and operation. However, when linking cost budgets to each business of the enterprise to account for costs, data disclosure is prone to occur. In addition, sectoral power enterprises do not take governance costs into account, which to a certain extent reduces the authenticity of financial statements.

## 3. FINANCIAL RISK ANALYSIS IN THE CLOUD ACCOUNTING MODEL

### 3.1 ENTERPRISE H CASE STUDY

The main sources of Enterprise H include initial investment and annual income from school fees from an education investment company in Anhui, income from school-run enterprises, income from school-enterprise cooperation projects, income from leasing school real estate and other government grants and subsidies as shown in Figure 2.



**Figure 2.** Structure of the main sources of funding for H enterprises to run schools

Table 1 shows the sources of income of Enterprise H from 2013-2017, of which tuition fee income is the most important source of income for the operation of Enterprise H. From 2013 to 2015, tuition fee income accounted for 95%-98% of the total income, with the overall

decrease in the number of candidates in Anhui, the number of students of the school has seen a sudden decrease, and the proportion of tuition fee income to the total income has decreased compared with the previous period, but the tuition fee The income from tuition fees of Enterprise H is positively correlated with the number of students of the School, and the number of students of the College shrank sharply and the number of admissions dropped significantly from 2016 to 2017 as a result of the continuous expansion of the State. In addition H Enterprises is a significant source of revenue through a large number of loans. As of December 2017, the cumulative loans from financial institutions and other micro and small lending financial institutions of Enterprise H reached RMB150 million. The large number of financial loans has increased the generation of financial management risks for Enterprise H. Based on this, the issue of how to effectively prevent fluctuations in tuition fee income and return of bank loans to fund schooling has increasingly become an important issue facing the financial management of Enterprise H.

**Table 1.** List of revenue sources of Enterprise H from 2013-2017(%)

Year	Income from tuition and fees	Income from school-run enterprises	Income from real estate leasing	Other
2013	96.15	3.15	0.30	0.09
2014	97.96	7.95	0.51	0.13
2015	105.17	8.87	4.14	0.08
2016	110.62	6.69	3.51	0.52
2017	113.11	2.23	6.41	0.14

### 3.2 ANALYSIS OF FINANCIAL RISK IDENTIFICATION FOR ENTERPRISE H

Through the discussion in the previous chapters, it is clear that Enterprise H can only rely on its own funding to finance the school, but there are certain limitations in terms of funding channels and funding capacity.

In 2008, the school-enterprise combination stage, H enterprises began to participate in private higher education in the face of the improvement of the school's level of operation by means of joint ventures with enterprises to continue to attract private capital to invest in the school.

In 2013, the funding bottleneck stage, after the initial founder investment and credit funding, tuition fee income became the main or even the only source of funding, and the rolling development of "student-support" by Enterprise H was affected by the continuous decrease in the number of students, which made it difficult to increase the size of the college.

From 2014 to 2017, the College was in debt and faced with the pressure of repaying the principal and interest on its bank loans, which resulted in overdue interest payments and a decline in its credit limit, making it impossible for the College to obtain loans.

It can be seen that there is a certain phase of the college's fundraising and financing behaviour. The school has a single financing method and limited financing channels. Difficulties in financing have become an obstacle to the financing channels of H enterprises. The school should plan ahead and further broaden its financing channels to inject fresh "blood" into the development of the college.

## 4. CONCLUSION

This paper focuses on the security of market operations, internal management audits and financial systems as risk factors that can prevent the loss of costing information and major pitfalls in corporate credit. In order to avoid such defects from occurring, it is proposed that the



sharing of data and information and the optimisation of the accounting model are achieved through cloud processing, and a more efficient and secure cloud accounting model is established. The effective countermeasures to control the application risks of cloud accounting are discussed in detail, taking into account the needs of enterprises for accounting information and the operational risks of cloud accounting. The results show that in the process of cloud accounting mode application, it can effectively make the enterprise construction more standardized, enhance the comprehensive quality of enterprise financial personnel as well as establish sound cloud accounting mode and other aspects to enhance the application effect of cloud accounting mode suggestions, in order to further promote the stable development of enterprises.

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# RESEARCH ON THE CONSTRUCTION OF TRAINING SYSTEM FOR RURAL TOURISM PRACTITIONERS IN THE CONTEXT OF RURAL REVITALIZATION

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## ABSTRACT

Taking the rural tourism industry as the research object, this paper adopts theoretical research, case studies, interviews and questionnaires, and conducts a combination of qualitative and quantitative analyses. On the basis of summarising training theories and taking into full consideration the industry characteristics of rural tourism, the current situation and problems of training in the industry are analysed with rural tourism as an example, and the causes of the problems are summarised in an all-round way to build a scientific, standardised and systematic training system for the rural tourism industry. The results show that by strengthening rural tourism training and improving the methods and ideas of rural tourism training, the quality of rural tourism operators and practitioners can be effectively improved, effectively increasing the operating income by 31.26%. This paper provides a comprehensive, systematic and in-depth study and analysis of training in the rural tourism industry, which has certain reference and significance for the training of talents in the rural tourism industry.

## KEYWORDS

Rural tourism; Training system; Quantitative analysis; Practitioner quality of practice; Business income

## 1. INTRODUCTION

The development of rural tourism requires a large number of high-level professionals, and in the early stages of rural tourism, farmers can engage in more basic tourism services [1-2]. However, as rural tourism develops further, its shortage of high-level talent is beginning to be highlighted, and the talent gap has become a major factor limiting the development of rural tourism in China [3-4]. Most practitioners are no longer able to adapt to the development of the industry and must have systematically studied, educated, business and management specialists, which must rely on institutions such as universities for specialised training [5]. In the new historical period, universities have to exercise the function of serving the society and give full play to their own advantages to serve the cultivation of talents and economic and social development [6]. Literature [7] The effectiveness of the construction of the training system for rural tourism personnel in colleges and universities directly determines the future development momentum and market competitiveness of rural tourism.

This paper addresses the problems that exist in training in the rural tourism industry,

proposes that industry training should establish a scientific and standardised training system, collates the ideas and principles for its construction, and lists the framework of the training system. It also elaborates on the various aspects of training at three levels: the training operation system, the training support system and the training management system. Thus, rural tourism continues to play its role as an economic promoter and requires practitioners with professional knowledge and high quality.

## **2. TRAINING SYSTEM CONSTRUCTION**

### **2.1 BUILDING THE PEOPLE MANAGEMENT SYSTEM**

In terms of the rural tourism practitioner industry, to establish a new concept of industry training, to see practitioner training as an important investment in human capital, and to innovate industry training as continuous, all-employee, and ahead-of-its-time lifelong training, the following aspects should be taken into account.

(1) Construct the concept of a learning organisation in the industry and raise industry training to a new level.

The concept of a learning organisation cannot remain merely in words, nor is it merely the responsibility of the competent departments of the industry, but requires the joint participation of management departments at all levels within the industry, various enterprises, training institutions and practitioners. Through a variety of channels and forms, it is appropriate to increase the dissemination of industry training and establish the concept of "big training", lifelong education and collective education.

(2) Integrating modern training concepts into industry training

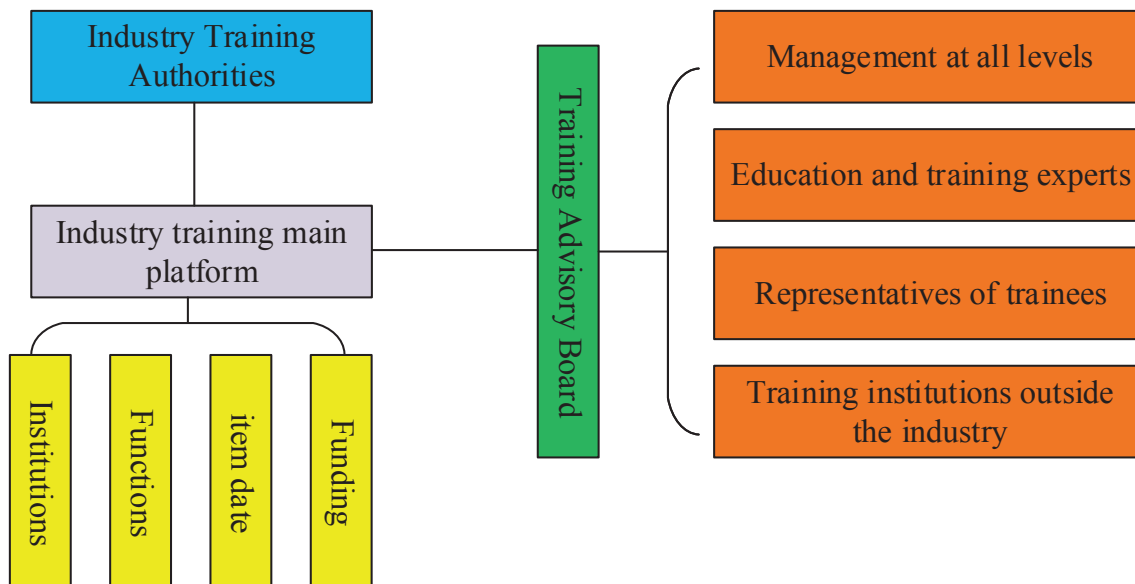
The modern training concept is a high-level conceptual understanding that training is an investment activity, and that the main purpose of training is to directly or indirectly improve labour productivity or work efficiency, and that the entire implementation process realises the function of transforming training content into employee work action.

(3) Establishing the concept of matching employee education and training with career planning

Industry training work does not exist in isolation, it is an important part of the whole talent team construction in human resources development. Ensure that employees with real potential are given training opportunities, closely combine training with promotion, advancement and rewards, and enhance the sense of honour for participating in training, thus strengthening the operational mechanism for converting training into output.

### **2.2 CONSTRUCTION OF THE PERSONNEL TRAINING SYSTEM**

The personnel training system constructed in this paper mainly promotes the training of rural tourism practitioners from the government and enterprises and schools, and the main system of the government and enterprises and schools is shown in Figure 1.



**Figure 1.** Training System Working Relationship after the Reform

(1) Government-led promotion

The government provides guidance and direction to rural tourism enterprises on a macro level by formulating policies, preparing training plans and providing training resources, while providing specialised training services to rural tourism enterprises by organising specialised training, providing training funds, promoting specialised publicity and introducing professional talents.

(2) Collaborative promotion by enterprises and schools

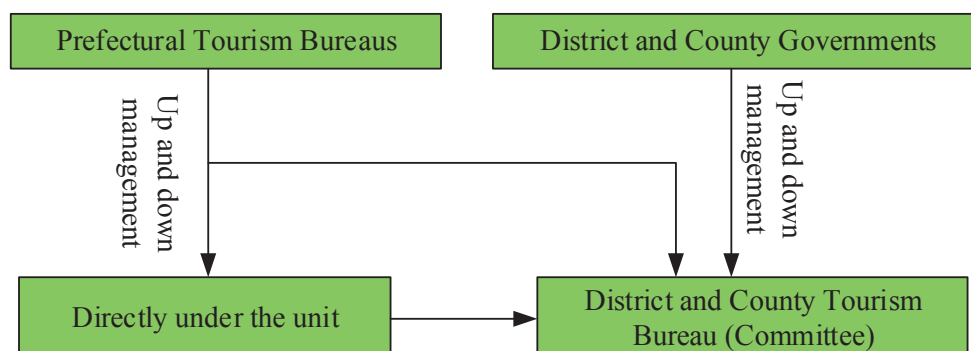
We will give full play to the advantages of enterprises in terms of talent, technology and other resources, and train rural talents through the establishment of industrial parks, demonstration bases and co-ordination platforms, so that villagers will have the business skills to develop tourism and create a team that understands operation, management and business. Strengthen the cooperation between enterprises and colleges, use the advantage of talent resources in colleges and universities, hire professionals from colleges and universities to provide guidance to villagers, and include college students in the training team, encourage college students to participate in rural projects, and build a group of professional teams with both practical skills and theoretical knowledge.

### 3. RURAL TOURISM INDUSTRY TRAINING

#### 3.1 INDUSTRY TRAINING MANAGEMENT STRUCTURE

Due to its self-administered municipal characteristics and geographical features, a two-tier rural tourism management system is adopted. The municipal tourism brigades as municipal rural tourism authorities, is the main decision maker in the management of the tourism industry in the city is the construction, maintenance, management of national and provincial roads, local waterways, integrated transport hubs of the matter of responsibility, is the province's tourism operation command and control and I-level emergency management of the organisers, is the guidance of the tourism business work of the districts and counties. The tourism brigade of each district and county, as the local management department, is the executor of the decision of the higher level, the person responsible for the construction, maintenance and management of the rural roads and the urban ports and integrated transport hubs at this level and the responsibility for the maintenance of the transport market order, and the organizer of the command and dispatch of the traffic operation and I-level emergency management in the

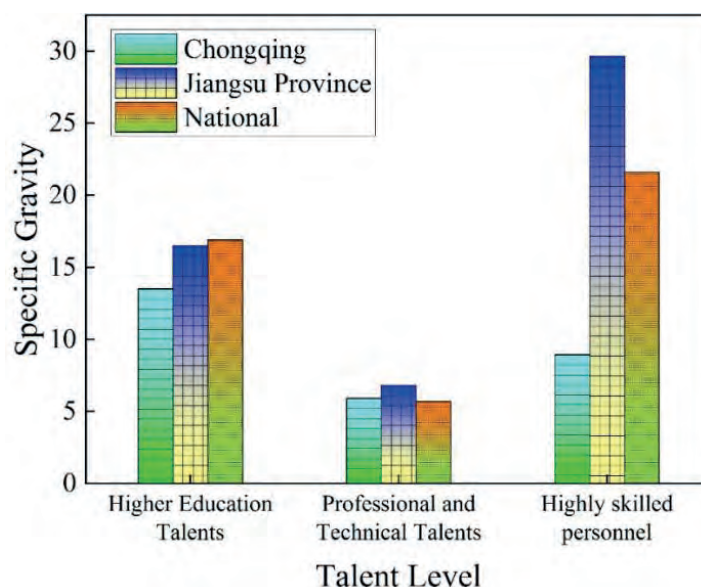
district and county areas. The grassroots-oriented advisory service provider is the organiser and leader of rural tourism affairs, and the training management structure is shown in Figure 2.



**Figure 2.** Management Structure of Chongqing Transportation

### 3.2 HUMAN RESOURCES SITUATION IN THE INDUSTRY

According to incomplete statistics, by the end of 2020, the total number of people working in the country's rural tourism industry was 3.526 million. Among them, 829,000 were managers, 105,200 were professionals and technicians, and 2,011,000 were skilled personnel. In terms of academic structure, 15,600 people have postgraduate degrees or above, and 2,871,500 people have college degrees or above, accounting for 87.15% of the total number of employees. In terms of the structure of titles, 34,800 people had professional and technical titles of associate or above, accounting for 0.27% of the total number of professional and technical personnel. There were 105,600 people with the rank of senior technician or above, accounting for 3.3% of the total number of skilled personnel. In terms of age structure, 394,500 people were under 35 years old, accounting for 17.7% of the total number of employees, as shown in Figure 3.



**Figure 3.** Talent Comparative Analysis

### 3.3 PRINCIPLES OF PERSONNEL TRAINING

The university training system should develop principles for the training of rural tourism personnel to meet the purpose of the training object to receive training.

(1) The principle of practicality. The purpose of the training is to acquire the skills and experience to get out of poverty and become rich, so it is necessary to carry out an in-depth

investigation and analysis of the training needs of rural tourism practitioners before carrying out the training, with a particular focus on the specific problems encountered by tourism practitioners in the course of their work or entrepreneurship.

(2) The principle of phasing. The rural trainees are not well educated and have a poor understanding of the text. For this reason, the training should be carried out in stages and the content of each stage should be different.

(3) The principle of operability. The training should be tailored to the type and scale of rural tourism enterprises in which the trainees are based, and should be delivered at different levels and in different ways, in accordance with the principles of practicality and adaptability, so that the training can proceed smoothly and achieve practical results.

#### **4. CONCLUSION**

This paper establishes a training assessment system, which should be based on the content and targets of the training, and develops a scientific and feasible assessment method that is highly operational and combines theory and practical operation, so as to promote the training work on an institutionalised and standardised track. At the same time, through the feedback mechanism, the training targets and tourists' opinions and suggestions on the effectiveness of training can be collected in time, so that the training plan can be adjusted and the rural tourism training work can be continuously improved. Rural tourism is fundamentally different from social welfare. To enable the rural tourism industry to develop healthily and steadily, to achieve the elimination of the best and the worst in the industry, and to improve the quality and level of the industry, it is also necessary for the government and the association, in conjunction with relevant institutions, to establish practice qualifications and standards of practice. Through the assessment of practice qualifications, the level of rural tourism practitioners will be thoroughly improved and the overall quality of rural tourism practitioners will be enhanced.

#### **FUNDING**

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# RESEARCH ON THE APPLICATION OF COMPUTER-AIDED DESIGN IN INDUSTRIAL PRODUCT DESIGN

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## ABSTRACT

This paper introduces the development of industrial design, and discusses the practical application problems and innovative application strategies of CAID based on the advantages of computer-aided systems in industrial design. With CAD technology as the core reliance of industrial design auxiliary system (CAID), the architecture of industrial design system is improved to promote the improvement and innovation of industrial design system. The results show that computer-aided applications in industrial product design can effectively improve the efficiency of technicians by 43.54%, and technicians can effectively analyse the prototype of industrial design and design concepts. Computer-aided systems applied to industrial design make it possible to solve data as well as analysis problems in the industrial design process, bringing all-round optimisation to product design.

## KEYWORDS

Industrial design; Computer-aided systems; CAID; CAD technology; System architecture; All-round optimization

## 1. INTRODUCTION

The rapid development of an information-based society and the widespread popularisation of humanistic concepts have given industrial products a new cultural connotation [1]. The production of traditional industrial products focuses on cost control and innovation of production technology, with the enhancement of production efficiency as the main objective [2]. With the expansion of aesthetics and environmental protection in the industrial field, the value of industrial products is no longer limited to product performance, but rather is a combination of performance parameters, appearance features and response to environmental protection [3-4]. The changing needs of society have led designers to apply computer-aided systems to industrial design, which must take into account the practicality and innovation of specific industrial products [5]. With the increasing competition in commodities and markets, not only are products required to shorten the cycle of renewal, but also to transform to more varieties, high quality and small batches, so the traditional manual design method cannot adapt to the requirements of this change [6-7]. At the same time, with the development of computer technology and electronic technology, there are many types of computer hardware and peripheral devices with good performance have been introduced one after another. Such as graphic display digitizer, light pen, automatic plotter and other varieties and functions of increasingly rich graphics processing devices, has gradually formed a reliable series of



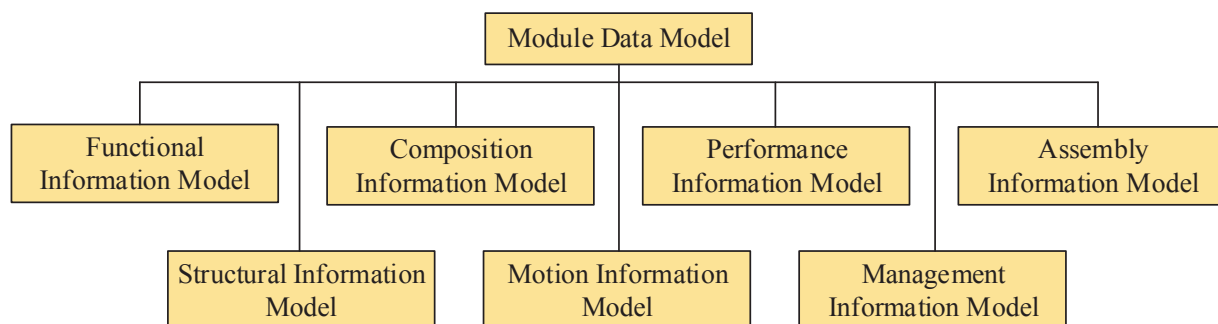
products, and has become a general device of CAD [8].

This paper is first based on the analysis of industrial design and the characteristics of design software related to computer-aided industrial design, the use of computer-aided design of industrial design. It also analyses and discusses the methods and means of computer-aided industrial design in tool development and design from several perspectives, such as computer-aided internal configuration design and expression of shape in tool design, in order to improve design accuracy and efficiency. Secondly, with the support of database, program library and graphics library, human-computer interaction methods are applied to optimize the design results in a short time. At the same time the best results are achieved in terms of product structure, energy consumption and materials. Finally the general framework of a computer-aided modular scheme design system for water pumps is established, taking water pump design as an example.

## 2. BASIC MODELS IN COMPUTER-AIDED MODULAR DESIGN

### 2.1 MODULAR DATA MODEL FOR INDUSTRIAL DESIGN

The module data model is the main model of the computer-aided modular solution design system, through which the modules in the system communicate and exchange data to achieve data sharing in the design process. In this paper, an object-oriented modelling approach is used to abstract the product and establish an integrated object-oriented module data model. The overall structure of the object-oriented module data model is shown in Figure 1.



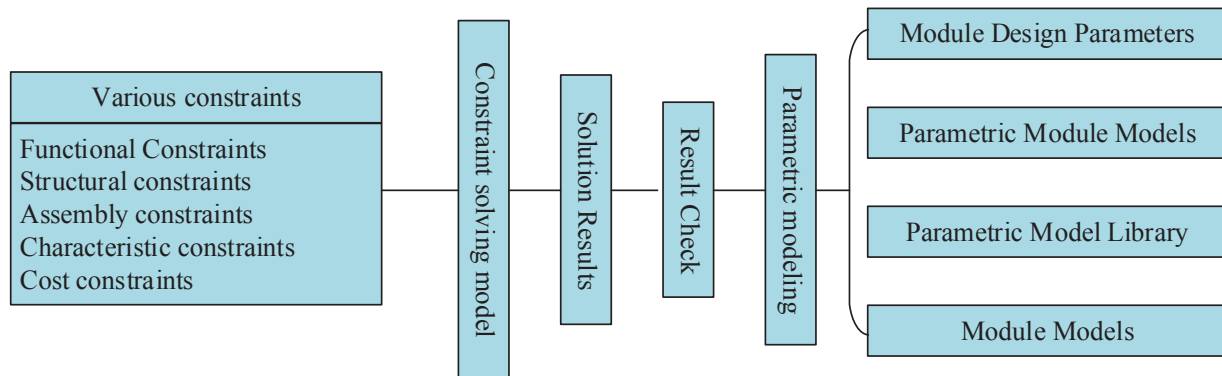
**Figure 1.** General structure of the module data model

Functional information model: reflects the main functions of the module and is the main basis for module creation and module selection. Structural information model: reflects the main structure and characteristic dimensions of the module. Composition information model: It is the collection of information of sub-modules that compose the module, and the module is aggregated by sub-modules through certain spatial location description. Motion information model: It mainly expresses the motion information of the module and provides the corresponding data for the subsequent simulation design. The motion information includes motion form, motion speed, motion range, etc.

### 2.2 A MODULAR MODEL OF INDUSTRIAL DESIGN FOR DIGITISATION

The creation of modules consists of two parts: the schematic design of the module and the detailed design of the module. In order to meet the needs of the modular design of the pump, only the schematic design of the module is discussed in this paper, i.e. only the corresponding module model is created. The module model reflects the characteristics of the module as a whole. These characteristics include functions, performance parameters, overall structure shape, overall dimensions, external linkage structure shape and dimensions, etc. The module model creation process is shown in Figure 2. Various constraints and design parameters are input into the constraint solving model to find out the structural properties and corresponding structural parameters that meet the requirements, to establish the parametric module model,

and store it in the parametric model library. The parametric module model consists of a module solid model and a module data model. Specific parameters are entered to drive the parametric module model to produce a specific module model, which is the standard solid model for commercial CAD/CAM software.

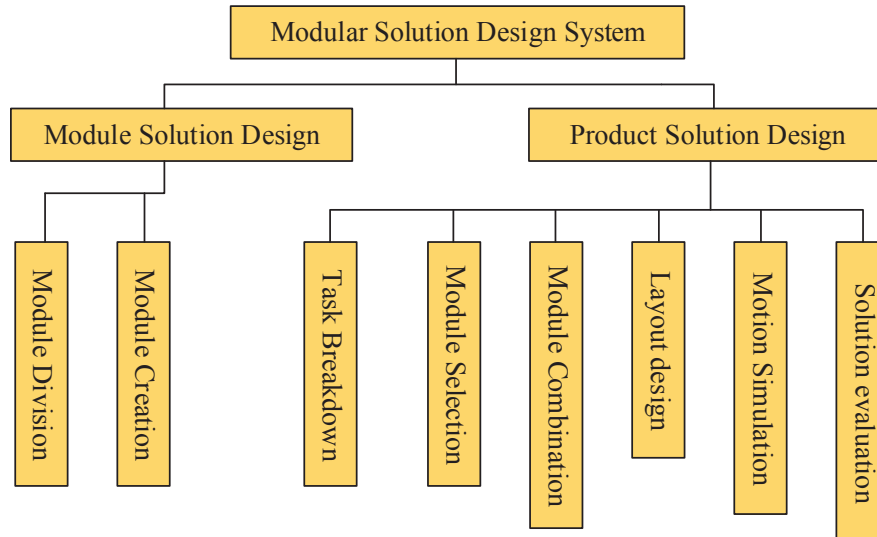


**Figure 2.** Module model creation process

### 3. APPLICATION OF COMPUTER-AIDED DESIGN IN INDUSTRIAL PRODUCT DESIGN

#### 3.1 GENERAL FRAMEWORK OF THE COMPUTER-AIDED MODULAR PUMPING SCHEME SYSTEM

Computer-aided modular concept design includes module concept design and product concept design. Module solution design includes module division and module creation. Product solution design includes design task decomposition, module selection, module combination, layout design, motion simulation, evaluation and redesign. The general framework is shown in Figure 3.



**Figure 3.** Modular design system framework

Module division: After the functional decomposition of a given design task, the product is divided into a series of modules that meet the requirements of modular design using certain division methods. Module creation: The divided modules are designed according to the requirements and stored in the module library. New modules are continuously used to replace obsolete ones in order to maintain the competitiveness of the product in the market and to extend the product life cycle. Task decomposition: according to the user's requirements, the total design task is defined and decomposed into a series of sub-tasks that can be implemented with modules. Module selection: Based on the requirements of the subtasks, modules are selected from a library of modules to form a combined solution for the product. If

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the required module is not available in the module library, a design request for a new module is made and the new module information is then added to the module library in order to continuously enrich the module library. Module combination: After module selection according to sub-tasks, the modules are combined by certain combination algorithms, and the connectivity between modules is judged, resulting in various achievable overall solutions.

### **3.2 EVALUATION AND REDESIGN OF MODULAR DESIGN SOLUTIONS FOR WATER PUMPS**

The evaluation of the modular design of a water pump is both the basis for the selection of the solution and the prerequisite for deciding whether a redesign is required, evaluation plays a very important role in the design process. There are two types of evaluation of modular design solutions for water pumps.

Single-indicator evaluation: evaluation of the answer to the question of the degree of conformity with the requirements of the proposed problem, that is, whether the programme meets each of the requirements. Feasibility evaluation is relatively simple, its purpose is to exclude from the many design solutions those that are not feasible, leaving feasible solutions, effectively reducing the workload of the comprehensive indicator evaluation of the programme.

Comprehensive indicator evaluation: Based on the evaluation of individual indicators, a comprehensive evaluation of the indicator system is carried out to select some overall more satisfactory solutions.

## **4. CONCLUSION**

This paper takes water pump design as an example and establishes the general framework of a computer-aided water pump modular scheme design system. The advantages of computer-aided systems in the field of industrial design are promoted. Relevant designers need to achieve the benign development of the industrial industry by adhering to the principles of humanized design and environmental protection design in the product design process through the highlighting of industrial product conceptualization and the enhancement of product interactivity experience. At the same time, prototypes made using rapid prototyping technology can directly carry out assembly inspection, interference checking and some functional tests that simulate the real working conditions of the product, such as motion analysis, stress analysis, fluid and aerodynamic analysis, etc., so as to rapidly improve the structure and performance of the product, the corresponding process and the design of the required tooling.

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# ANALYSIS OF CUSTOMER RELATIONSHIP MANAGEMENT MECHANISMS FOR EXPERIENTIAL MARKETING COMMUNICATION VALUE CHAIN

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## ABSTRACT

Based on marketing practice, this paper puts forward the marketing value chain theory, constructs a marketing value chain model, and uses the model as a theoretical basis to establish an enterprise marketing system, with a view to guiding the marketing work of enterprises. Secondly, an overview of marketing is studied, the importance of implementing customer relationship management mechanism in marketing is analysed, and a study of customer relationship management mechanism based on marketing is conducted in order to be able to promote the development of enterprises. The results show that: customer relationship in the marketing value chain is located in the proportion of 0.351, directly affect the development of enterprises, so the enterprise's products as long as there is a customer source, can be in the market. For enterprises to adapt to the marketing of the market, maintaining a good relationship between enterprises and customers is particularly important, and only by dealing with the relationship between the two sides can promote the sustainable development of enterprises.

## KEYWORDS

Marketing; Marketing value chain model; Marketing system; Customer relationship; Management mechanism; Sustainable development

## 1. INTRODUCTION

In the context of China's growing economy, competition between industries has become increasingly fierce and has raised the requirements of businesses in terms of marketing [1-2]. Any business that wants to gain a definite build up must pay for service to open and retain customers, and thoroughly study the development of thorough e-commerce, customer relationship management plans in order to minimise customer relationship management costs [3-4]. The main work of marketing is to provide customers with quality services, improve customer satisfaction with the products and services of power companies, increase customer

purchase of power products, thereby increasing the profits of power companies [5]. In the process of enterprise development, marketing-related theories help enterprises to obtain the maximum economic benefits and achieve their own development goals when input costs are certain [6]. Literature [7-8] according to China's market development as well as development environment to innovation, especially should focus on marketing concept innovation, strategy innovation, product innovation and management innovation several aspects of innovation and breakthrough.

This paper firstly analyses the company's current market segmentation, market selection and market positioning, and visits the company's technical, marketing and customer service departments to identify the company's current marketing problems and to find the direction in which the company should focus on solving them. Next, the KMV model was used to analyse the company's current customer profile and to determine where the company should improve its customer relationship management. Finally, the relationship between the antecedent, intermediate and outcome variables is analysed and the marketing mix is optimised according to the relationship between the variables.

## **2. MARKETING VALUE CHAIN MODELLING**

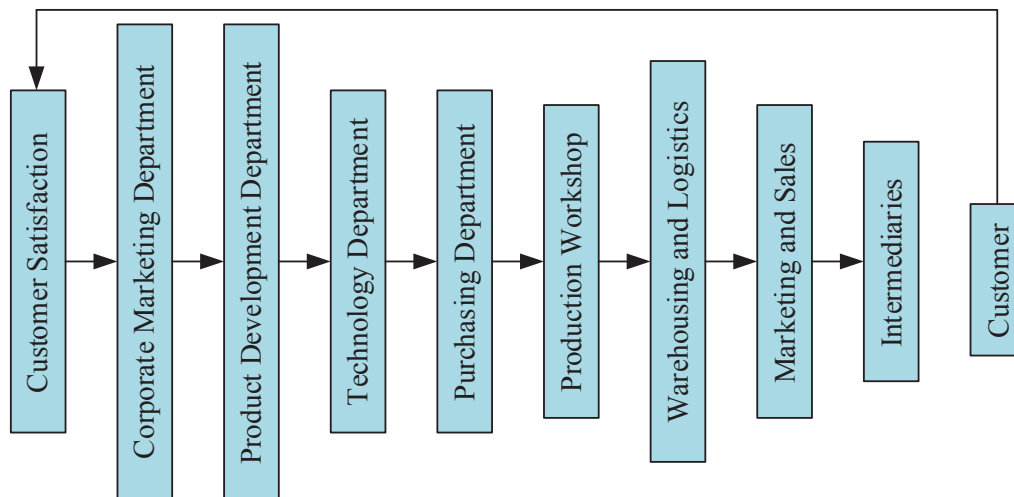
The important connotation of field marketing is value management, the purpose of enterprise marketing is to achieve value-added, in all aspects of the value chain to achieve value accumulation and efficient integration, in order to enhance the efficiency of enterprise value-added.

### **2.1 THE MARKETING VALUE CHAIN**

Compared with the traditional value chain theory, the marketing value chain is conceptually very different from it. In order to break through the limitations of the value chain theory, some researchers have proposed the marketing chain theory. By analysing the limitations and shortcomings of the value chain and marketing chain theory, this paper explains the marketing value chain which can better reflect the value-added of the marketing activities of enterprises.

In a value chain system, suppliers increase upstream value, companies add value to their products through internal value chains, channel distribution adds value to distribution by improving distribution efficiency, and customers buy products to achieve customer value, and the company's value chain ultimately determines the size of the company's customer value.

The marketing chain is based on the basic theory of marketing and the improvement of the enterprise value chain theory, the marketing chain In the market environment, starting from the market demand, enterprise marketers and customers as the core elements of the two main subjects, the marketing chain to customer satisfaction as the end point, constitute a simplified model of the marketing chain as shown in Figure 1.



**Figure 1.** Simplified model of the marketing chain

The above analysis shows that the value chain starts with the enterprise supplier, the end of the value chain is the value of customer relationship, the starting point of the marketing chain is customer demand, and the enterprise realises value identification, creation and transmission through production and management activities. Ultimately, the marketing chain is a two-way extension of the enterprise's value chain to achieve customer satisfaction. With regard to the understanding of customer value, both the value chain and the marketing chain have deficiencies in understanding:

(1) Failure to understand the double meaning of customer value, which includes the value of customer concessions provided by enterprises and the value of customer relationships provided by customers. Both the value chain and the marketing chain are one-way in their understanding of customer value, considering only the value given by the customer and ignoring the value given back to the company by the customer.

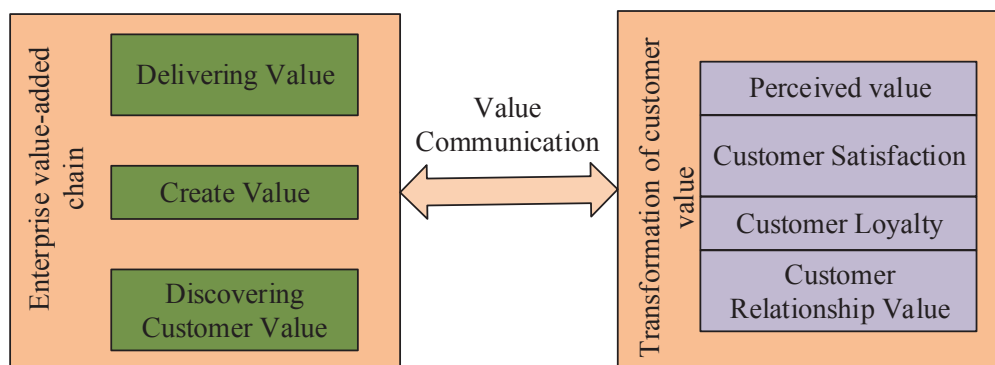
(2) The understanding of the connotation of customer value is too narrow, focusing on the value of physical objects but ignoring the value of relationships.

As both the enterprise value chain and marketing chain theories have deficiencies in the understanding of value, based on the research of the above two theories, this paper establishes a marketing value chain model.

## **2.2 MARKETING VALUE CHAIN MODELLING**

The marketing value chain is based on a broad customer value-added path as a connecting element, starting with customer needs, i.e. the discovery of customer value. Based on the value needs of the target customer, the enterprise integrates various functional departments to improve efficiency and collaborate to create the value needed by the customer, and by improving transaction efficiency, the customer value is efficiently delivered to the consumer and customer satisfaction is maximised. The marketing value chain is a value-added chain in

which both the company and the customer participate, forming a closed loop through value communication and value transfer, as shown in Figure 2.



**Figure 2.** Model of marketing value chain

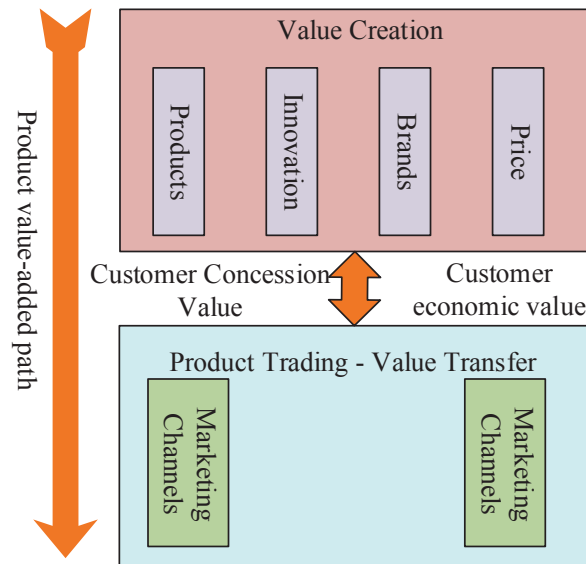
In the marketing value chain, the company is the main driver for value addition. With marketing as the strategic orientation, the company pays close attention to the customer's need for value, discovers the needs of the target customer through research and analysis, and determines the core value it can provide. The company integrates all functional departments and uses various resources to create higher customer yield value in an optimal way by improving the efficiency of the internal value chain, and transmits this value to the target customer through transactions. In other words, the company delivers customer value in exchange for economic value. The value of the customer relationship includes both economic and non-economic value. Efficient value communication in the marketing value chain is an essential tool for adding value.

### **3. CONSTRUCTION OF A CUSTOMER RELATIONSHIP MANAGEMENT MECHANISM BASED ON THE MARKETING VALUE CHAIN**

#### **3.1 THE CONSTRUCTION OF A CORPORATE MARKETING SYSTEM**

By examining the value-added path of the marketing value chain, this paper constructs a corporate marketing system. The various marketing elements in this system are interrelated and independent of each other. By integrating the subsystems of the enterprise marketing system through the value-added path of the marketing value chain, the enterprise marketing system will have functional integrity, the marketing practice of the enterprise will be systematised, and the marketing efficiency will exceed the sum of the effectiveness of the individual work of each subsystem, so that the enterprise can obtain a lasting competitive advantage as shown in Figure 3.





**Figure 3.** Marketing value chain-based enterprise marketing system model

### 3.2 APPROACH TO CUSTOMER RELATIONSHIP MANAGEMENT

#### (1) Improving customer satisfaction with power companies

Customer satisfaction is based on the effect that customers feel after using products or related services, and directly determines whether customer resources are lost. Therefore, in order to effectively maintain good customer relationship management, enterprises need to make their customers satisfied with the recognition of the enterprise's products and related services. Enterprises to enhance customer satisfaction with the enterprise, need to strengthen the service consciousness of marketing service personnel, innovative marketing service channels, to provide customers with better quality services.

#### (2) Improve customer relationship management system

In order to maintain a good cooperative relationship with customers in marketing, enterprises need to pay more attention to customer relationship management. So there is a need to improve the customer relationship management system. Enterprises should respect and understand electricity customers as a marketing principle, fully understand the relevant situation of customers, and then summarise and classify customer resources so that enterprises can obtain relevant information about customers at the first time. Managing customer relationships well is actually an emotional communication between marketers and customers, and only when marketers treat customers with a sincere heart can they connect the bridge between enterprises and customers.

## 4. CONCLUSION

Marketing value chain is a systematic enterprise marketing management thinking, marketing value chain expands the perspective of value chain management to the field of customer value transformation. This paper builds an enterprise marketing system based on

the marketing value chain is a new paradigm for marketing research by exploring the methods and approaches to achieve value-added enterprise value chain by marketing management, taking the direction of customer value addition as the path. Customer relationship management requires enterprises to manage the connections generated by mutual trust and interdependence with their customers. Customers directly influence the development of the enterprise, so the enterprise's products can gain a foothold in the market as long as they have customers.

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# INTELLIGENT ALGORITHM-BASED ANALYSIS OF TRANSCRIPTOME DIFFERENCES IN RESPONSE TO SALT STRESS IN DIFFERENT SALT-TOLERANT SORGHUM TYPES

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## ABSTRACT

In this paper, different species of salt-tolerant sorghum were tested, different assays were selected to enable extraction of salt stress response data, and differential transcriptional analysis of the pooled data was performed using the Coyote Intelligence algorithm. The differential transcriptional analysis of different salt-tolerant sorghum types in response to salt stress was demonstrated by salt tolerance identification, transcriptome sequencing quality and differentially expressed genes. From the salt tolerance identification, sorghum possessed a better salt tolerance response when the  $K^+/Na^+$  value was  $2.06 \pm 1.75$  b. In terms of differentially expressed genes, the GO classification of differentially expressed genes for salt-sensitive and salt-tolerant materials showed approximately the same trend in distribution across annotated entries.

## KEYWORDS

Salt-tolerant sorghum; Salt stress response; Transcriptome; Differential analysis; Coyote intelligence algorithm; Differentially expressed genes

## 1. INTRODUCTION

Salt stress is an important class of abiotic stresses that severely restricts sustainable agricultural development. Under salt stress conditions, the osmotic ion concentration of the soil

solution increases and the osmotic potential is altered, leading to changes in cellular plasma membrane permeability, affecting the uptake of mineral elements by plant roots and the development of plant morphology, and inhibiting photosynthesis, respiration and material metabolism [1-3]. Salt stress is a complex physiological process, and the ability of crops to resist salt stress is mainly controlled by the genes of the plants themselves, and different crops respond to salt stress in different ways [4-5].

Sorghum, an important food and cash crop, has a high salt tolerance. It is known that sorghum seedlings are most sensitive to salt stress based on soil salinity patterns, and that good seedling growth affects sorghum maturity and yield [6-7].

In order to demonstrate the transcriptome differences between different salt-tolerant sorghum types in response to salt stress, this paper first selects different species of sorghum for test material preparation, gives the method of data determination, and uses the Coyote Intelligent Algorithm to implement data analysis, and then gives the results of transcriptome sequencing in response to salt stress under different conditions, including total RNA extraction and differentially expressed gene screening. Finally, the results were used to identify different salt-tolerant sorghum types for salt tolerance, transcriptome sequencing quality feasibility and differentially expressed gene analysis. The results showed that the transcriptomes of different salt-tolerant sorghum types differed in their expression of differentially expressed genes in response to salt stress.

## **2. MATERIALS AND METHODS**

### **2.1 TEST MATERIALS AND TREATMENTS**

Two sorghum varieties with different salt tolerance were initially screened for differences in germination rates under salt stress, and the sorghum seeds used in the trials were provided by the sorghum breeding group of an agricultural university.

Plant sorghum in vermiculite and water twice a week with nutrient solution. When seedlings reach the three-leaf stage, they are transferred to a plastic bucket (30cm x 50cm) containing Hoagland nutrient solution for hydroponic cultivation. Ten plants were grown in each bucket and the nutrient solution was changed every 3 d. Salt stress was started 1 week after transplanting and slowing down. Five treatments were set up with a NaCl concentration of 250 mmol/L for 2h, 4h, 6h, 8h and 12h, with sorghum seedlings that had not been treated with salt stress as the control (0h). The leaves that had just fully expanded were selected for the measurement of all physiological indicators and each treatment was replicated three times.

### **2.2 MEASUREMENT METHODS**

Soluble protein content was determined by the Komasa Brilliant Blue method and proline (Pro) content was determined by the ninhydrin colourimetric method. Total chlorophyll content was determined using the 80% acetone extraction method and malondialdehyde (MDA) content was determined using the thiobarbituric acid (TBA) method.

### **2.3 DATA PROCESSING - COYOTE INTELLIGENCE ALGORITHM**

Let the number of total populations be  $N$ ,  $N_p$  be the number of coyote subpopulations, and the number of coyotes in each coyote subpopulation be  $N_c$ . Initialize each coyote individual at random, with each coyote individual represented as a vector, so that the initial position of the  $c$ th coyote individual in the  $p$ th coyote subpopulation is represented as:

$$s_{c,j}^p = l_j + r \times (u_j - l_j) \quad (1)$$

where  $r$  is a random number between  $[0,1]$  and  $u_j, l_j$  is the upper and lower limit of dimension  $j$ , respectively. Let the dimension be  $D$ , then  $j = 1, 2, \dots, D$ . The ability of each individual coyote to adapt to society is called the degree of adaptation, which is expressed as an objective function as:

$$F = f(s_c^p) \quad (2)$$

The Coyote Intelligence algorithm was used to summarize the salt stress response data of salt-tolerant sorghum and then analyze the transcriptome sequencing results to understand the differential gene expression of salt stress on different salt-tolerant sorghum types.

### 3. TRANSCRIPTOME SEQUENCING

The data from the previous trials indicated that this was the most sensitive period for sorghum to respond to salt stress. In order to exclude the influence of extraneous factors and to ensure the accuracy of the data, three replicates were set up and the materials were selected in parallel. RNA extraction was performed separately for each sample for subsequent experiments.

#### 3.1 EXTRACTION OF TOTAL RNA

Total RNA was extracted using the TIANGEN RNA plant plus Reagent kit. RNA samples were tested for purity, concentration and integrity using 1% agarose electrophoresis, Nanodrop 2000, Qubit 2.0 and Aglient 2100 methods.

Digital gene expression profiling (DGE) library construction and transcriptome sequencing, sequencing data bioinformatics analysis cDNA library construction and transcriptome sequencing samples RNA was prepared by a biotechnology company. RNA samples were quality tested and entered the Illumina HiSeq 2000 platform for transcriptome sequencing.

#### 3.2 SCREENING FOR DIFFERENTIALLY EXPRESSED GENES

Differentially expressed genes were obtained by comparing the gene expression data from the sequencing of the salt-stressed samples with those from the control samples. The Benjamini-Hochberg correction method was used for this assay, with a screening criterion of difference multiplicity  $FC \geq 2$  and false discovery rate  $FDR < 0.001$ . Difference multiplicity  $FC = \text{expression of a gene in the treated group} / \text{expression of that gene in the control group}$ .

## 4. RESULTS AND ANALYSIS

### 4.1 SALT TOLERANCE IDENTIFICATION ANALYSIS

Table 1 shows the growth of sorghum seedlings after 15 days of salt stress treatment. The salt-tolerant material showed a fast growth rate and showed a high salt tolerance, while the salt-sensitive material showed shorter roots, lighter fresh weight and lower growth rate under salt stress and was more sensitive to salt stress. The performance of sorghum seedlings in response to salt stress was consistent with the growth performance of sorghum at later stages.

**Table 1.** Growth indices of sorghum seedlings

Material	Root length(cm)	Bud length(cm)	Plant fresh weight(g)	Growth rate(cm/d)
3562R	1.07±0.91 ab	0.95±1.25 b	0.35±1.01 a	2.52±1.34 a

678B	1.11±0.69 a	1.25±1.11 a	0.27±1.25 ab	2.48±0.79 a
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Table 2 shows the effects of salt stress on K<sup>+</sup> and Na<sup>+</sup> concentrations and Na<sup>+</sup>/K<sup>+</sup> values in the leaves of GRL. Under salt stress conditions, the Na<sup>+</sup> content of salt-tolerant materials was less than that of salt-sensitive materials, and salt-tolerant materials could improve the selective uptake of Na<sup>+</sup> and its accumulation and distribution in the plant. The difference in K<sup>+</sup> content of sorghum leaves between salt-tolerant and salt-sensitive materials was not significant. When plants were exposed to salinity adversity, the salt-tolerant material had higher SOD and CAT activities and lower MDA content than the salt-sensitive material, suggesting that the strength of plant resistance to adversity is related to the strength of the ability to maintain higher antioxidant enzyme activity in the body.

**Table 2.** Effects of salt stress on K<sup>+</sup> and Na<sup>+</sup> concentration and K<sup>+</sup>/Na<sup>+</sup> in sorghum leaves

Material	K <sup>+</sup> (mg/g, DW)	Na <sup>+</sup> (mg/g, DW)	K <sup>+</sup> /Na <sup>+</sup>
3562R	5.51±0.87 a	2.71±1.17 a	2.06±1.75 b
678B	5.21±1.04 a	1.21±0.98 b	4.34±2.24 a

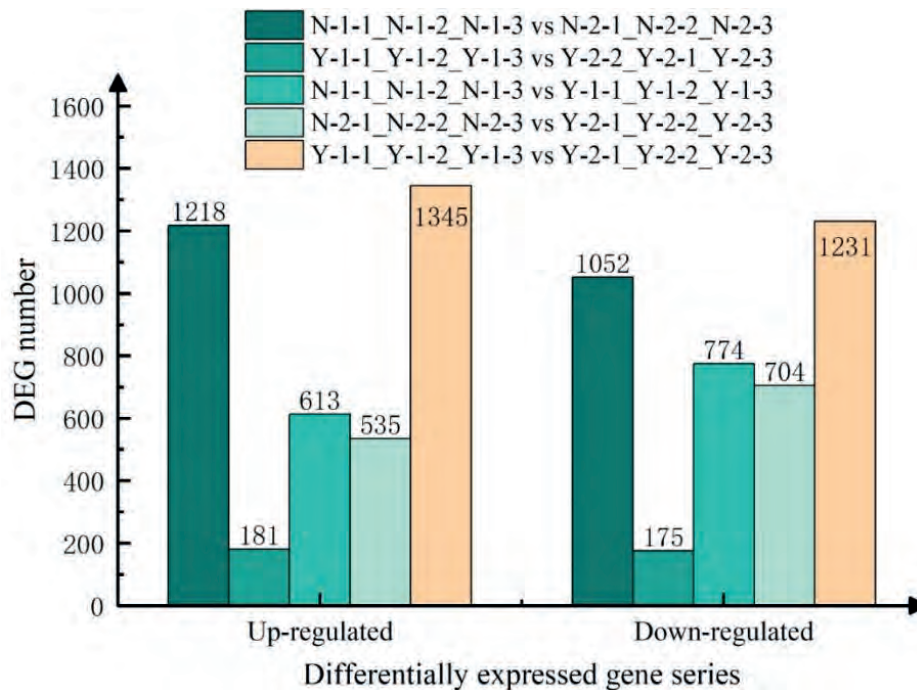
## 4.2 THE SORGHUM SALT-TOLERANT TRANSCRIPTOME

### 4.2.1 TRANSCRIPTOME SEQUENCING QUALITY FEASIBILITY ANALYSIS

The transcriptome sequencing results of all samples (12 in total) from the salt stress and control groups were screened by sequencing quality control and yielded a total of 90.07 Gb Clean Data, with each sample having more than 6 G of data and 21608654 and 30477687 clean reads respectively. The GC (guanine and cytosine) content of the 12 samples ranged from 55.19% to 56.85%, slightly higher than the AT (adenine and thymine) content, and the percentage of Q30 bases in each sample was not less than 94.40%.

### 4.2.2 ANALYSIS OF DIFFERENTIALLY EXPRESSED GENES

The number of differentially expressed genes was different between salt-sensitive and salt-tolerant materials under the same salt stress conditions. Analysis of the expression data of differentially expressed genes in different sorghum materials under salt stress for 12 h compared to 6 h of stress yielded the results shown in Figure 1.



**Figure 1.** Analysis of differentially expressed genes

From the analysis of differentially expressed genes in salt stress, N-1-1\_N-1-2\_N-1-3 (salt-tolerant material treatment 6h) vs N-2-1\_N-2-2\_N-2-3 (salt-tolerant material treatment 12h) differentially expressed 2270 genes, including 1218 up-regulated expressed genes (N-1-1 indicates salt-tolerant material salt stress treatment|replicate|, others analogous). y-1 -1\_Y-1-2\_Y-1-3 (6h salt-sensitive material treatment) vs Y-2-2\_Y-2-1\_Y-2-3 (12h salt-sensitive material treatment) 356 differentially expressed genes, including 181 up-regulated genes (Y-1-1 indicates salt-sensitive material salt stress treatment|replicates|, others by analogy). n-1-1\_N-1-2\_N-1-3 vs Y-1 -1\_Y-1-2\_Y-1-3 differentially expressed genes 1387, including 613 up-regulated genes. n-2-1\_N-2-2\_N-2-3 vs Y-2-1\_Y-2-2\_Y-2-3 differentially expressed genes 1239, including 535 up-regulated genes. y-1-1\_Y-1-2\_Y-1-3 vs Y-2-1\_Y-2-2\_Y-2-3 differentially expressed genes 2576, including 1345 up-regulated expressed genes.

In summary, the GO classification of differentially expressed genes for salt-sensitive and salt-tolerant materials showed approximately the same trend in distribution across the annotated entries, and the number of differentially expressed genes on each entry did not differ significantly and the enrichment was basically the same, indicating that the response pathways to salt stress are the same for salt-sensitive and salt-tolerant materials.

## 5. CONCLUSION

The expression of salt tolerance genes differed significantly between salt-sensitive and salt-tolerant materials of sorghum. The genes regulated in salt-tolerant materials were involved in phytohormone signaling, carbon metabolism, phenylpropanoid synthesis, starch and sucrose metabolism, and amino acid biosynthesis. Salt-sensitive materials up-regulated expression genes include cellular process up-regulated expression genes, single tissue process up-regulated expression genes, catalytic activity up-regulated expression genes, and binding function up-regulated expression genes.

In summary, the analysis of transcriptomic differences in the response of different salt-tolerant sorghums to salt stress, and thus the search for mechanisms of tolerance to salt stress in sorghum, can provide some physiological, biochemical and molecular theoretical basis for sorghum breeding and salt-tolerant cultivation.

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# RESEARCH ON THE DEVELOPMENT PATH OF COLLEGE IDEOLOGICAL AND POLITICAL THEORY WORK AND COLLEGE STUDENTS' MENTAL HEALTH EDUCATION IN THE ERA OF BIG DATA

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## ABSTRACT

Exploring the development path of ideological and political theory work and mental health education of college students can solve the mental health problems of college students while conducting ideological and political education. This paper first analyzes the connotation of college students' mental health education, and then defines the integration course of ideological and political work and mental health education, i.e. psychology class. Finally, it is proposed that the development path of psychology class is to adopt the way of "three comprehensive education" to build the mental health education mode. The model of "three-wide education" can realize the effective development of the integration of psychological health education of college students through thinking and government work, and also provides a new research direction for college students' mental health education.

## KEYWORDS

psychology class; college political work; mental health education; development path; relevance

## 1. INTRODUCTION

When youth thrive, the country thrives; when youth are strong, the country is strong. As the progressive force among youth, college students shoulder the important task of achieving the great rejuvenation of the Chinese nation, which requires them to have not only firm ideals and beliefs and excellent professional skills, but also a healthy mind and sound personality [1-3]. However, college students in the period of rapid social development and transformation are under heavy pressure of thoughts and reality due to the impact of multiculturalism and the influence brought by the

intensification of social competition, which leads to the frequent occurrence of psychological problems and psychological crises [4-5]. These problems not only affect the healthy growth and comprehensive development of college students, but also seriously endanger the stability and unity of schools and the harmony and stability of society [6-7].

In order to study the integration path of the development of college ideological and political theory work and college students' mental health education, this paper analyzes from three parts. The first part focuses on defining the specific definition of the integration course of college ideological and mental health education, i.e., psychology class, and elaborates mental health education and curriculum. The second part analyzes the factors that restrict the development of psychology class in colleges and universities, including the educated, educators, and teaching evaluation levels. The third part analyzes the countermeasures to promote the development of psychology courses in colleges and universities in terms of education structure, teacher team construction, teaching evaluation system and the synergistic development of the "three whole educators".

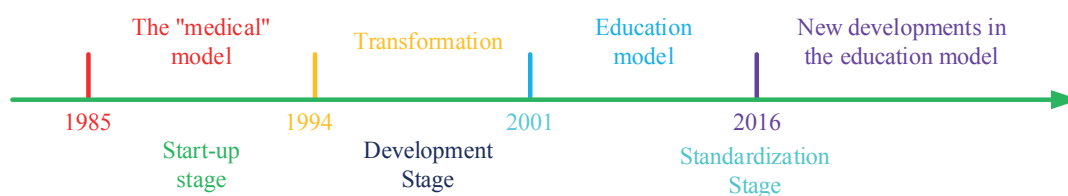
## **2. THE INTEGRATION COURSE OF IDEOLOGICAL AND POLITICAL AND MENTAL HEALTH EDUCATION IN COLLEGES AND UNIVERSITIES**

Quality education requires schools to pay more attention to the cultivation of students' mental and moral quality, physical and psychological quality in addition to their learning ability.

### **2.1 MENTAL HEALTH EDUCATION FOR COLLEGE STUDENTS**

The connotation of mental health education is mainly reflected in two aspects, one is to reflect the standard of mental health, and the other is to reflect the function of educational development. Mental health education as an educational activity is to achieve the mental health and improve the psychological quality of the education target through the use of various educational tools and teaching methods such as measurement, dialogue and guidance, and also to equip the education target with relevant psychological adjustment skills through education to promote their coordinated physical and mental development.

In the mental health education, students should be able to assess and maintain their own psychological state through their own learning, so that they can prevent psychological crisis events. On this basis, it is necessary to cultivate good psychological quality of college students and build a sound personality. The evolution of mental health education model in Chinese universities is shown in Figure 1.



**Figure 1** The evolution of mental health education model

## 2.2 MENTAL HEALTH EDUCATION COURSE

The integration course of Civics and Mental Health Education in colleges and universities (referred to as psychology course in the latter part of the paper) is mainly for the education of Marxist general knowledge, character education and social science general knowledge for college students. It is an important part and way of moral education in universities and has important disciplinary, moral and ethical values.

The fundamental task of psychology class is to establish moral education, the fundamental purpose is to cultivate socialist core values, is to help students establish the correct political direction, improve the core quality of ideological disciplines, enhance social understanding and participation ability of a comprehensive, activity-based subject courses. University psychology courses do not exist in isolation; they complement each other with practical political education and cooperate with other disciplinary courses and moral education work to share the task of psychological education and moral education.

## 3. ANALYSIS OF FACTORS LIMITING THE DEVELOPMENT OF PSYCHOLOGY COURSES IN UNIVERSITIES

### 3.1 EDUCATOR LEVEL REASONS

Students are the masters of their own learning and are the central subjects of their learning activities. The purpose of psychology class is to help students establish the correct values and sense of responsibility. The special physical and mental stages of college students make the penetration of "psychological education" more difficult, and some students have more serious psychological problems because of their status as only children. In addition, the lack of family and social education increases the workload of "heart education", which also deepens the difficulty of penetrating "heart education" in the process of psychology class in colleges and universities to a certain extent.

### 3.2 EDUCATOR-LEVEL REASONS

The teacher is the dominant person in teaching activities and is an important player in teaching bilateral activities. The teacher of psychology class is the leader of psychological health education in psychology class, and he or she is an important

factor governing the penetration of psychological health education in psychology class.

For psychology teachers, good psychological quality is the basis of "infiltration" of psychological education, and the ability to explore psychology class materials is the premise of infiltration of "psychological education". Only when the teachers' own psychological quality is up to standard and they can make correct judgment among multiple contradictions and value choices, they can educate college students with healthy psychology. Moreover, the ability of psychology teachers to explore the teaching materials also affects the effectiveness of teachers' infiltration of mental health education.

### **3.3 REASONS FOR TEACHING EVALUATION LEVEL**

Teaching evaluation is the activity of making value judgment on the teaching process and its results according to the teaching objectives and serving for the teaching decision, and it is the process of making judgment on the real or potential value of teaching activities. Evaluation and assessment guide the way of teaching, and a scientific and perfect evaluation will scientifically guide the teaching process rationally, while an unscientific and incomplete evaluation will weaken the effect of teaching greatly and make it farther and farther from the educational goal.

In order to improve the effectiveness of psychology classes, it is necessary to make some corrections to the original assessment methods that focus only on examinations and do not include mental health education assessment. The number of evaluation methods and the mode of evaluation are important factors that limit the penetration of the concept of "mental education" in psychology classes.

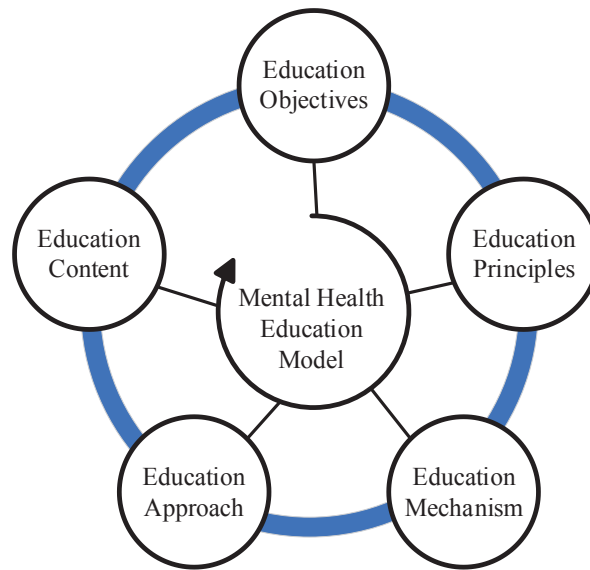
## **4. ANALYSIS OF COUNTERMEASURES TO ENHANCE THE EFFECTIVENESS OF PSYCHOLOGY CLASSES IN COLLEGES AND UNIVERSITIES**

### **4.1 IMPROVING THE EDUCATIONAL STRUCTURE OF PSYCHOLOGY CLASSES**

The psychology class in the new period is to establish moral education as the fundamental, and focus on cultivating the comprehensive development of moral, intellectual, physical and aesthetic, with ideals, skills and responsibilities of the new man of the times. Mental health education in colleges and universities in the new era should focus on the positive development of students, be based on value leadership, focus on the whole process, the whole staff and all-round participation, establish a new period of psychological education work system, highlight the value of the times of college education, and comprehensively promote the development of mental health education into a new era.

On the premise of scientific orientation, the model of college psychology class must also have a complete internal structure, which mainly includes five parts:

education goal, education principle, education content, education way and education mechanism, and its specific structure is shown in Figure 2.



**Figure 2** Internal structure of mental health education model

#### **4.2 STRENGTHENING THE FACULTY**

Teachers are the leaders of teaching activities, and they are also the people most closely related to improving the effectiveness of teaching activities. To enhance the effectiveness of "psychological education" in psychology classes in colleges and universities, we should start from the teacher level.

To enhance students' awareness of mental health in the process of teaching psychology classes, students are required to express their psychological needs. Teachers of psychology classes should be aware of the need to improve their teaching quality, to clarify the necessity of "psychological education" in psychology classes, and to strengthen their awareness of learning mental health education. Teachers should pay close attention to students' behaviors in their schedules and have a certain understanding of the common psychological problems of college students, so that they can have solutions when they encounter possible psychological problems of students.

#### **4.3 IMPROVE THE TEACHING EVALUATION SYSTEM**

Teaching evaluation has a guiding effect on teaching and learning, and scientific evaluation methods can promote the development of teachers and students, improve teaching quality, and promote classroom teaching reform. Different from the traditional single evaluation method, the teaching evaluation of psychology course emphasizes more on diversified evaluation methods.

Focus on the evaluation of mental health education so that teaching can be driven by evaluation. In order to clarify what psychological knowledge students have

mastered, what psychological problems they have solved, and what psychological problems still exist, the effectiveness of "psychological education" penetration in psychology classes can be improved. For the evaluation of psychology class, it is necessary to diversify the evaluation subjects, diversify the evaluation methods and multi-dimensional evaluation principles, so as to enhance the effectiveness of psychology class.

#### **4.4 REALIZING THE SYNERGISTIC DEVELOPMENT OF THE "THREE HOLISTIC EDUCATION"**

With the development of the times, big data technology should be effectively applied to the teaching of psychology class in colleges and universities, so as to realize the comprehensive development of psychological health education in colleges and universities. The practical measures of psychology class teaching in colleges and universities should go deeper into the concept of "three whole education", improve the psychological education ability of all staff, focus on the participation of the whole process of psychological education, form an all-round education pattern, and truly implement "whole staff education", "whole process education" and "all-round education", so as to better educate people. "In order to better play the role of college psychology class in enhancing mental health education, we should improve the ability of psychological education of all staff, focus on the participation of the whole process of psychological education, and form an all-round education pattern.

#### **5. CONCLUSION**

The report of the 19th Party Congress proposes to "cultivate the new man of the times who will assume the great responsibility of national rejuvenation". Such a new man of the times is ideal, capable and responsible, and should also have a rational, calm, positive and healthy mentality. Integrating mental health education into ideological and political education of colleges and universities can, on the one hand, cultivate healthy mentality of college students, solve psychological problems and realize the purpose of "educating the mind". On the other hand, it can enrich and develop the ideological and political education of colleges and universities with the educational contents, teaching methods and evaluation methods of mental health education, improve the scientificity, relevance and affinity of ideological and political education, and realize the purpose of "educating morality". Finally, we can realize the combination of "educating the mind and educating morality", and promote the comprehensive quality and comprehensive physical and mental development of college students.

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# RESEARCH ON THE INTEGRATION MODEL OF UNIVERSITY THINKING PARTY CONSTRUCTION FOR ARTIFICIAL INTELLIGENCE

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## ABSTRACT

*The study of the integration mode of university thinking party construction is to pursue the innovative direction of university party construction work. In this paper, starting from the development opportunities and constraints of AI-empowered university thinking party construction, the intelligent party construction system is constructed using AI technology, and the performance analysis is conducted for the system. From the performance analysis, the average response time of the system in this paper improved by 2.43 times when the number of concurrent users increased from 10 to 50. This shows that the use of artificial intelligence technology can effectively achieve the integration of efficient thinking party construction and further innovation of party construction work in universities.*

## KEYWORDS

*Artificial intelligence technology; Intelligent party building system; University thinking party building; Development opportunities; Constraints; Performance analysis*

## 1. INTRODUCTION

In recent years, digital technology has developed rapidly, and digital technologies such as artificial intelligence, big data, cloud computing and pan-virtual reality technology are fully embedded in social life, which profoundly change people's way of thinking and behavior patterns, and have far-reaching influence on the party construction work of colleges and universities in the new era[1-2]. Digital intelligence is an important embodiment of using digital technology and digital means to carry out work, and the practical exploration of digital intelligence party construction has been carried out in some universities, which has become a new trend of party construction in universities [3-4].

To improve the quality of party construction, we should not only adhere to and carry forward the fine tradition and successful experience formed by our party in strengthening its own construction, but also vigorously promote reform and innovation according to the new situation and new problems faced by party construction, and use new ideas, measures and methods to solve new contradictions and problems [5-7].

In order to explore the integration mode of university thinking party construction, this paper firstly analyses and explains the development opportunities and constraints of university thinking party construction. It then uses artificial intelligence technology to build a smart party construction system, gives the specific architecture and operation system of the system, and evaluates the performance of the system. Finally, a practical strategy for AI-enabled university thinking party construction work is given, starting from the working concept and technical



foundation, which can realize the integrated mode of AI-enabled university thinking party construction work.

## **2. OPPORTUNITIES AND CONSTRAINTS FOR THE DEVELOPMENT OF AI-ENABLED UNIVERSITY THINKING PARTY CONSTRUCTION**

### **2.1 DEVELOPMENT OPPORTUNITIES**

The new generation of artificial intelligence mainly has key common technologies such as knowledge computing engine and knowledge service technology, cross-media analysis and reasoning technology, virtual reality intelligent modeling technology, new architecture and technology of hybrid augmented intelligence, intelligent technology of autonomous unmanned system, intelligent computing chip and system, natural language processing technology. Among them, the technologies of knowledge computing engine and knowledge service, cross-media analysis and reasoning, virtual reality intelligent modelling and natural language processing have strong relevance to the work of party building in universities, and can bring new development opportunities for the decision-making of party building in universities, and the construction of party organizations and party members.

### **2.2 CONSTRAINTS**

While artificial intelligence technology brings development opportunities to the work of university thinking parties, it also carries the risk of technological alienation. Problems such as “information cocoon”, privacy infringement and technical formalism are increasingly becoming important variables in AI-enabled university civic party construction. At the same time, despite the major breakthroughs in AI technology and application scenarios, it is still at the stage of weak AI, and its impact on society is both endogenous uncertainty and externally deferred uncertainty.

## **3. INTELLIGENT PARTY BUILDING SYSTEM BASED ON ARTIFICIAL INTELLIGENCE**

### **3.1 SMART PARTY BUILDING SYSTEM ARCHITECTURE**

Figure 1 shows the architecture of the intelligent party building system based on artificial intelligence technology, which is divided into five layers, and the specific functions of each layer are described as follows:

The first layer is the underlying environment, supported by an open source Linux system, embedded with neural networks and machine assembly language, to achieve support for the upper layer.

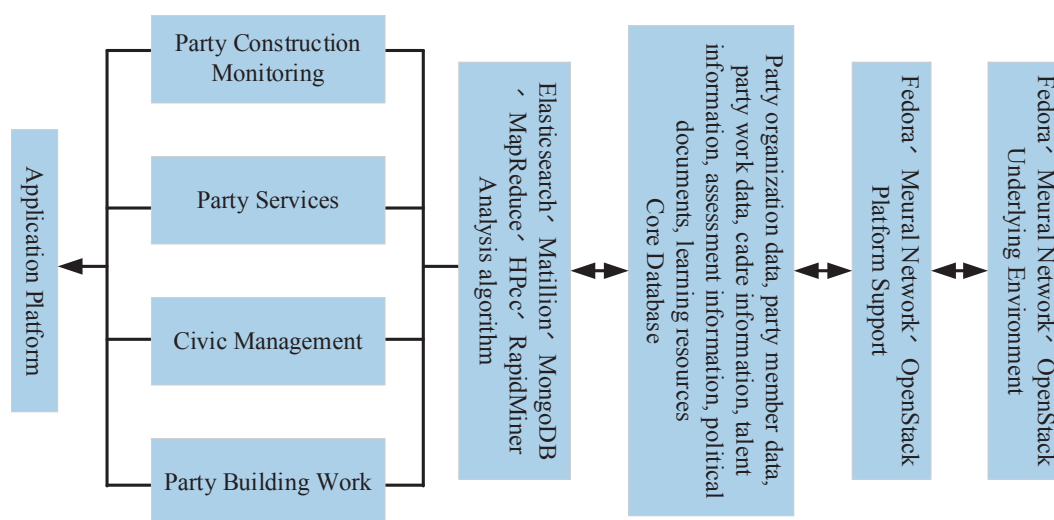
The second layer is the platform support, mainly including the basic database platform, using Service, Oracle Server Analysis as the data service platform, using VINCA, Atlasti and other data parsing technology, to achieve the mining and analysis of the upper layer database.

The third layer is the core database, collecting party organisation data, party member data, party work data, cadre data, cadre education and training data, etc. to form a cloud data centre supporting massive heterogeneous sensory data.

The fourth layer is the analysis algorithm, which takes the structured, semi-structured and unstructured data in the core database of the lower layer as the analysis object and selects the algorithm that finds a specific optimal solution among multiple optimization problems in order to achieve in-depth research and analysis of party organizations and individuals.

The fifth layer is the application platform, which mainly provides four service modules: party building work, thinking management, party services and party building monitoring, among

which party building work realises a series of functions such as “three meetings and one class”, theme party day, organisation and individual precision assessment and other functions of grassroots party organisation management.



**Figure 1.** Intelligent Party Building System Architecture

### 3.2 INTELLIGENT PARTY BUILDING SYSTEM OPERATION SYSTEM

c The intelligent party building system based on artificial intelligence technology should have strong data perception, collection, mining, learning and analysis, thinking and research, personalised recommendation, decision making as well as implementation capabilities, forming an intelligent party building management mechanism and path for strict management and governance of the party.

#### 3.2.1 BIG DATA TO SUPPORT THE CONSTRUCTION OF A “WISDOM LIBRARY

The data analysis and decision-making centre effectively integrates data on party building, party affairs and cadre work in schools through the xAPILRS library, OpenStack and IMS hierarchical database, and transforms it into a visual multi-dimensional data model of analysis objects, ensuring that the above data is presented in an intuitive graphic form. At the same time, through image recognition, voice recognition, semantic analysis and big data technology, the data will be gathered into a large database for party building, and then a “wisdom library” will be formed using programming algorithms, laying a solid foundation for the use of cloud computing technology and learning analysis technology to discover potential relationships and value orientations at all levels of party building, party affairs and cadre work.

#### 3.2.2 CLOUD COMPUTING SUPPORTS “SMART BRAIN” CREATION

The huge amount of data carried by the wisdom library needs to be mined, deconstructed and analysed in order to be of significant use. The rule base incorporates the idea of rule-based reasoning, focusing on aspects such as attribute synthesis and attribute value transfer, and digitally generalises a number of amendable and extensible ontological reasoning rules.

#### 3.2.3 LEARNING ANALYTICS TO SUPPORT ‘INTELLIGENT EYE’ FORMATION

The perceptual context acquires relevant information pre-defined by virtual entities or systems, supported by diverse embedded and integrated algorithms such as big data analysis and learning analytics technology as software. It is able to effectively analyse and drive the data in the wisdom repository to make accurate research and judgement while identifying

party building issues, providing intellectual support and automatic correlation services for party building practices.

### 3.2.4 ARTIFICIAL INTELLIGENCE SUPPORTS THE DEVELOPMENT OF “SMART PEOPLE”

Through artificial intelligence research and the development of rational value standards for party building wisdom people, based on the construction of intelligent digital model analysis system, can form the party building “wisdom people”. The core architecture of this module is call control, which consists of contextual data flows, configuration models and algorithmic modelling. The algorithm model defines conf identifiers, semi identifiers, contextual parameters, detection information values, etc.

### 3.3 PERFORMANCE ANALYSIS OF THE INTELLIGENT PARTY BUILDING SYSTEM

Load Rmmer 11 was used to stress test this system, focusing on the average response time and CPU utilisation for concurrent multi-user operations, and the performance test results are shown in Table 1.

**Table 1.** System performance test results

<b>Number of concurrent users (people)</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>
Average response time	0.23	0.42	0.55	0.63	0.79
CPU utilization (%)	42.31	46.12	51.35	55.26	58.11

The performance test shows that when the number of concurrent users of the system in this paper increases, the average response time also increases and the CPU usage also increases. In particular, when the number of concurrent users increased from 10 to 50, the average response time increased by a factor of 2.43 and the CPU occupation increased by 37.34%. This shows that the intelligent party building system constructed in this paper can achieve parallel pressure on basic users and can contribute to effective analysis in the field of artificial intelligence technology in the intelligent party building of universities.

## **4. PRACTICAL STRATEGIES OF ARTIFICIAL INTELLIGENCE TO EMPOWER PARTY BUILDING WORK IN UNIVERSITIES**

### **4.1 SORTING OUT A WORKING CONCEPT THAT COMBINES INNOVATION AND RIGHTEOUSNESS**

The establishment of correct conceptual thinking is the ideological prerequisite for promoting AI-enabled university party construction, which requires the main body of university party construction work to actively promote the integration of intelligent technology and university party construction, but also to stand firm on political stance and ensure the leading position of party construction work. In the process of promoting the intelligent development of university thinking party construction, university party organizations should always take the implementation of the fundamental task of establishing moral education and serving the growth and development of teachers and students as the footing point of their work.

### **4.2 CONSOLIDATE THE TECHNICAL FOUNDATION OF AI-ENABLED UNIVERSITY PARTY CONSTRUCTION**

To empower the construction of university civic parties with artificial intelligence, we must strengthen the research and development of intelligent technology and the collaborative sharing of data resources. It is necessary to strengthen technical research and development and promote the construction of digital infrastructure for the construction of university thinking parties. Digital infrastructure is the material basis of AI application scenarios, and the construction of digital infrastructure for party building should be supported by strong intelligent technology.

The interface between the university and the local community should be strengthened between the intelligent platform for party building and the construction of smart cities and the e-government party system, and the joint training of intelligent talents and the common research and sharing of intelligent technology should be realized between the university and the enterprises, so as to build up an all-round and all-linked pattern of collaborative sharing of data resources.

## **5. CONCLUSION**

This paper aims to effectively promote the digital management of grass-roots party construction, the intelligent management of grass-roots organizational life, the information upgrading of party affairs, and the digital modeling of cadres' portraits by constructing the basic platform of the intelligent party construction system and building the operation system of the intelligent party construction system. To this end, the following suggestions are put forward for the intelligent party construction of university thinking parties:

(1) Do a good job of top-level design at the level of platform and system, and improve the construction of intelligent party construction management system.

(2) To realize the scientific allocation of talents for intelligent party building, and incorporate excellent talents with Internet thinking and familiar with relevant technology into the party building work team, so as to effectively improve the professional work level.

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# THE IMPACT OF INTEGRATING THE OVERALL NATIONAL SECURITY CONCEPT OF BIG DATA NETWORK EDUCATION INTO COLLEGE EDUCATION AND TEACHING

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## ABSTRACT

The development of big data network education makes more possibilities for national security, and the core and essence of integrating the overall national security concept into college education and teaching is to carry out effective reform of curriculum. In this paper, the overall national security concept is used as a guide to reform the content of education and teaching in general colleges and universities. As an important initiative, in order to test whether the subsequent reform is effective, a scientific and open evaluation system including teachers' and students' dimensions is established, aiming to promote the reform by evaluation and continuously improve the content system of education teaching in general colleges and universities under the new situation, so that it can follow the national security situation and serve the national security strategy in the new era of socialism with Chinese characteristics.

## KEYWORDS

Big data; Online education; Overall national security concept; University education and teaching; Evaluation system; Curriculum reform

## 1. INTRODUCTION

Adhering to the overall national security concept is one of the basic strategies for adhering to and developing socialism with Chinese characteristics in the new era, which is of outstanding practical significance for coordinating the two major situations of domestic and international security and development, and achieving long-term national security [1-3]. The in-depth implementation of the overall national security concept cannot be achieved without strengthening national security education and organically integrating the contemporary values, important contents and policy requirements of the overall national security concept into society-wide publicity and education activities, so as to enhance the awareness of worries and to be prepared for danger in times of peace [4-6].

As a university that undertakes and implements the fundamental task of establishing moral education, it needs to be at the forefront in promoting the realization of national security education in schools, in teaching materials, in classrooms and in students' minds, and continuously improve the effectiveness of integrating the overall national security concept into education and teaching [7-8].

In order to explore the effective path of integrating the overall national security concept into college education and teaching in the era of big data network education, this paper firstly elaborates the overall national security concept, including its specific system structure and characteristics. Then, the index evaluation system is designed for both students and teachers according to the integration of the overall national security concept into college education and

teaching. Finally, the methods and paths of the new model of national security education are sought according to the index design, including the reform of teaching ideas, teaching objectives and teaching subjects, so as to promote the effective integration of the overall national security concept into university education and teaching.

## 2. OVERALL NATIONAL SECURITY CONCEPT

### 2.1 THE SYSTEM OF THE OVERALL NATIONAL SECURITY CONCEPT

The structure of the overall national security concept system is shown in Figure 1.



**Figure 1.** Overall national security concept system structure

The overall national security concept is a content-rich, open and inclusive, and constantly developing ideological system, the core elements of which can be summarized as five major elements and five pairs of relationships. The five elements are to take people's security as the purpose, political security as the root, economic security as the foundation, military, scientific and technological, cultural and social security as the guarantee, and the promotion of international security as the backbone.

### 2.2 CHARACTERISTICS OF THE OVERALL NATIONAL SECURITY CONCEPT

First, the overall national security concept is rich in connotation. For a country, development and security are indispensable, development is the basis of security, and security is the condition of development. The overall national security surface proposes the comprehensiveness of the national development system and the comprehensiveness of the national security system.

Second, the overall structural integrity in the layout of national security. This is mainly reflected in the fact that security at the national level is not a simple superposition of security elements in multiple fields, but the national security structure is like a large interconnected network, interlocking, influencing each other and closely connected.

Third, the pursuit of durability in the effectiveness of national security. It means that under the guidance of the overall national security concept, the relationship between national development and national security must be scientifically handled, and by giving equal importance to the relationship between development and security, seeking unity in both, and

implementing both in parallel to achieve a mutually reinforcing relationship between development and security.

### 3. THE OVERALL NATIONAL SECURITY CONCEPT IS INTEGRATED INTO THE EDUCATION AND TEACHING INDEX SYSTEM OF COLLEGES AND UNIVERSITIES

#### 3.1 SETTING OF STUDENT EVALUATION INDEXES

Students are one of the indispensable actors of teaching activities and the main audience of knowledge. Modern educational philosophy requires respecting and giving full play to students' subjective position in learning activities, stimulating their subjective initiative, independence, creativity and development. Therefore, students' status in the reform of relevant teaching contents is no longer just a single audience, but also a participant and evaluator. Transforming students from traditional objects of evaluation to subjects of evaluation requires proper guidance of their subjective role. From this, we can get the student evaluation index system for the integration of the overall national security concept into college education and teaching as shown in Table 1.

**Table 1.** Student evaluation index system

Primary Indicators	Secondary Indicators
Required Course Evaluation	Whether they are interested in the new content to be expanded
	Whether the expanded new content can enrich the knowledge system
	Whether the overall national security concept is established
	Whether they are satisfied with the reformed curriculum
Electives Course Evaluation	Are you interested in the content of the lectures?
	Whether it complements the content of the compulsory courses
	Whether the understanding of some new issues was deepened or not
	Whether the overall security concept has been strengthened
	Whether they are satisfied with the content of the course
Special Lecture Evaluation	Whether they are interested in the content of the lecture
	Whether the understanding of security concept is more concrete
	Did you gain anything after the lecture?
	Whether they were satisfied with the course

#### 3.2 SETTING OF TEACHER EVALUATION INDICATORS

Teachers are the subjects of curriculum development. The communication and evaluation among teachers is one of the ways of teachers' professional development advocated by the new curriculum reform, and also an important part of the quality evaluation of teaching reform. Accordingly, in the evaluation index system of the effectiveness of the reform of university education content under the guidance of "overall national security concept", the focus of "teachers' evaluation" should be on the teachers' grasp of the connotation of the overall national security concept, the connection between the new content and the original knowledge system, and the improvement of teachers' professionalism in the reform. The evaluation should focus on the teachers' grasp of the meaning of the overall national security concept, the connection between the new content and the original knowledge system, and the improvement of teachers' professionalism. The teacher evaluation index system of integrating the overall national security concept into university education and teaching is shown in Table 2.



**Table 2. Teacher evaluation index system**

Primary Indicators	Secondary Indicators
Educational Reform Content Design	Introduction of the general security concept overview
	Introduce the concept of each area of the Total Security Concept
	Presenting security issues in each area
	Presenting the latest developments in each area of security
	Discuss the views of others
	Compare and contrast various theories
	Present the sources of ideas and concepts
	Logical relationships between new content
Educational Reform Quality	Effectiveness of teaching in the classroom after the teaching reform
	Students' understanding of teaching reform knowledge
	Change in students' national security concepts
	Improvement of teachers' academic sophistication
Students Benefit	Increase interest in learning
	Enrich knowledge structure
	Expanding the mind

**4. METHODS AND PATHS FOR BUILDING A NEW MODEL OF NATIONAL SECURITY EDUCATION**

**4.1 CHANGE THE THINKING OF EDUCATION AND TEACHING**

Under the background of “strengthening and improving the ideological and political work of colleges and universities under the new situation”, colleges and universities should integrate the national security education with “overall national security concept” as the core meaning into the ideological and political education system of colleges and universities. With “socialist core values” as the leader, we focus on strengthening the all-round cultivation of national consciousness, legal consciousness and social responsibility consciousness of college students. It also focuses on tapping the implicit national security education function in the professional courses, promoting the reform and innovation of national security education, and realizing the synergistic effect of promoting national security education in the whole staff and the whole process.

**4.2 CLARIFY EDUCATION AND TEACHING OBJECTIVES**

In order to better cultivate college students' national security awareness, colleges and universities must clarify the objectives of education and teaching. The overall objective is to learn the Party and national security line, guidelines and policies, and gain a comprehensive understanding of the connotation of the “overall national security concept”. Through the analysis of hot events and major news at home and abroad, students can improve their objective thinking ability, learn to see the essence of the problem through the phenomenon and establish a scientific concept of national security. Students are guided to analyze various issues in national security with Marxist positions, views and methods, to think and judge with a broader perspective, and to consciously safeguard national security.

**4.3 CULTIVATE THE MAIN BODY OF EDUCATION AND TEACHING**

Teachers in colleges and universities as the main body of the implementation of teaching behavior, the quality of teachers directly affects the effectiveness of national security education teaching. Colleges and universities should focus on strengthening teachers' pre-service and

in-service training, formulating training plans for key teachers, focusing on training subject leaders, and vigorously improving teachers' theoretical level. Focus on problem-oriented thematic teaching, advocate collective lesson preparation under the leadership of famous teachers, and implement teaching attacks. Establish a resource pool of teachers and encourage party and government cadres, researchers in the social science and theoretical circles, and faculty members of military colleges and universities with high theoretical education and rich practical experience to participate in the teaching of national security education in schools.

## 5. CONCLUSION

The era of big data makes online education more closely connected with national security. Starting from the overall national view, this paper constructs an index system for the integration of the overall national education view into college education and teaching. It deeply analyzes the methods and paths for constructing a new model of national security education, and puts forward the following suggestions for realizing the integration of the overall national security concept into college education and teaching.

(1) Strengthen the construction of national security disciplines and enhance intellectual support. Promoting the discipline construction of national security is an important prerequisite for implementing the overall national security concept, strengthening national security construction and cultivating national security talents.

(2) Pay attention to innovation in education and teaching mode to ensure practical effects. With the overall national security concept as the guide, to strengthen national security education and teaching in colleges and universities, it is necessary to focus on exploration and innovation to ensure the actual effect.

(3) Consolidate the foundation of education and teaching practice and build a long-term mechanism. Efforts should be made to solve the problem of how to launch and create a number of fine courses of national security education teaching to realize the integration of the whole process of national security education.

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# RESEARCH ON THE PATH OF INNOVATIVE THEORY DEVELOPMENT OF IDEOLOGY AND POLITIC EDUCATION IN UNIVERSITIES UNDER THE BACKGROUND OF BIG DATA

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## ABSTRACT

Under the background of big data, ideology and politic education in colleges and universities needs to find an innovative theoretical development path. Based on PageRank algorithm, this paper mines the big data of ideological and political-related behaviors of college students, analyzes the current problems mainly from the channels of information-based teaching and acquiring current political views, so as to propose corresponding innovative development paths. The use of slide teaching is the key means of current Civic and Political Science education, accounting for 92.3%. And the degree of using the emerging network teaching mode is very low, such as micro-class only accounts for 5.8%. on the basis of the analysis of big data, college Civic Education obviously lags behind the growth of the times, which requires colleges and universities to change their traditional education ideas.

## KEYWORDS

Big data; PageRank algorithm; Ideology and politic education; Information-based teaching

## 1. INTRODUCTION

Big data has a significant impact on the ideology and politic education work done in colleges and universities. As a result, the relevant work should conduct ground-breaking research with the aid of big data and improve services using big data [1-2]. The ideological and political work of colleges and universities must undergo significant transformations in the big data era. How to use big data to enhance the research has emerged as a key question [3-4]. The substance of ideology and politic education in higher education is enhanced by new media, which also increases educational materials, improves college students' learning processes, and increases the relevance and efficacy [5]. The basic education curriculum is crucial in helping colleges and universities build their systems of ideological and political concept courses, extensive literacy courses, and professional courses [6].

In addition, literature [7], using the core subjects of computer science as an example, the ideological and political curriculum creation program of professional courses was developed on the basis of mining and classifying the features of engineering courses. The literature [8] investigated the flipped classroom's contribution to the growth of ideology and politics as well as its reform and use as a teaching strategy. The literature [9] studied that cell phone dependence is very serious in ideological and political classes in higher education institutions.

Although college students are present, they are not actually in the classroom. Literature [10] proposed that the ideological education should be oriented to talent gathering, resource integration and system integration to realize the paradigm shift of humanistic education, the transformation of diversified educational subjects and the transformation of teaching diversity. The above studies are less involved in the study of students' behaviors, Hence, this study, based on the PageRank algorithm, explores the ideological and political actions of college students' daily actions, analyzes the issues they face, and suggests an original development route that complies with the big data era's features.

## 2. BIG DATA MINING OF STUDENT BEHAVIOR BASED ON PAGERANK

### 2.1 BIG DATA IDEOLOGY AND POLITIC EDUCATION

Big data has given birth to new ideas, new requirements and new methods for ideology and politic education work. Big data in ideology and politic education is a type of educational activity that successfully mixes big data, ideology, and politic teaching work in higher education institutions. It uses a variety of big data elements. In the big data era, network has become the most frequent necessity for young college students' daily contact, and college students contact and generate massive information data through network. The ideology and political education staff in higher educational institutions can better understand the way of thinking, values, and behavioral lifestyles of college students by gathering, summarizing, and analyzing information and data linked to the ideology and politics of university students. This can help us hold out more focused ideology and political education courses for college students.

### 2.2 STUDENT BEHAVIOR CLASSIFICATION BASED ON PAGERANK

#### 2.2.1 MODEL INTRODUCTION

For Figure  $G = (V, E)$ , each student is defined as a vertex  $V_i$  in the graph. If two students belong to the same version of the classroom forum or have the same assignment grade, then an edge is defined between these two vertices  $V_i, V_j$ .

This paper constructs a social network graph based on sample learning behavior data, which is a social network of learning behaviors containing 120 students. The points marked with numbers indicate the corresponding numbered students, and the edges between the points indicate the relationships between the students' learning behaviors.

#### 2.2.2 PAGERANK ALGORITHM

The PageRank algorithm is Google's proprietary web ranking technology, which takes the interlinked hyperlinks between web pages as one of the elements of web ranking, it evaluates a website's significance in comparison to other websites included in the index of search engines..

Assuming that user  $A$  is the average of all users on the Internet, the probability of  $A$  being on page  $W_i$  at  $n$  is  $\pi_i(n)$ , assuming that after enough online roaming, page  $W_i$  has  $N_i$  external links.  $A$  has no personal preference, so the probability of clicking on each external link is  $1/N$ . Based on the above assumptions, we can obtain:

$$\pi_i(n+1) = \sum_j \pi_j(n) \cdot p_{j \rightarrow i} / N_i \quad (1)$$

where  $p_{j \rightarrow i}$  is an indicator function describing the link structure, and  $p_{j \rightarrow i}$  takes the value 1 if page  $W_j$  has a link to page  $W_i$  and 0 vice versa. the probability of visiting each page on

user  $A$ 's  $n$ th visit is combined as  $p_n$  and its  $i$ th component is  $p_i(n)$ . The transfer probability matrix is  $P$  and its  $(i, j)$  element is  $p_{ij} = p_{j \rightarrow i} / N_i$ . So we have:

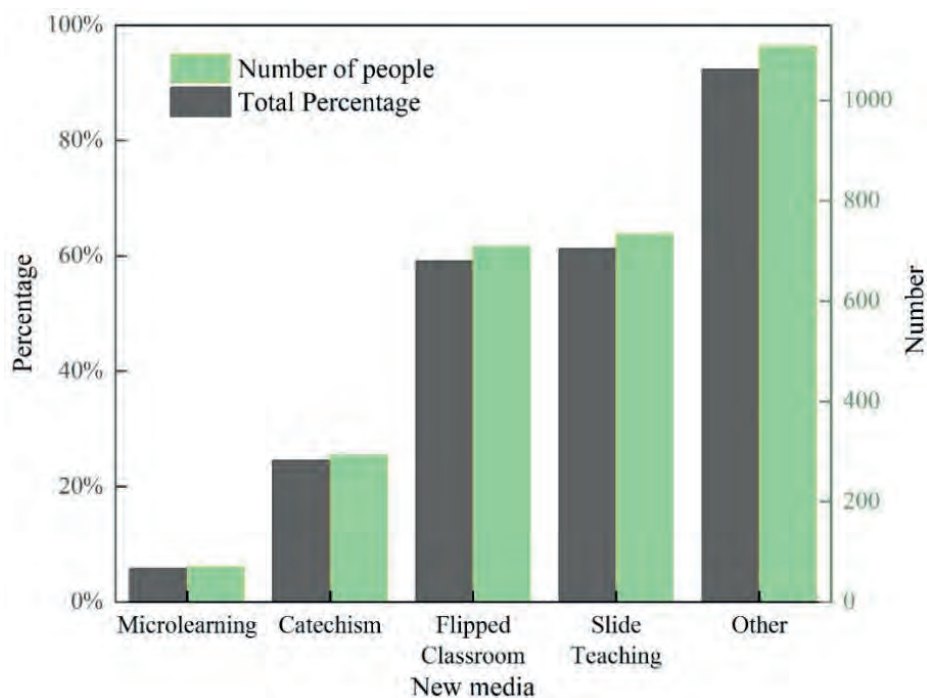
$$\pi_{n+1} = \pi_n P = \pi_0 P^n \quad (2)$$

If  $P$  there is a limiting distribution, then a smooth probability distribution can be found.

### 3. ANALYSIS OF COLLEGE STUDENTS' THINKING AND POLITICAL BEHAVIOR EXCAVATION

#### 3.1 ANALYSIS OF INFORMATION TEACHING OF CIVIC EDUCATION FOR STUDENTS IN HIGHER EDUCATION

Findings from new media technology mining based on PageRank algorithm are shown in Figure 1. Seventy college students used “micro-class”, having 5.8% of all pupils as its constituents. There are 294 college students using “mu-class”, being responsible for 24.5% of all students. 709 university students used “flipped classroom”, being responsible for 59.1% of all students in the study. A whole of 1108 university students used “slide teaching”, representing 92.3% of the overall number of research participants. A whole of 734 college students used “other new media teaching”, accounting for 61.2% of the respondents.

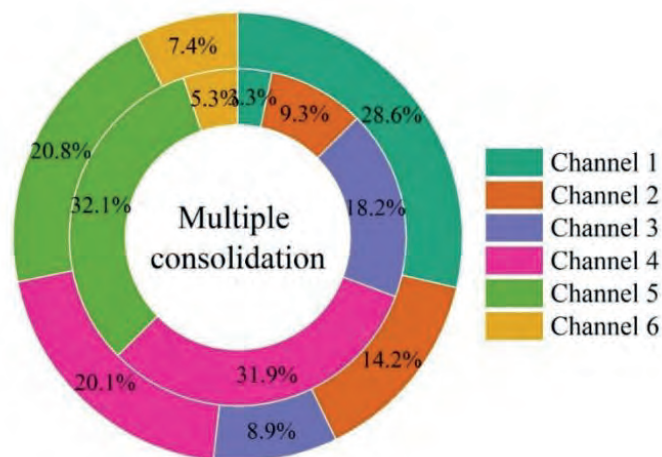


**Figure 1.** New Media Technology Mining for Ideology and politic education Use

#### 3.2 ANALYSIS OF STUDENTS' ACCESS TO CURRENT POLITICAL VIEWS

Figure 2 displays the distribution of routes used by college students to access current political opinions according to the mining of PageRank. There are 1129 college students who got the information from “microblog or WeChat activists”, accounting for 94.1% of the surveyed students. There are 560 college students who got the information from the official microblogs and weibo platforms of the university, accounting for 46.7% of the surveyed students. 353 college students got the information from “theory teachers, counselors and class teachers”, accounting for 29.4% of the surveyed students. 793 college students got the information from “family and dormitory members”, accounting for 66.1% of the surveyed students. The number of students who got the information from “traditional media (TV, radio, newspaper, etc.)” was 821, accounting for 68.4%. 292 students got the information from “other” channels, accounting

for 24.3%.



**Figure 2.** Distribution of channels to obtain current political views

### 3.3 THE INNOVATION PATH OF COLLEGE CIVIC EDUCATION IN THE ERA OF BIG DATA

Politics and ideological educators in higher educational institutions should make an effort to learn about big data in addition to acquiring their expert knowledge of politics and ideological education in order to increase their grasp of and proficiency with the technology, so as to better record, store, analyze and excavate more hidden meanings of data information, and more comprehensively and objectively understand the ideologic and ethical status of education targets. The instruction dissemination channels and contents in the “Internet+” environment have also changed, which requires us to build a good all-round collaborative education mechanism for ideology and politic education based on the integrated theory the original resources, in an effort to keep up with the evolution of modern young college students' thinking, so as to better serve and unite the youth. It should be noted that the traditional ideological and political education mechanisms in institutions of higher learning have had a difficult time adapting to the needs of the big data era. As a result, we must create a new ideological and political education mechanism, and while doing so, we must fully recognize the significant role that big data plays and then indicate on its prospective educational value.

## 4. CONCLUSION

In order to examine the political and ideological attitudes of college students, investigate the challenges facing school political education, and suggest a course of action, this research uses PageRank algorithms for data mining in big data. The research presented here draws the following findings:

(1) College ideology and politic education workers must understand big data with a forward-looking development vision and innovate college ideology and politic education by using the advantages of big data, in order to provide a new environment for college ideology and politic education.

(2) As part of the effort to encourage the deep integration of big data and ideology and politic education work, attention should be paid to strictly abide by the laws and regulations on personal information protection, scientifically and reasonably define the legal boundaries of data collection, data utilization and management, and avoid the occurrence of infringement on students' personal privacy.

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# ANALYSIS AND APPLICATION STRATEGIES OF ENTREPRENEURSHIP EDUCATION AND ENTREPRENEURIAL ACTIVITIES OF COLLEGE STUDENTS IN THE ERA OF BIG DATA

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## ABSTRACT

Studying entrepreneurship education and entrepreneurial activities of college students can better propose entrepreneurial guidance strategies. Based on the analysis of the impact of big data on college students' entrepreneurial process, this paper studies the current situation of entrepreneurship education in terms of both entrepreneurship education faculty and methods, and proposes targeted application strategies by analyzing the problems of college students' entrepreneurial activities. The full-time entrepreneurship teachers in colleges and universities only account for 0.65% of the entrepreneurship education faculty, and the entrepreneurship faculty has not been given enough attention. And the problem of inadequate policy implementation is the most serious in entrepreneurial activities, accounting for 24.67%. This study has guiding implications for entrepreneurship education innovation and entrepreneurial activities.

## KEYWORDS

Big data; Entrepreneurship education; Entrepreneurial activities; Full-time entrepreneurship teachers

## 1. INTRODUCTION

Entrepreneurship is a driving force and source of economic and social development, and an effective way to create jobs and relieve employment pressure. At present, the difficult employment problem of college students caused by the massification of higher education has made the entrepreneurial behavior of college students get high attention from the society [1-2]. However, in the context of a society with diverse interests, multiple values and contradictions, the problems of college students in entrepreneurial practice have gradually emerged, and the success rate of entrepreneurship is extremely low, so there is an urgent need to make effective education and value guidance for college students' entrepreneurial practice [3].

In recent years, with the vigorous promotion of the national innovation-driven strategy, entrepreneurship education for college students has been developed rapidly, and the curriculum, practice platform and institutional system of entrepreneurship education have been gradually established and improved [4]. However, due to the late start of entrepreneurship education, the social atmosphere of encouraging and supporting entrepreneurship is not yet strong, and other reasons, there are still problems in the practice of entrepreneurship education for college students, such as weak educational effectiveness, poor coordination and

guarantee mechanism, imbalance in curriculum construction and faculty structure, and weakened function of entrepreneurship education [5]. In the era of big data, for the entrepreneurial activities of college students, the literature [6], on the basis of summarizing and analyzing the previous research results, elaborated the current status and significance of the research on entrepreneurial risk assessment algorithms for college students, and described the development background, current situation and future challenges of big data analysis technology. The literature [7] constructed a model system suitable for college students' employment and entrepreneurship prediction guidance through artificial intelligence algorithm and fuzzy logic model. The literature [8], on the other hand, conducted a study on entrepreneurship education for college students, and explored the role of experiential entrepreneurship education in guiding entrepreneurship by taking a first-class undergraduate entrepreneurship program as an example. The literature [9] provides a preliminary analysis of entrepreneurship courses and curricula in Italian universities, comparing them with the needs of companies for entrepreneurial and managerial competencies.

This paper mainly focuses on the influence of big data on college students' entrepreneurship, and analyzes the problems in the current status of entrepreneurship education by selecting a college faculty as the research object, mainly pointing out the problems in it from the faculty and entrepreneurship education methods. At the same time, the distribution status of the problems faced by college students' entrepreneurial activities is analyzed, and the corresponding response strategies are proposed.

## **2. THE IMPACT OF BIG DATA ERA ON COLLEGE STUDENTS' ENTREPRENEURSHIP**

### **2.1 THE BUSINESS VALUE OF BIG DATA**

With the combination of big data and a new generation of information technology to use deeper and wider, "data-driven" to create enterprises to enhance the value of the factor contribution rate continues to rise. For example, by collecting and analyzing data on users' searches, browsing and eventual purchase of services, we can realize personalized segmentation of customer groups and needs, grasp market trends in real time, help businesses adjust their layout, ensure the accuracy and effectiveness of advertising and marketing, and thus form long-term management of customer relationships. This analysis advantage is clearly reflected in Taobao, Meituan and other shopping e-commerce.

### **2.2 ENTREPRENEURSHIP**

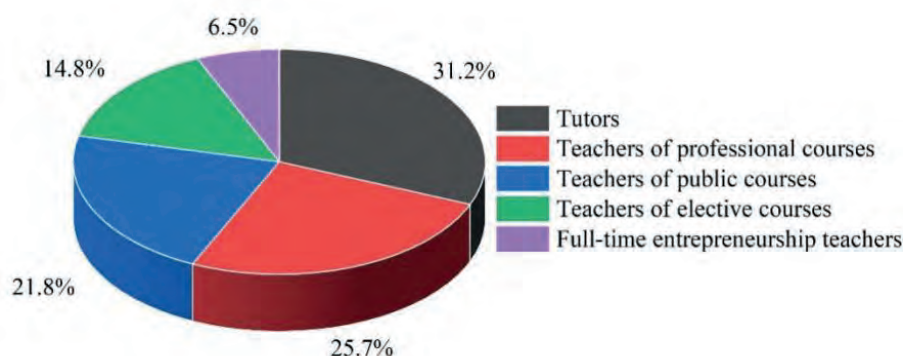
Entrepreneurial competencies refer to the psychological preparation, theoretical knowledge, professional skills and other comprehensive qualities that influence the development of entrepreneurial activities. Combined with the impact of big data in the economy and society, we can see that big data can not only provide us with the conditions and opportunities to develop these capabilities, but also penetrate into all aspects of entrepreneurship, such as market research, project decision-making, and management operations. The keen capture and analysis of big data is becoming a key factor for enterprises to compete and win.

## **3. ANALYSIS AND STRATEGY OF ENTREPRENEURSHIP EDUCATION FOR COLLEGE STUDENTS**

### **3.1 ANALYSIS OF ENTREPRENEURSHIP EDUCATION FACULTY**

The composition of teachers of entrepreneurship education in colleges and universities is shown in Figure 1. The composition of the staff structure of the teachers who carry out entrepreneurship education for college students is 31.2% for counselors, 25.7% for teachers of professional courses, 21.8% for teachers of public courses, 14.8% for teachers of elective courses, and 0.65% for full-time entrepreneurship teachers in colleges and universities.

Counselors are both specialized personnel of ideological and political education of college students and part-time teachers of entrepreneurship courses and career guidance courses, and they take up most of the entrepreneurship education courses in colleges and universities with a large proportion. And the proportion of full-time entrepreneurship teachers in colleges and universities is the smallest, which is due to the fact that few colleges and universities set full-time entrepreneurship course teachers alone, most of them are served by counselors and other class teachers, and the entrepreneurship teaching team has not been paid enough attention.



**Figure 1.** Composition of teachers for entrepreneurship education

Entrepreneurship education for college students has high requirements for teachers, it is a multidisciplinary cross-fertilization teaching process, which has certain requirements for both theoretical and practical experience of entrepreneurship teachers, only with good comprehensive multidisciplinary theoretical literacy and good practical experience in entrepreneurship can provide effective theoretical guidance and project support to college students.

### 3.2 ANALYSIS OF ENTREPRENEURSHIP EDUCATION APPROACHES

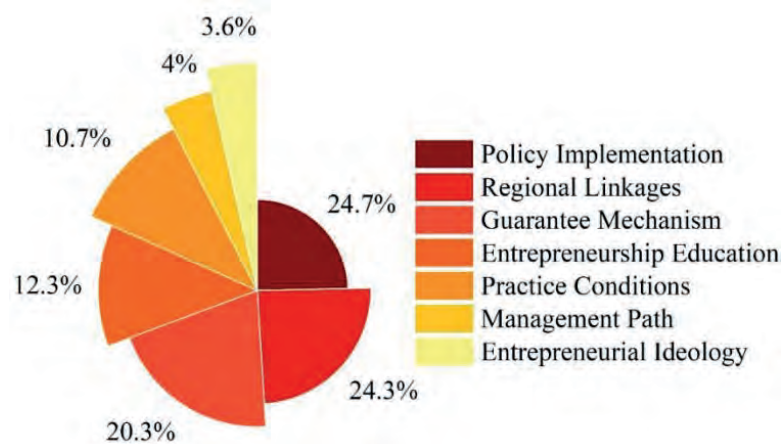
In response to the question "In which way did you receive entrepreneurship education during your school years?" 32.5% chose "lectures", 21.4% chose "online media publicity", 13.6% chose "social practice", 16.2% chose "classmates", 7.4% chose "extracurricular scientific and technological activities", and 7.4% chose "social practice". The proportion of those who chose "classmates" was 16.2%, the proportion of those who chose "extracurricular scientific and technological activities" was 7.4%, and the proportion of those who chose "family education" was 8.0%. Thus, it can be seen that the main way for college students to receive entrepreneurship education is still classroom lectures. At the same time, the rapid development of the Internet era and the interconnection of new media have made the information received by college students more diversified and diverse, which has promoted the timely delivery and effective propagation of college students' entrepreneurship policies, and the proportion of "online media propaganda" in entrepreneurship education has gradually increased. The lower proportion of "extracurricular science and technology activities" and "family education" in entrepreneurship education is probably due to the actual situation of schools and the difference in the atmosphere of college students' families. Therefore, it is the fundamental guarantee to carry out good entrepreneurship education for college students.

## 4. ANALYSIS AND APPLICATION STRATEGIES OF ENTREPRENEURIAL ACTIVITIES OF COLLEGE STUDENTS

### 4.1 ANALYSIS OF THE PROBLEM OF ENTREPRENEURIAL ACTIVITIES OF COLLEGE STUDENTS

The distribution of the main problems faced by college students' entrepreneurial activities

is shown in Figure 2. Among them, the problems of inappropriate policy implementation and obvious lack of material support account for 24.67%, and the policy system is gradually improved, but the dividends are not obvious. The problem of how to effectively connect with the overall development and needs of the region accounts for 24.33%, and there is an obvious lack of regional advantages in the development of entrepreneurial practice activities of school students, and, in reality, it shows that there are obvious incongruities and inconsistencies between the development of universities and the external environment. The problem of unsound mechanism of resource management and utilization of entrepreneurial practice and education accounts for 20.34%, and innovation and entrepreneurship education is gradually popularized, but the foundation is still weak. The positioning of entrepreneurship education in colleges and universities is not clear enough. The problem of insufficient conditions for the development of entrepreneurial practice activities accounts for 12.34%, and the so-called special funds in most schools are basically nominal, and some of them cannot even support the daily needs of teaching career planning of school students.



**Figure 2.** Distribution of problems faced by college students' entrepreneurial activities

#### 4.2 STRATEGIES TO IMPROVE ENTREPRENEURIAL ACTIVITIES OF COLLEGE STUDENTS

College faculties should always clarify the objectives of innovation and entrepreneurship education, combine the advantages of disciplines and majors, integrate majors with innovation and entrepreneurship, and create innovation and entrepreneurship education activities with characteristics. Under the guidance of clear objectives, colleges can set up innovation and entrepreneurship activity monitoring departments, which are composed of students and teachers involved in innovation and entrepreneurship activities, so that they have the interest to timely find out the problems that arise in the process of activity development and solve them.

The college can hold more exchange meetings and invite students and instructors who have achieved excellent results in science and innovation, Internet+ competition and professional practice and innovation competition to make presentations, which can be used to motivate other students to actively participate in innovation and entrepreneurship activities, while their rich and productive experience can also give some help and guidance to other students.

#### 5. CONCLUSION

This paper explores the influence of big data era on college students' entrepreneurship, and on this basis, through analyzing the current situation of college students' entrepreneurship education and entrepreneurial activities, gives the response strategies for the existing problems. Under the new economic situation, with the continuous improvement of socialist market economy system, society needs more and more entrepreneurs with innovative spirit

and change consciousness, which is the only way to effectively cope with the increasingly fierce international competition and enhance the economic strength of the country and the quality of entrepreneurs themselves. Of course, college students need entrepreneurship education in schools to encourage and guide students, so that they can understand entrepreneurship and then move towards it, and make certain contributions to the economic development and scientific and technological development of the country.

## FUNDING

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# ANALYSIS OF THE IMPACT OF INTERNET INFORMATIZATION ON HIGHER EDUCATION MANAGEMENT AND OPTIMIZATION OF INNOVATION PATH

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## ABSTRACT

The impact of informatization on higher education management can be better studied by analyzing its innovation path. Based on the basic characteristics of Internet information, this paper establishes a model of information-based management in higher education, analyzes and explains the key elements of information-based applications, and finally investigates the impact of information-based management on the efficiency and fairness of higher education management through empirical evidence. Compared with the traditional model, the management of informatization has improved on average 23.8% in administrative efficiency and 18.6% in educational fairness. This study proposes an innovative path for informatization of higher education management, hoping to provide some useful references for higher education management builders.

## KEYWORDS

Higher education management; Internet information technology; Administrative efficiency; Educational fairness

## 1. INTRODUCTION

As the national society requires higher and higher standards for talents, universities, as the main place for talent cultivation, need to constantly reform their education system so as to cultivate innovative talents that are more in line with the development of the information age [1-2]. Education system reform and higher education management model innovation are closely related, so finding out some current problems of higher education management model and realizing management model innovation on the basis of the existing ones are also the current educational issues that the society is more concerned about [3-4].

The literature [5] assessed the state of sustainability of management education as a field of study based on a literature analysis method, pointing out the lack of consistency in the concepts used and the fact that few studies integrate the three levels of the educational concept - teaching, curriculum design and learning. The literature [6] provides confirmation of the social experimentation approach in a virtual space that allows the identification of the main alternatives to the administrative tasks of developing and solving the problems of quality management in regional higher education through new automated information technologies. The literature [7] develops an integrated customer-centered educational quality management model through the use of multiple methods that allow to assess the quality of services and prioritize their improvement. The literature [8] states that university governance based on pluralistic governance and law is becoming the new normal in higher education management.

The new normal university governance will be transformed through philosophy, logic and methodology. The literature [9] explored the application of the balanced scorecard in higher education management, using Indonesian universities as a research subject.

Unlike the above studies, this paper focuses on the key elements of the application of information technology in higher education management from the perspective of Internet informatization. On this basis, the impact of Internet informatization on higher education management is analyzed by comparing the changes in efficiency and fairness before and after the study of university faculties.

## **2. INFORMATIONIZATION OF HIGHER EDUCATION MANAGEMENT**

### **2.1 CHARACTERISTICS OF INTERNET INFORMATIZATION**

The Internet + era advocates the synergistic development of the Internet and the traditional industries of society, through technological innovation of traditional models. The Internet + era advocates the synergistic development of the Internet and traditional social industries, through technological innovation of traditional models, mechanisms, systems and means, so that traditional industries have the characteristics of networking, informatization and intelligence. Internet+ is not a simple superposition of technologies, but a full integration of business values and thinking patterns. According to theoretical research, we can determine the following characteristics of the Internet+ era: First, cross-border integration. Cross-border integration mainly refers to the integration and reshaping, which can make the identity and market positioning of the people undergo profound transformation. Secondly, it is innovation-driven. Innovation-driven is to achieve self-revolution and innovation of traditional industries through Internet thinking.

### **2.2 ESTABLISHMENT OF INFORMATION MANAGEMENT MODE OF HIGHER EDUCATION**

The process of "Internet + education management" is the process of innovation, the process of structural reshaping and form optimization. In this process, education administrators should change the traditional education management concept, optimize the education management mode, and make the education management process more compatible with the basic characteristics of "Internet+", such as "respecting humanity", "reshaping structure", "innovation-driven" and "cross-border integration". The basic characteristics of "Internet+" are "respecting human nature", "reshaping structure", "innovation-driven" and "cross-border integration". It is true that the basic initiative of "Internet + education management" is the full application of computer network information technology, which is the integration of "Internet thinking" in the process of higher education management. However, this educational management innovation is only on the surface, that is, the application of network technology to achieve the innovation of the traditional educational management model. Network elements should be penetrated into different aspects of education management. In terms of education management methods, the traditional form of indoctrination and instruction should be changed, and passive management should be transformed into active guidance. That is, through prevention, analysis and guidance, students with problems should be educated.

### **2.3 CONSTRUCTION OF EVALUATION MODEL OF INFORMATION TECHNOLOGY IN HIGHER EDUCATION MANAGEMENT**

#### **2.3.1 ANALYSIS OF KEY ELEMENTS OF INFORMATION TECHNOLOGY APPLICATION IN HIGHER EDUCATION**

This study used the keywords "informatization" + "evaluation", "informatization" + "application" and "informatization" + "index" to retrieve 634 papers published between 2011

and 2019 from the CNKI journal database and the database of outstanding master's theses, and screen 154 articles about the assessment index of education informatization, including 31 articles on the application of informatization in higher education. By counting, analyzing and summarizing the influencing elements mentioned in the literature and combining the influencing factors of higher education informatization mentioned in the report, the key elements influencing the application of higher education informatization were summarized and counted, and the results are shown in Table 1.

**Table 1.** Key elements of information technology application in higher education

First level factors	Number	Secondary factors	Number
Human Factors	26	Faculty	12
		Students	1
		Administrators	3
Factors of information resources	23	Teaching Resources	5
		Research Resources	13
		Management Information Resources	12
Factors of the system	19	Teaching System	6
		Scientific Research System	12
		Management System	4
		Public Service System	6
Factors of software tools	8	Teaching Tools	14
		Learning Tools	13
		Digital Research Tools	9
Factors of business	12	Teaching Sessions	12
		Scientific Research	5
		Flow of Asian Affairs	7

### 2.3.2 EXPLANATION OF ELEMENTS

The human factors affecting the application of information technology in higher education mainly refer to teachers, students and managers. Teachers and students are the executors and beneficiaries of technology application in teaching, their ability to apply information technology is the prerequisite and guarantee of the development of teaching informatization, and their satisfaction with the application of information technology is an important feedback and reflection of the application of information technology. Only when teachers have good informatization ability can they better integrate information technology with all aspects of teaching and learning, and students can better apply information technology for learning.

The factor of information resources refers to the application of information resources in teaching, scientific research, management and public service, and as an important factor in the assessment of the application level of education informatization, it mainly includes the application of teaching resources, the application of scientific research resources and the application of management information resources. Among them, teaching resources mainly refer to multimedia courseware, online courses, etc. Scientific research resources mainly refer to the digital scientific research resources applied in the process of scientific research development. Management information resources mainly refer to personnel information, student achievement resources, etc.

The system factor here refers to the application of various systems in various businesses

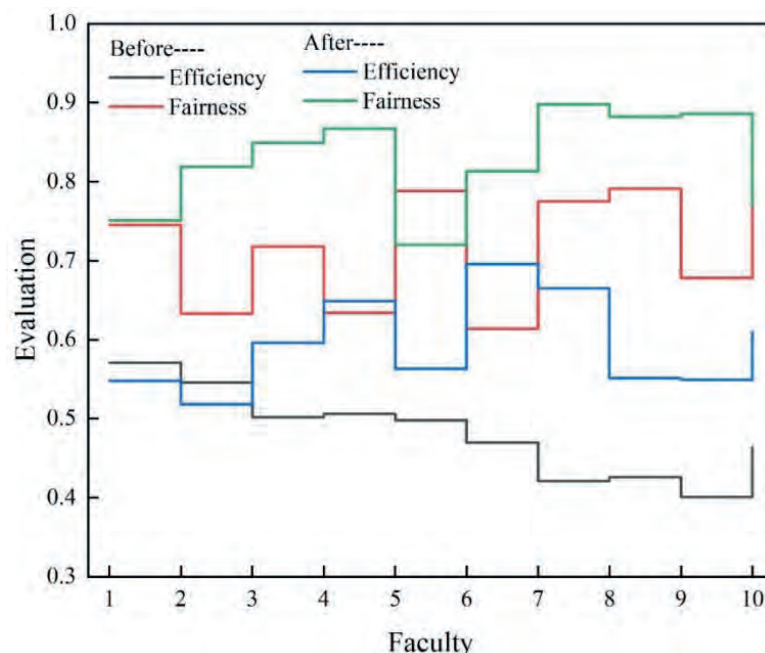


such as teaching and management of the school, including the application of teaching system, the application of research system, the application of information management system, etc. Teaching system mainly refers to the system platform that assists teaching. Scientific research system refers to the system platform that assists scientific research projects, such as scientific research project management system, etc. Management system mainly refers to the system platform used for school affairs management. The public service system refers to the information system for faculty and student services.

### 3. ANALYSIS OF THE IMPACT OF INFORMATION TECHNOLOGY ON HIGHER EDUCATION MANAGEMENT

In this paper, different faculties of colleges and universities were selected as research subjects, and their efficiency and fairness before and after the adoption of information-based management methods were compared and analyzed, and the comparison results are shown in Figure 1. The information-based education management method has improved 23.8% on average in administrative efficiency compared with the traditional mode. Informatized management greatly improves the efficiency of information transmission and effectively saves communication costs. In the era of informatization, most school administration can be handled through the network platform, which leads to a scientific division of school administration resources through the network platform, thus allowing all administration departments to allocate reasonable administration resources.

In terms of fairness, the Internet-based information management has improved by 18.6% compared to the original. This is because the information-based management system can fully disclose the data, making the process transparent and the data-based management effectively avoids the human factor. By introducing information technology, university management workers can then disclose the main contents of management affairs and the way of handling them on the online platform, making the management work open and transparent.



**Figure 1.** Before and after comparison of information management methods

### 4. CONCLUSION

Based on the characteristics of Internet informatization, this paper analyzes the impact of informatization on higher education management in terms of both efficiency and fairness by studying the informatization process of higher education management. The informatization

management mode can reasonably allocate management resources, effectively improve management efficiency, optimize the organizational structure of university management, and make management transparent. With the increasing influence of information technology on people's production and life, reform and innovation of higher education in the era of informationization is the requirement of the times for colleges and universities to carry out sustainable development. Therefore, it is necessary for colleges and universities to explore the management methods of higher education in the information era, determine the management strategies that are more in line with the development of the schools themselves, and apply them effectively in higher education management so as to continuously improve the management level of colleges and universities.

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# A PRACTICAL STUDY ON THE INTEGRATION OF CHINESE TRADITIONAL CULTURE INTO THE TEACHING OF MUSIC AND AESTHETIC EDUCATION IN COLLEGES AND UNIVERSITIES IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper firstly discusses the connotation of music aesthetic education and the function of music aesthetic education teaching in colleges and universities. Then it investigates the current situation of the integration of traditional culture and music aesthetic education teaching in Panzhihua Conservatory of Music by means of questionnaires, and studies the necessity of the integration of traditional culture and music aesthetic education teaching. Finally, the way of integrating music aesthetic education teaching with Chinese traditional culture in colleges and universities was analyzed. In the current situation of integration, close to 50% of teachers think it is necessary to offer traditional culture music teaching, still a higher percentage of teachers (39%) think it is not so urgent, which shows a large difference in the understanding of traditional culture. 42% people think it is not necessary to integrate traditional culture in music teaching, and the percentage of those who do not know is 25%. The teaching of music aesthetic education integrating traditional culture has not attracted enough attention, and the integration path should be innovated in order to adapt to the modern educational needs.

## KEYWORDS

big data; traditional culture; music aesthetic education teaching; integration path; modern education; cultural penetration

## 1. INTRODUCTION

The important role of music aesthetic education in quality education has gradually been recognized by the majority of educators [1]. The essence of aesthetic education is to improve people's aesthetic ability, and excellent music works bring people the feeling of beauty; therefore, music education appears as an important part of aesthetic education in the curriculum system of general education courses in the

talent training program of colleges and universities [2-3]. The literature [4] took music education for non-music majors in colleges and universities as the research object and proposed corresponding countermeasures and suggestions for the implementation of music education. Literature [5] analyzed the current situation of music education in ethnic minority regions and put forward the advantages and problems of implementing music education for ethnic minorities. The literature [6] investigated the current situation of music education pointed out the common problems in the development of public music education in colleges and universities, analyzed the main causes of these problems, and put forward the methods and strategies of using music education to implement aesthetic education, taking into account the new requirements of nurturing people in colleges and universities in the new era.

This paper mainly discusses the connotation of music aesthetic education, the function of aesthetic education teaching and the practical significance of traditional culture infiltration in music teaching. The current situation of the integration of traditional culture and music teaching in Panzhihua Conservatory of Music is investigated by means of questionnaires, as well as the necessity of teaching traditional culture and music aesthetic education is studied. Finally, the ways of transmitting Chinese traditional culture in music aesthetic education teaching in colleges and universities are discussed.

## **2. THE INTEGRATION OF TRADITIONAL CHINESE CULTURE INTO THE TEACHING OF MUSIC AND AESTHETIC EDUCATION IN COLLEGES AND UNIVERSITIES**

### **2.1 THE CONNOTATION OF AESTHETIC EDUCATION IN MUSIC**

Through different combinations of regular musical sounds, music is presented by the human auditory system as a complete artistic image from which emotions are expressed and moods are created, thus reflecting the content of real life and explaining the good wishes of the author. Music education can connect the two different systems of music and education, similar to the bridge and link between the two. Music education in a broad sense can not only integrate elements of intellectual and cultural education and art education, but also reflect ideological and political education and aesthetic education, which is indispensable for the overall development of the individual and is the main form of promoting music and culture and art in society and the state. In general, music education is indispensable for the overall development of the individual, whether it is for the cultivation of students' physical and mental health, artistic and moral qualities, or for the demonstration of the structure of professional musical knowledge, and it has an important role that cannot be ignored.

## 2.2 THE FUNCTION OF MUSIC AESTHETIC EDUCATION TEACHING IN HIGH SCHOOL

Aesthetic education refers to the form of aesthetic education that perfectly shapes the personality of individual college students through the integration of artistic and realistic beauty in the teaching process and scientific teaching methods and means. Undoubtedly, aesthetic education is of great significance to the all-round development of individuals, not only helping students to cultivate qualities of ideological and moral qualities such as beauty of mind and behavior, but also promoting the realization of aesthetic education goals of music education in colleges and universities.

### (1) Highlighting the function of music education to cultivate sentiment

From the essence of education and teaching, the fundamental characteristics of aesthetic education are reflected in its emotion. In the framework of quality education, the role of aesthetic education is mainly reflected through the word emotion. Many educators attach great importance to the role of aesthetic education, and Mr. Wang Guowei once mentioned that aesthetic education can promote the development of an individual's emotions and thus achieve perfection, which shows the important value of aesthetic education advancement. Therefore, the integration of aesthetic education elements in music education can highlight the basic function of music education to cultivate sentiment, and through music education can help students to nurture their sex and express their feelings, and then cultivate noble and pure sentiment, so as to enrich and develop the spiritual realm of college students.

### (2) Embodying the role of music education in beautifying life

College students are in the golden period of life and have abundant emotions. Teachers can present aesthetic elements such as natural beauty, social beauty and artistic beauty through various and diversified teaching methods, so that students can gradually form correct aesthetic concepts in participating in music education, and gradually feel beauty, appreciate beauty and achieve the teaching purpose of expressing and creating beauty through music education under the guidance of teachers. Therefore, the integration of aesthetic education elements in music education in colleges and universities can reflect the role of music education in beautifying life and have a subtle influence on the beauty of college students' mind.

### (3) Reflecting the value of music education to enhance aesthetics

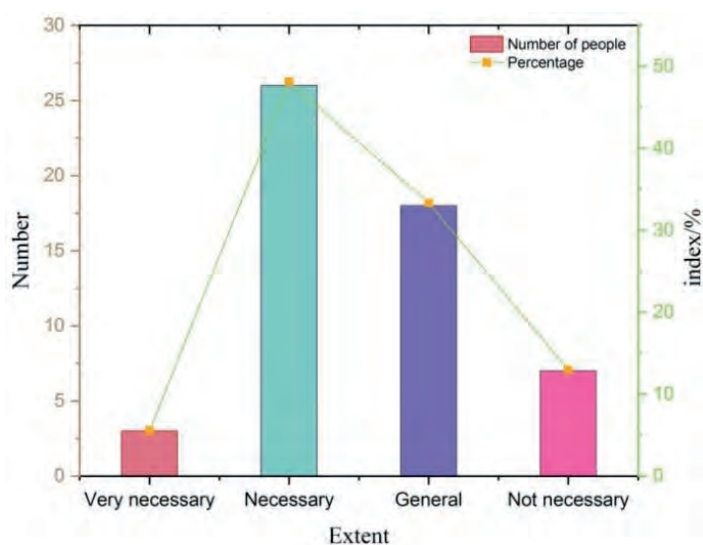
Aesthetic education is a form of reflecting higher spiritual activities, in which individuals can feel the value of beauty and bring their subjective consciousness into full play when they participate in aesthetic education activities. For college students, whether or not they have built a correct aesthetic consciousness will affect their basic

judgment of right and wrong, good and evil, beauty and ugliness. Therefore, the integration of music aesthetic elements in college music education can reflect the important value of music education in enhancing aesthetics. In practice, the new model of aesthetic education adopted by teachers, which integrates online and offline, can not only help students gradually build a correct aesthetic consciousness, but also help them shape a perfect personality quality, which ultimately manifests the ultimate goal of music education.

### 3 THE CURRENT SITUATION OF INTEGRATING TRADITIONAL CULTURE AND MUSIC AESTHETIC EDUCATION TEACHING

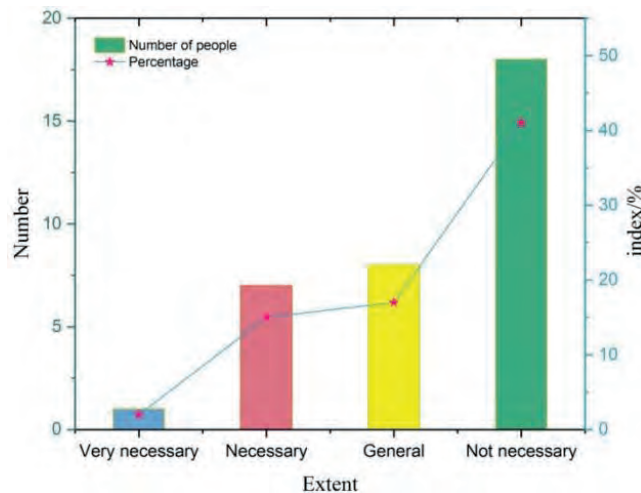
In order to investigate the awareness of traditional culture and its integration with the teaching of music and aesthetic education in colleges and universities, a total of 50 music teachers from Panzhihua Conservatory of Music were selected as interview respondents for this study, and 90 students from different grades and classes were selected as questionnaire respondents. The questionnaires were filled out by the respondents themselves. A total of 50 questionnaires were distributed by the teachers, with 100% recovery rate and 100% efficiency; 90 questionnaires were distributed by the students, with 84 recovered, 93% efficiency and valid data.

In the survey on teachers' perception of traditional culture and its integration with music teaching, the results of the survey on whether it is necessary to offer courses related to traditional culture show that nearly half of the teachers think it is necessary, and still a higher percentage of teachers (39%) think it is not that urgent, which shows that there is a large difference in the perception of traditional culture, which may be related to the educational environment and the importance of traditional culture in schools. Figure 1 shows the survey of whether it is necessary to offer traditional culture courses.



**Figure 1** Survey on the need for traditional culture courses

In the study of whether it is necessary to integrate traditional culture in music teaching, the percentage of those who think it is not necessary is 42%, and the percentage of those who do not understand is 25%, which shows that most teachers do not pay enough attention to or even do not understand traditional culture. Figure 2 shows the necessity of integrating traditional culture into music teaching.



**Figure 2** The need to integrate traditional culture in music teaching

#### **4. WAYS TO PASS ON TRADITIONAL CHINESE CULTURE IN THE TEACHING OF MUSIC AND AESTHETIC EDUCATION IN COLLEGES AND UNIVERSITIES**

##### **(1) Appreciating traditional culture in song teaching**

Chinese traditional culture itself has a very close relationship with songs. The ancient people loved songs and dances, and they liked to express their emotions through music whether they were at work or on a journey, for example, many poems in the Book of Songs are depictions of the daily life of the ancient people. Therefore, in order to let students fully experience the charm of traditional culture, music teachers can take advantage of the music discipline to guide students to learn some of the more famous songs. This way of learning will not only make students feel that music lessons are very rich and interesting, but also learn the traditional culture that is rich in them, which is conducive to the cultivation of students' excellent qualities.

##### **(2) Perceiving traditional culture in appreciation teaching**

In the music courses of colleges and universities, many ethnic songs are selected, and when enjoying these songs, students can deeply perceive the charm of traditional culture. For example, when learning the Tibetan song "The Ballad of Lhasa", in order to make students sing the song well with emotion, students can first feel the ethnic

orchestral music by listening to "Beijing Joyful News to the Border Village", so that they can experience the ethnic styles of Miao and Yi. At the end of the lesson, students can talk about the background of the song and their understanding of the emotion of the song to further deepen their understanding of traditional culture.

### (3) Inherit traditional culture in teaching musical instruments

Since China has been a great nation of rituals and music since ancient times, music teachers can make full use of Chinese national musical instruments when motivating students to learn traditional culture. Music teachers can actively carry out activities to teach students the more distinctive national musical instruments in the actual teaching process. For example, starting from elementary school, students can choose their favorite musical instruments such as gourd silk, flute, guzheng, etc. In this way, they can ensure that each student can gradually deepen their understanding of the excellent Chinese traditional music culture and thus stimulate their love for traditional music culture.

## 5. CONCLUSION

This paper mainly studies traditional culture, the basic connotation of music aesthetic education teaching in colleges and universities, explores the current situation of integration of traditional culture and music teaching, as well as studies the way to inherit Chinese traditional culture in music aesthetic education teaching in colleges and universities. The following conclusions are mainly drawn.

1. In the current situation of integration of traditional culture and music teaching, the results of the survey on whether it is necessary to offer courses related to traditional culture show that nearly half of the teachers think it is necessary, and still a higher percentage of teachers (39%) think it is not that urgent, which shows that there are large differences in the understanding of traditional culture. In the research of whether it is necessary to integrate traditional culture in music teaching, the percentage of those who think it is not necessary is 42%, and the percentage of those who do not know is 25%.

2. Among the ways to inherit Chinese traditional culture in the teaching of music aesthetic education in colleges and universities, the main ways are to appreciate traditional culture in song teaching, to perceive traditional culture in appreciation teaching, and to inherit traditional culture in musical instrument teaching.

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# THE APPLICATION OF TRADITIONAL SYMBOLS IN INTERIOR DESIGN WITH VIRTUAL REALITY TECHNOLOGY

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## ABSTRACT

This paper explores the development trend of virtual reality technology and analyzes the unique existence of the main symbolic elements in Chinese interior design from the perspective of semiotics, elaborates their role and significance in modern interior design, and focuses on the methods that should be used to deepen the study of traditional Chinese interior design elements with ornamental symbols, decorative symbols, Chinese characters and calligraphic art symbols, religious concept symbols, and traditional symbols of folk art. The study of traditional Chinese interior design elements should be deepened, so that they can become effective design languages, tools and entry points for grasping traditional Chinese culture and cultural lineage, and also provide directions for thinking about the organic combination of traditional and modern design for modern Chinese interior design. In 2019, the development of the integration of virtual reality technology and interior design reached its peak, with the index reaching 32 in March, an increase of 2 over 2018, and the lowest point in May, with the integration index at 10 in 2018 and 8 in 2019. The integration of traditional cultural symbols into interior design can reflect distinctive Chinese characteristics, so the research in this paper is of important significance.

## KEYWORDS

virtual reality technology; traditional symbols; interior design; fusion development; design language; design elements

## 1. INTRODUCTION

Traditional symbols are formed by the progressive summation and continuous accumulation of human beings in the history of speech and transmission thus [1]. Traditional cultural and artistic forms, for the design development culture, are the results of civilization accumulated in various aspects of life and production in a long history [2-3]. The literature [4] suggests that we should not be obsessed with the

transposition of traditional architectural decorative symbols, believing that as long as the traditional symbols are brought to play a role in the transmission of culture. The literature [5] proposes to study traditional Chinese architectural decorative symbols in the field of interior design today with a semiotic analysis.

This paper first introduces the development and characteristics of virtual reality technology and studies the integration of virtual reality technology and interior design, then explores the influence of traditional cultural symbols on modern interior design, and analyzes the ways of applying traditional Chinese symbols in modern interior design, mainly using ornamental symbols, ancient architectural decorative symbols, Chinese characters and calligraphic art symbols, religious concept symbols, and traditional symbols of folk art In the interior design.

## **2. VIRTUAL REALITY TECHNOLOGY**

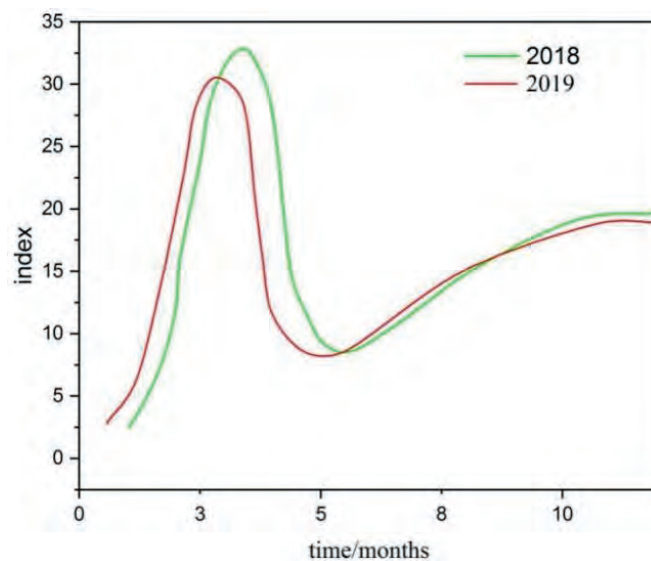
Virtual reality technology is an important direction of simulation technology, which is a collection of simulation technology and computer graphics, human-machine interface technology, multimedia technology, sensing technology, network technology, and other technologies. It is a challenging cross-technology frontier discipline and research field. Virtual reality technology mainly includes simulation environment, perception, natural skills and sensing devices. The simulated environment is a computer-generated, real-time dynamic three-dimensional realistic image. Perception means that the ideal VR should have all the perceptions that people have. In addition to the visual perception generated by computer graphics technology, there are auditory, tactile, force, motion and other perceptions, and even smell and taste, also known as multi-perception. Natural skills refer to human head rotation, eye, hand gestures, or other human behavioral movements, which are processed by computers to match the participant's actions and respond to the user's input in real time and feedback to each of the user's five senses. Sensing devices refer to three-dimensional interaction devices.

### **2.1. FEATURES OF VIRTUAL REALITY TECHNOLOGY**

Virtual reality technology has the characteristics of immersion (resonating with human perception system and thinking as in the real world), interactivity (people enter the virtual space and interact with the surrounding environment), multi-perception (including visual, auditory, haptic, motion and other perception methods), conceptualization (in the virtual space can establish scenes that do not exist in reality can spread human thinking), autonomy (in the virtual space objects can move according to the laws of physics).

## 2.2 THE INTEGRATION OF VIRTUAL REALITY TECHNOLOGY AND INTERIOR DESIGN

Virtual reality technology experienced many setbacks when it was first promoted, especially in the mid-1990s, when the public was curious and expectant about this new thing, but the immaturity of the technology at that time led to bulky equipment, low imaging resolution and long delays, which limited its acceptance and application by the public. The speed of maturity evolution of various new technologies and the time required to reach maturity are divided into five stages, which are the promotion period of technology birth, the peak of excessive expectations, the trough period of bubbling, the bright period of steady climbing, and the peak period of substantial production, from 2013 to 2018 the trough period of bubbling of virtual reality technology is gradually moving towards the period of steady climbing, and in 2018 it is no longer classified as an emerging technology, which also indicates that In 2018, virtual reality technology has become a mature high-tech. Figure 1 shows the integration of virtual reality technology and interior design, and it can be seen that the integration in 2018 is better than that in 2019.



**Figure 1** Integration of virtual reality technology with interior design

## 3. THE INFLUENCE OF TRADITIONAL CULTURAL SYMBOLS ON MODERN INTERIOR DESIGN

Cultural symbols are the essence of culture accumulated through a long period of washing and precipitation, and they are originally complete systems that must respect the rules of social cognition in order to convey information accurately when they are actually applied. Traditional culture has obvious inheritance, and traditional cultural symbols are very important components of national culture, which are expressed by using graphics, colors, words and other traditional cultural connotations.

Cultural symbols can be penetrated into various products to give full play to the value of traditional culture, and through these products to let people recognize and identify with traditional culture. Traditional cultural symbols have been used in interior design since ancient times, with the Forbidden City and the Summer Palace being typical examples. The application of traditional cultural symbols in modern interior design is not only reflected in the level of interior decoration, but also in the style and cultural connotation of the space. In essence, interior design is a combination of social culture, and whichever design style it is, it is closely related to local cultural customs and can also showcase local folklore. At the same time, it can also reveal the Chinese style of the interior space and present a diversity of styles in combination with regional cultural differences. People in the new era, the interior design is not only the functional level of space requirements, but also emphasize the spiritual enjoyment, pay attention to the layout and decoration of space can make themselves feel happy. After years of innovation, traditional cultural symbols can now be flexibly applied in a variety of design styles without any sense of incongruity. The application of cultural symbols as independent elements in interior design can achieve better aesthetic effects and also make interior design have richer cultural connotations to meet people's aesthetic needs.

#### **4. APPLICATION OF TRADITIONAL CHINESE SYMBOLS IN MODERN INTERIOR DESIGN**

##### **4.1 APPLICATION OF ORNAMENTAL SYMBOLS**

Since ancient times there have been techniques to apply ornamental symbols to pottery, dyeing and weaving, furniture, painting and folk art. However, as interior designers, we cannot simply change some ornaments from patterns to patterns on decorations, but should also design them into furniture and decorative elements in our life, such as furniture design is to transform some patterns of Chinese ornaments into three-dimensional forms to make furniture with Chinese characteristics. In the application of traditional ornamentation symbols are first derived and then integrated into modern interior design.

##### **4.2 APPLICATION OF DECORATIVE SYMBOLS IN ANCIENT ARCHITECTURE**

Ancient Chinese architecture is known for its mortise and tenon building elements, and people in the Ming and Qing dynasties used the structure of architecture to create Ming and Qing furniture with Chinese characteristics. In modern times, we should summarize the architectural features with Chinese characteristics and make them not only into furniture, but also into our own decorative walls, furniture, lamps and other interior decoration components. For example, we can transform the outline of Jiangnan's architecture into graphics on our decorative walls, make the architectural

elements into graphics for lampshade ornaments to create "Chinese" lamps and lanterns, and also transform the carved beams and painted patterns into symbols for our design to be applied in every corner of interior design, so that the design is not only in color and furniture We can make the design not only present the "Chinese" style in color and furniture, but also make it have the culture of a certain historical period interspersed in the beginning and end, making the design more vital and historical.

#### **4.3 THE APPLICATION OF CHINESE CHARACTERS AND CALLIGRAPHIC ART SYMBOLS**

Words in interior design often play the role of the finishing touch, a pair of calligraphy and painting can reflect the owner's cultural literacy, a calligraphy and painting can change the flavor of the space, a calligraphy and painting can enhance the grade of the space. At the same time the printing technology of words - movable type printing technology is the most Chinese characteristics of the written symbols, Nanjing Audit Institute Pukou campus of the audit culture and education museum using movable type printing template enlargement as an image wall, not only to present to visitors the ancient history of Chinese printing, but also with this technology template abstract for the uneven wall with The light and darkness of the lighting enhance the sense of space.

#### **4.4 APPLICATION OF RELIGIOUS CONCEPT SYMBOLS**

By abstracting the religious magic tools or culture or legends into symbols, we can apply these symbols to interior design, with these symbols we can not only design Buddhist space with Zen, Christianity with ethereal, Catholic space with mythological colors. To create a religious space with Chinese characteristics, it is necessary to integrate religious symbols with Chinese characteristics into our design, abstracting religious ideas and magic tools with Chinese characteristics into symbols and designing them as interior design components or ornaments to express the interior design space with Chinese religion, and we can even add symbols with historical characteristics to create a religious space to make the interior design with a sense of history.

#### **4.5 APPLICATION OF TRADITIONAL SYMBOLS OF FOLK ART**

In China, a country with a long history, folk art has the same history as the country, such as paper cutting, embroidery, shadow play, New Year painting and other folk art.

For example, we can make a common wall between the living room and the dining room in interior design into a hollowed-out wall according to the form of folk art, exaggerating or moderately deforming them to express the user's preference, so that

the wall is ventilated and beautiful, and at the same time has the unique properties of each space. This way, the wall is ventilated and beautiful, but also has the unique properties of each space, so that the design is not repeated and cannot be copied, creating a Chinese wall with Chinese characteristics. In the same way we can use it in creating sculpted table tops, hollowed out chair backs, light and shadow staggered lighting, etc., so that the space is reshaped in a fun way.

## 5. CONCLUSION

This paper mainly explores the integration of virtual reality technology with interior design and the application of traditional Chinese symbols in modern interior design. The following conclusions are mainly drawn.

The modern interior design Chinese traditional symbols are applied in the following ways: the use of ornamental symbols, ancient architectural decorative symbols, Chinese characters and calligraphic art symbols, religious concept symbols, and the use of folk art traditional symbols.

In the case of the integration of virtual reality technology and interior design, the integration was better in 2018 than in 2019, probably because it was influenced by the epidemic situation in 2019, and the use of virtual reality technology in interior design was not as good as in previous years.

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# THE CURRENT SITUATION AND OPTIMIZATION STRATEGIES OF CULTURE COURSES FOR ENGLISH MAJORS IN UNIVERSITIES IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper firstly studies the current situation of offering English major culture courses in colleges and universities, and explores the current teaching level of English culture courses in colleges and universities, the teaching level of teachers, the acceptance level of students, and the satisfaction of teaching. Then the problems of teaching English major culture courses are discussed, mainly the classroom teaching mode is old and monotonous, and the classroom is partial to theory and light on practice. Finally, the teaching optimization measures of innovating teaching contents and building faculty are proposed. In terms of teaching level in colleges and universities, the worst performance is in stimulating students' deep thinking and examination strategies, with an approval rating of only 44.9%, and adapting to students' acceptance, interaction with students and homework feedback, with an approval rating of 60.4%. There are still many problems in the current college English major culture course that need to be optimized and upgraded for the course teaching.

## KEYWORDS

big data; culture courses; optimization strategies; teaching innovation; English majors; teaching level

## 1. INTRODUCTION

With the ever-changing development of the world economy, English education professionals are increasingly valued by society [1]. But the relatively backward talent training mode is increasingly difficult to meet the needs of society [2-3]. It is practical



to improve the curriculum system to cultivate useful talents needed by the society [4]. The literature [5] points out that current junior high school English teaching places too much emphasis on written test scores and ignores the applicability of language. The literature [6] points out that cooperative learning in junior high school English classrooms is a formality, and some English classes appear from the surface to have high student motivation, active thinking, and many forms of activities, but in fact these activities are not integrated into the classroom, but are instead purely for the sake of activities, and cannot achieve teaching effects that meet expectations through truly effective activities.

This paper explores the current level of English teaching in colleges and universities, examining and evaluating aspects such as teacher recognition, satisfaction with teaching methods, and student adaptation. The problems of English teaching are discussed as well as the proposed measures to optimize the English education curriculum.

## **2. THE CURRENT SITUATION OF OFFERING CULTURE COURSES FOR ENGLISH MAJORS IN COLLEGES AND UNIVERSITIES**

### **(1) Teaching Levels**

In order to study the current teaching level of culture courses of university teachers, this paper conducted a survey on the teaching of courses to students of Sichuan Foreign Language. A total of 100 questionnaires were distributed, and 90 were returned. This paper measured the teachers' professional level by the level of "the teachers' English teaching process is standard and their expressions are fluent and natural". The survey found that 60% of the students who chose the level of conformity and very conformity indicated that the teachers' teaching level was high. The percentage of students who did not meet and did not meet very well was 18%, indicating that the teachers' English proficiency was low. The remaining nearly a quarter (26.9%) of the students thought that the teachers' English proficiency was average. This shows that the teaching level varies widely among teachers, and most of them are able to teach competently, but there are still a significant proportion of teachers who are not.

### **(2) Professional level**

This study measured teachers' professionalism by the degree to which the teacher's content is his/her area of expertise. The survey found that 82.6% of the students approved of the teacher's professionalism, while only 8.2% disapproved, and the remaining 17.2% thought the teacher's professionalism was average. It can be seen that the professional level of Cheng's lecturers is generally high, which is

consistent with the professional orientation of research universities.

### (3) Teaching methods

English proficiency and professionalism are concentrated on one actor, but teaching is a collaborative activity between teachers and students, involving two actors, which makes the evaluation of teaching level more complicated. Combined with related theories, this paper measures teachers' teaching level in three dimensions: systematic relevance, student-centeredness and stimulating deep learning. Table 1 shows the teaching level measurement question stems and results.

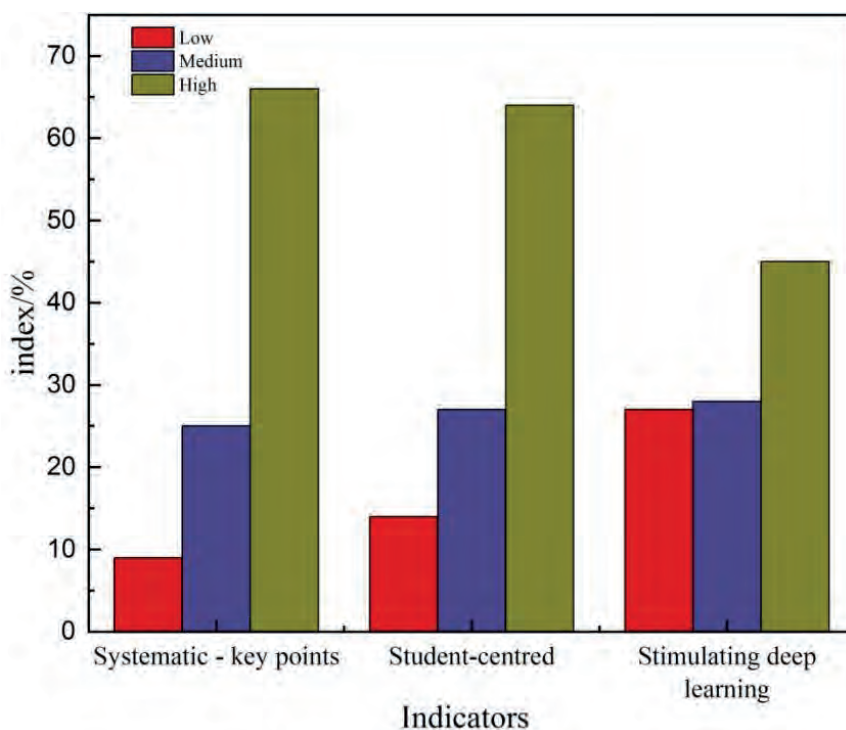
**Table 1** Teaching level measurement question stems and results

	Question stem	Mean value	Standard deviation
Systematic - Focus	The content of the teacher's lectures is well structured and well connected	4.88	964
	The teacher's presentation of the course content was focused and clear	384	940
	The teacher explained the difficult points very well.	4.75	976
Student-centred	The pace of the lessons was adapted to our needs	377	949
	The teacher had frequent interaction with the students in class.	4.71	1032
	Feedback on assignments was timely and effective	4.57	994
Stimulating deep learning	The teacher often stimulates us to think deeply	353	1047
	The exams are mainly memory based (reverse marking)	4.88	964

The survey results showed that most students recognized the teachers' teaching level, and the teachers performed the best in terms of systematic teaching and explanation of important and difficult points, with an approval rating of 68.2%. This was followed by adapting to student acceptance, interaction with students and feedback on assignments, with an approval rating of 64.4%. The worst performance was in stimulating students' deep thinking and test-taking strategies, with an approval rating of 45.9%. In other words, the teachers' teaching level decreases one by one on systemic-heavy, student-centered, and stimulating deep learning. Overall, the percentage of higher teaching level was 56.5% and the percentage of lower was 18.2%.

The results showed that teachers performed best on the foundational teaching competency of systematic repertoire, but only with 67.2% approval. Several studies have found a decrease in classroom teacher-student interaction. Our survey partially confirms this finding, but there are significant differences between teachers' and students' performance on teacher-student interactions. The survey found that ". The

survey found that "...the teacher has frequent interactions with students in class" with 61.0% approval, while "I often speak up in class" with only 18.9% approval. This indicates that teachers play a leading role in teacher-student interaction, while students are more passive, and that most English classes are still "teacher-centered" rather than "student-centered". Teachers' assessment strategies scored the lowest among the evaluation indicators. The mean score for "the course exam is mainly about memorization" was only 2.96 with a standard deviation of 3.158. 38.1% of the students did not meet the criteria, 38.2% met the criteria, and 27.7% of the students did not have a clear opinion. It is evident that there are significant differences in evaluation strategies among teachers, with more than one-third of them using an evaluation strategy that primarily examines memory. Teachers' assessment styles will influence students' learning strategies. Teachers who examine primarily lower-order cognitive skills such as memorization, recitation, discrimination, and citation on tests will have students choose shallow learning strategies accordingly. Conversely, teachers who examine students' higher-order cognitive abilities such as analysis, interpretation, argumentation, and comparison will have students choose deep learning strategies accordingly. In this sense, the more teachers focus on examining students' memory, the lower their instructional level is. Figure 1 shows the three-dimensional results of teaching level.



**Figure 1** Three-dimensional results of teaching levels

### 3 PROBLEMS IN TEACHING CULTURE COURSES FOR ENGLISH MAJORS

#### (1) Classroom teaching mode is old and monotonous

As an emerging course, the characteristics of the culture course are not fully revealed in the course teaching, often attached to other professional disciplines, not fully combined with their own vocational, cross-cutting and other characteristics to carry out. And the course is mostly set up as an elective course, which not only shows that the school does not pay enough attention to the culture course, but also the students ignore it because it is an elective course. Moreover, the overall teaching mode of the classroom is mostly "teacher" or "subject" oriented, without taking into account the future cultural level students need to demonstrate in the culture course, which makes the culture classroom teaching monotonous and boring in an invisible way. This inevitably makes culture classroom teaching monotonous and boring, and students cannot pay attention to it, and their learning initiative cannot be effectively stimulated.

#### (2) Theory over practice

The key to cultural education is to help students realize the "unity of knowledge and practice", which is also the concept that needs to be strictly followed in teaching cultural courses. However, at the present stage, most institutions tend to overdo it in the teaching process, that is, practice for practice's sake. On the surface, both teachers and students are performing "practice", teachers set many practical activities for students, and students work hard to complete "practice reports". It seems to be interlocking, but the teachers do not pay attention to the specific process and details of the practice in real time and give guidance, and the students are mostly formal, only looking at whether the written report is beautiful or not.

### **4 . OPTIMIZATION OF ENGLISH EDUCATION MAJOR CURRICULUM**

#### (1) Formulation of the objectives of the cultural quality education program

In the overall design of the cultural quality education curriculum, the determination of the objectives of the curriculum is the most important stage, and the realization of the three stages of curriculum content, curriculum implementation, and curriculum evaluation depends, to a large extent, on the determination of the objectives. Through the previous analysis, we can clearly see the influence of curriculum goals on curriculum content, curriculum implementation, and curriculum evaluation. Moreover, the stages following the curriculum objectives can be seen as means to achieve the curriculum objectives.

#### (2) Enhancing the depth and breadth of curriculum content

The focus of the course content of cultural quality education should be on

cultivating and improving the ability and quality of college students. Compared with the "mastery of systematic knowledge", the deeper learning objectives such as "intellectual skills" and "broad comprehension of concepts and values" should be achieved, and the learning activities of college students should be more demanding. The students' learning activities have higher requirements. The emphasis on the depth and breadth of the content of the cultural education courses does not require that the courses be based on cutting-edge, cutting-edge scientific research. On the contrary, as mentioned above, the principle of "basic, classical and comprehensive" should be implemented in the selection of course contents, and the knowledge and principles of the subject system should not be the main basis for selection. Knowledge is the basis for the formation of abilities and qualities, but knowledge is not equal to abilities and qualities. "The formation of abilities and qualities requires students to experience and understand the logic behind the hidden knowledge.

## 5. CONCLUSION

This paper mainly studies the status of English major culture courses and teachers' teaching level in colleges and universities, explores the problems in teaching English major culture courses, and proposes reformative measures. The main conclusions are as follows.

Teachers performed the best in terms of systematicity of lectures and explanation of important and difficult points, with an approval rating of 68.2%. This was followed by adapting to students' receptiveness, interaction with students, and feedback on assignments, with an approval rating of 64.4%. The worst performance was in stimulating students' deep thinking and examination strategies, with an approval rating of 45.9%.

The main problems are: the classroom teaching mode is old and monotonous, and teaching is theoretical and light on practice. The main measures are to formulate the objectives of the cultural quality education curriculum and strengthen the depth and breadth of the curriculum content.

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# A STUDY OF HIGHER VOCATIONAL SOCIAL STUDIES STUDENTS' LEARNING ENGAGEMENT IN THE CONTEXT OF MILLION-DOLLAR EXPANSION-A CONSTRUCT AND TEST OF A MULTIPLE CHAIN MEDIATION MODEL

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## **ABSTRACT**

This paper uses path coefficients to generate direct learning effects through mediating effects through a multiple chain mediation model. The differentiated needs and student service system management are taken as a starting point and then explored for students' academic emotional behavior. The results show that the correlation coefficient between student training goals and major settings is 0.864, the significance probability of the test is  $0.000 < 0.01$ , and the mediating effect accounts for 22.08% of the total effect. Thus, it can be seen that the multiple chain mediation model has guiding significance for developing pedagogical research in higher education and helping students to improve their academic performance.

## **KEYWORDS**

Multiple chain intermediation; Path coefficient; Intermediation effect; Differentiated demand; Probability of significance

## **1. INTRODUCTION**

With the economic development and industrial transformation and upgrading, industry enterprises have higher and higher requirements for the comprehensive quality of workers, and higher vocational colleges and universities assume the responsibility of cultivating high-quality technical skills talents for the society. The "million expansion" of higher vocational institutions plays an important role in improving the quality of society, expanding the supply of technical skills talents, and solving the structural contradiction between supply and demand of technical skills talents, which is urgently needed by society [1-3]. To a certain extent, the technical skilled talents cultivated by the "million expansion" can meet the requirements of industrial restructuring and technological upgrading, thus promoting the development of social economy [4-5].

The "one million expansion" is an important task of the times to supplement the national shortage of high-quality technical and skilled talents, protect people's livelihood and stabilize employment, promote industrial upgrading and promote social and economic development. It is important for higher education institutions to deepen the reform of teaching, talent cultivation, and reform for the "million expansion" students to achieve the connotative

development of higher education. The main objective of the study in the literature [6] was to clarify which aspects of blended learning could improve students' knowledge, as measured by their final course grades. Principal component analysis and hierarchical clustering of variables were used to extract components describing the blended learning dimensions and to represent the explanatory variables in a multiple regression model with students' final grades as the dependent variable. The literature [7] identified group moderation as an important factor influencing student performance in project-based learning. Students who learn through facilitation mechanisms exhibit more positive learning behaviors. Integrating group regulation facilitation methods can be an effective means of improving student learning performance. Improving students' active regulatory learning behaviors warrants an in-depth study of students' regulatory learning behaviors in collaborative learning activities. To sum up, the research on student learning is still at the primary stage and does not combine the current characteristics of the development of higher vocational social recruitment students to propose new methods and strategies to adapt to the learning of single-college students.

Based on this, this paper designs a multiple chain mediation model in the context of million expansion. Firstly, the model is used to explore the factors influencing the learning commitment of senior social recruitment students, and the mediating effect is used to explore students' academic emotions from differentiated needs and student service system management. Secondly, in this process, the higher vocational students continuously strengthen and improve the management of learning service system, and finally, the model is proved to be effective in improving the enrollment rate of higher vocational social recruitment students' learning through experiments.

## **2. MILLION EXPANSION BACKGROUND OF HIGHER VOCATIONAL STUDENTS LEARNING INPUT**

### **2.1 STRENGTHEN SUPPORT FOR LEARNING SERVICE SYSTEM MANAGEMENT**

The functional theory of management proposes that the four basic functions of management include planning, organizing, leading, and controlling. The efficacy of management is reflected in whether academic support and non-student support can adequately and dynamically meet the differentiated needs of students. In order to guarantee the professional learning of higher education students in the context of millions of expansions, higher education institutions must establish a strong learning support service system [8-9]. First of all, the party and government leaders of higher education institutions must have the consciousness of serving students, and at the same time, they should be deeply familiar with the needs of diversified higher education students, and they should strengthen the training of learning support service providers to enhance their service consciousness and service skills. Management regulations and systems for student support services should be formulated so that managers of each functional department have standards to follow. Finally the learning support services for higher education students should be open and dynamic.

### **2.2 LEARNING ACADEMIC EMOTIONAL BEHAVIOR EXPLORATION**

Academic emotions are the various emotions that students experience in various learning situations such as classroom, extracurricular, and examinations, and can be classified into four types according to their structure-positive high arousal, positive low arousal, negative high arousal, and negative low arousal [10]. Self-efficacy is a subjective feeling of one's own abilities that affects an individual's regulation of his or her motivation, thinking, actions, and emotions. Self-efficacy positively predicts positive academic mood and negatively predicts negative academic mood. There is a significant positive correlation between positive academic mood and academic self-efficacy, a significant negative correlation between



negative low arousal academic mood and academic self-efficacy, and the dimensions of academic mood partially mediate the relationship between academic self-efficacy and academic adjustment.

### 2.3 CONSTRUCT OF MULTIPLE CHAIN INTERMEDIARY MODEL

The multiple mediator model containing only one independent variable and one dependent variable is the basic unit of multiple mediator effect analysis, on which the more complex multivariate multiple mediator model is developed. Multiple mediating variables exhibit sequential characteristics and form a chain of mediators. A multiple chain mediation model is one in which multiple mediating variables form a chain of mediators and act sequentially between the independent and dependent variables. In this paper, we construct a multiple-chain mediation model, which includes the learning mediating variables of higher vocational social recruitment and generates direct learning effects through the mediation effects of path learning coefficients.

## 3. ANALYSIS OF LEARNING OUTCOME TEST FOR HIGHER EDUCATION STUDENTS

### 3.1 CORRELATION ANALYSIS OF THE DIMENSIONS OF STUDENT DEVELOPMENT

In this paper, under the background of million expansion, we study the learning of social recruitment students in colleges and universities, and design a multiple chain mediation model to explore the correlation between talent training and training objectives, professional settings, curriculum, teaching content and methods, faculty and training evaluation through correlation analysis of each dimension of the questionnaire, and the correlation analysis of each dimension of student training is shown in Table 1.

**Table 1.** Correlation Analysis of the Dimensions of Student Development

	Training Objectives	Professional Settings	Curriculum	Teaching Content Methodology
Course Curriculum	0.856**	0.834**		
Teaching Content Methodology	0.838**	0.836**	0.853**	
Faculty Members	0.849**	0.845**	0.860**	
Training Evaluation	0.826**	0.846**	0.786**	0.839**

As can be seen from Table 1, the correlation coefficients of each dimension range from 0.782 to 0.866. The correlation coefficient between training objectives and professional settings is 0.864, the probability of significance of t-test is  $0.000 < 0.01$ , and the absolute coefficient value between the two is 0.746. The correlation coefficient between training objectives and teaching contents and methods is 0.831, the probability of significance of t-test is The absolute coefficient between the two is 0.691, which indicates that the higher vocational students are trained according to the principle of categorization, and the students are provided with targeted and personalized education to help expand the enrollment and improve the learning efficiency.

### 3.2 MEDIATING EFFECT TEST ANALYSIS

To analyze in depth the role of student academic emotion and academic self-efficacy on academic adaptation. The mediating role of academic emotion was examined by stratified regression analysis according to the multiple chain mediation model, and the specific data are shown in Table 2.

**Table 2.** Hierarchical Regression for Intermediate Effects Test

Access Steps	Independent Variable	Dependent Variable	Adjusted R2	F	$\beta$
First Layer	Sense of Efficacy	Learning to Adapt	0.645	1678.224***	0.859
Second Layer	Sense of Efficacy	Positive High Arousal	0.554	1256.759***	0.752
		Negative High Arousal	0.589	79.056***	-0.275
Third Layer	Positive High Arousal	Learning to Adapt	0.187	456.842***	0.608

As shown in Table 2, when the 4 dimensions of academic emotion entered the equation, self-efficacy was a significant predictor of learning adaptation ( $\beta=0.607$ ,  $p<0.001$ ), the mediating effect accounted for 22.08% of the total effect, and the mediating effect explained 20.50% of the variance variance of the dependent variable (learning adaptation). It indicates that the use of multiple chained mediation model for higher vocational social studies students learning allows students to become autonomous learners with high self-efficacy, possess positive emotions and better adapt to their academic life.

#### 4. CONCLUSION

In this paper, we actively explore the study of higher vocational social studies students in the context of the million expansion. In the process of exploration, a multiple chain mediation model is designed, and the feasibility of the model is verified by the multiple chain mediation model and through the analysis of experimental results. The results showed that the correlation coefficient between student training objectives and professional settings was 0.864, the significance probability of the test was  $0.000<0.01$ , and the mediation effect accounted for 22.08% of the total effect. It indicates that the multiple chain mediation model plays a positive role in the teaching research of higher education and helps students improve their academic performance.

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# DIGITAL INTELLIGENT MANAGEMENT PLATFORM FOR HIGH-RISE BUILDING CONSTRUCTION BASED ON BIM TECHNOLOGY

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## **ABSTRACT**

This paper firstly introduces the application method of BIM technology to describe the building through 3D model and to design, purchase, construct and maintain the data in engineering. Then the six modules of digital intelligent management platform are elaborated, including intelligent water and electricity management module, dust and noise monitoring module, solid waste management module, etc. Finally, the intelligent management process of building construction component progress is discussed and the application effect of intelligent management method of high-rise building construction using BIM technology is analyzed. In terms of the application effect, the project quality pass rate before application is basically about 40%, while the project pass rate after applying BIM technology increases month by month, basically around 90%, which is 50% higher. BIM technology can well improve the efficiency and quality of high-rise building construction.

## **KEYWORDS**

BIM technology; high-rise building construction; digitalization; intelligent management platform; project quality

## **1. INTRODUCTION**

With the progress of science and technology and the development of the times, building information modeling technology has a broad application prospect in the construction field [1-2]. At present, the application of BIM technology in China's construction industry is at the initial stage [3-4]. Literature [5] proposed that the information model in the design phase cannot be effectively transferred to the construction phase, which is a key factor hindering the development of BIM in China at present, so there is an urgent need for the national preparation of BIM standards to better coordinate the relationship between various phases and upstream and downstream. Literature [6] analyzed the current situation of BIM technology application in the construction industry and summarized how to apply BIM technology in the whole process of the project to improve productivity. The literature [7] constructed an information model integration framework system covering mainly the building and structural design stages, which can initially realize the integration of building and structural model information and lay a technical foundation for the development of the next-generation construction engineering software system based on BIM technology.

This paper firstly studies the method of using BIM technology to describe the building through 3D model, which also contains in engineering design data, procurement data, construction data, maintenance data, etc., thus constituting a complete engineering dynamic data chain. Then the six modules of digital intelligent management platform are introduced, including intelligent water and electricity management module, dust and noise monitoring module, dust monitoring and automatic spraying module and solid waste management module. Finally, the process and application effect of the digital intelligent management platform system are analyzed.

## **2. BIM TECHNOLOGY THEORY RESEARCH**

### **2.1 BASIC CONCEPT OF BIM TECHNOLOGY**

BIM is called Building Information Modeling, and the standard definition of BIM technology is "the expression of real data of building information and equipment functions in the form of virtual digital information technology simulation to simulate the physical manifestation of the building". control in terms of project schedule and cost,

realizing dynamic and whole process control of the building, and facilitating the creation, control and sharing of the whole life cycle of the building.

## **2.2 APPLICATION OF BIM TECHNOLOGY**

In the whole project construction process, it involves the whole life cycle of the project from planning to operation period, and the resulting BIM model can be used by all parties involved in the construction. The use of BIM model ensures the characteristics of data integrity, information relevance and resource unity. The integrity is mainly reflected in the fact that BIM technology in engineering project construction not only describes the building through 3D model, but also includes engineering design data, procurement data, construction data, maintenance data, etc., thus constituting a complete engineering dynamic data chain. Through the use of BIM technology, the core elements such as engineering cost can be effectively controlled to ensure the quality of the project while also ensuring that the project is completed within the expected time and cost, thus reflecting the advantages brought about by BIM technology.

## **3. DIGITAL INTELLIGENT MANAGEMENT PLATFORM FOR HIGH-RISE BUILDING CONSTRUCTION BASED ON BIM TECHNOLOGY**

Green construction management platform has been multi-functionally integrated after field trial and improvement, mainly including six functional modules such as intelligent water and electricity management, dust and noise monitoring, automatic sprinkler and liquor alarm, project drainage monitoring, solid waste management and renewable resource management. These functions and modules can also be displayed intelligently through BIM models, data collection, data viewing and downloading, abnormal alarms and application feedback, etc., and can be developed with modular functional interfaces according to the actual needs of the project.

### **3.1 SIX MODULES OF DIGITAL INTELLIGENT MANAGEMENT PLATFORM**

#### **(1) Intelligent water and electricity management module**

At the early stage of the project, when preparing the temporary water and electricity construction plan, the project construction areas should be fully considered and planned, and different types of water use plans should be planned and arranged for the office and living areas, and water-saving equipment and intelligent electricity system should be installed at the construction site to build an intelligent water and electricity network. When water and electricity use abnormalities occur, the background can receive alarms, protect the speed break, remote control, etc., to realize the full control of water and electricity use.

#### **(2) Dust and noise monitoring module**

The dust and noise monitoring instrument is mainly combined with the LED display and mobile terminal and computer terminal. The computer background can directly display the status of the monitoring instrument and the current environmental noise situation, and can automatically analyze the dust and noise situation. At the same time, the monitoring instrument is powered by solar panels, eliminating the tedious and complicated on-site wiring, and the environmental monitoring instrument can provide real and reliable data for project managers and governmental supervisors to grasp the environmental situation at construction sites.

### (3) Dust monitoring and automatic spraying module

Water spraying system is mainly pressurized tap water, sprayed by the nozzle, mainly by pressurized water pump, PPR pipe, nozzle and control box, site installation according to the regional terrain, dust distribution and other characteristics, reasonable distribution of spraying points and draw the spraying water system path, and then determine the various types of materials required to lay the pipe and install the nozzle. Automatic spraying water system can automatically spray dust removal according to environmental needs. When the on-site dust monitoring system monitors PM concentration reaches the set value, the spraying water system is automatically activated, and when the PM concentration is qualified, the spraying water system is automatically shut down.

### (4) Solid waste management module

The solid waste generated at construction sites is relatively large, and the traditional treatment method is relatively crude, relying mainly on manual disposal. Solid waste is inventoried on site and sorted according to type and weight for weighing, and then data is recorded and transmitted. The solid waste generated on site is precisely controlled, and the data on the total amount of solid waste, classification, recycling amount and outgoing amount can be queried through the solid waste module in the management background.

### (5) Recycling resource management module

In recent years, the industry has conducted a lot of research on the use of renewable resources. In order to calculate the efficiency of renewable energy equipment use, the site can be configured with special meters for measuring the consumption of renewable energy, combining the input cost of equipment, resource savings and turnover frequency, etc., to statistically analyze the economic benefits of renewable resources in order to guide the use program of renewable resources in construction projects.

### (6) Project sewage discharge monitoring module

On the project site, the living and office areas, as well as the sewage generated during the construction process are discharged into the city municipal network after treatment. Engineering sewage discharge monitoring module automatically real-time online monitoring of sewage water quality, engineering sewage water quality discharge must meet the requirements, real-time monitoring system to upload data to the green construction management platform, when the water quality monitoring structure does not meet the standard, the background alarm, to urge managers to take relevant sewage treatment measures, effectively realize the supervision of the discharge of sewage.

### 3.2 DIGITAL MANAGEMENT SYSTEM FOR HIGH-RISE BUILDING CONSTRUCTION

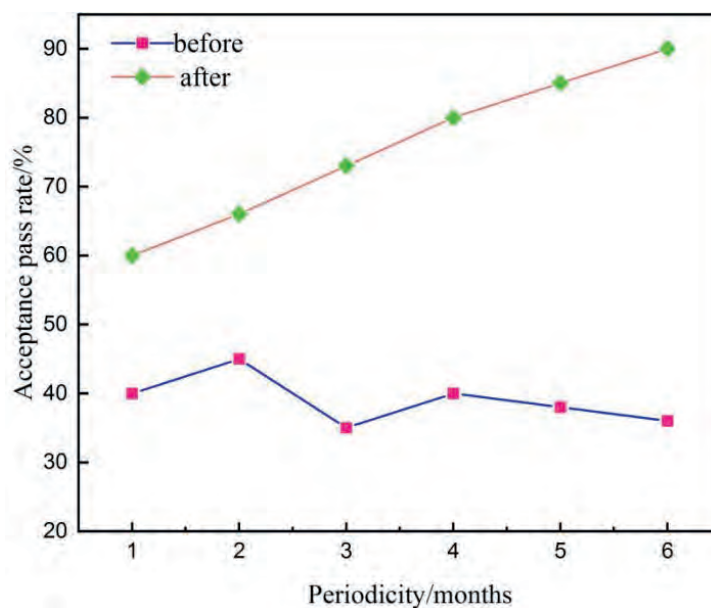
After the design of intelligent management method of high-rise building construction is finished, the perception management system of BIM technology is constructed to realize the goal of intelligent management of building construction in an all-round way. Firstly, using the hierarchical analysis method, BIM technology is divided into three specific layers: the perception layer as the main layer, combined with the supporting role of the network layer and application layer, together to help the intelligent management of building construction. RFID radio frequency identification technology and sensors are used to set the main functions of the perception layer, which includes information and data collection of high-rise building construction, so that the perception layer can achieve the goal of real-time collection of construction data and information. Table 1 shows the intelligent management process of the progress of building construction components.

**Table 1** Intelligent management process for the progress of building construction components

Stages	Job Description	Information Storage	Information Sources
Production phase	Production of machined components	RPIDTextbook Library	RPID Readers
	PID tagging of components into components		
Inventory stage	Division of the construction inventory into zones		
	Arrangement of stock management personnel in the different zones		
Transport phase	Determining the location of the component transport yard		
On-site stage	Arrangement of component yard managers		
	Scheduling of component entry and exit times		



In order to further make an objective analysis of the application effect of the intelligent management method of high-rise building construction based on BIM technology, the project team conducted the following experimental tests. Based on the principle of quality management, the construction process is taken as the quality control point, and the construction management control point is determined according to the construction responsible unit and type. Based on BIM technology, the construction period of the project is set to 6 months, and the primary acceptance rate of the building project with and without the application of the intelligent management method of building construction designed in this paper is obtained as shown in Figure 1.



**Figure 1** Comparison of quality of work

According to Figure 1, it can be seen that after the application of intelligent management method of high-rise building construction based on BIM technology in construction projects, the project quality primary acceptance pass rate has been significantly improved, and the overall construction quality of the project is more stable without substantial fluctuation. The project without the application of intelligent management method has a lower pass rate, and the overall pass rate fluctuates more, and there is a decreasing trend in a certain period of time, which is not conducive to the development of construction projects. Therefore, the intelligent management method of high-rise building construction designed in this paper is more effective and has better management quality.

#### **4. CONCLUSION**

This paper mainly studies the use of BIM technology in the digital intelligent management platform of high-rise building construction, briefly describes the six

modules of the digital intelligent management platform, and analyzes the quality passing rate of the project before and after the application. The study shows that the use of BIM technology can improve improve the efficiency and quality of intelligent management.

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# INNOVATION OF TEACHING MODE COMBINING ARTIFICIAL INTELLIGENCE TECHNOLOGY AND COLLEGE CIVICS COURSE

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## **ABSTRACT**

In light of the transformative technological advantages of artificial intelligence, its introduction into the education of college Civics and Political Science class, over effective integration with ideologic and politic education big data, can facilitate the precise implementation of many teaching aspects such as student learning identification, teaching content customization, teaching activity design, teaching process tracking and prediction, teaching evaluation and decision making, and then realize the precise teaching of college Civics and Political Science class on the whole. Through the survey, teachers' role perception of teaching level under the submission of AI technology in college Civics class, more than 45% of teachers think that AI has a greater impact on the teaching of college Civics class at present. Only 8.06% of teachers think that the impact is less. Thus, it can be seen that the educational changes triggered by the application of AI technology in college Civics class have achieved a certain consensus among the group of college Civics teachers.

## **KEYWORDS**

Ideologic and politic theory course; Artificial intelligence; Learning recognition; Precise teaching; Teaching prediction; Teaching evaluation

## **1. INTRODUCTION**

An essential area of advancement in the field of education is the promotion of schooling and artificial intelligence integration as well as a high level of fit between educational resources and students' needs [1]. Promoting the thorough integration of AI and teaching in civics and political science classes is both a necessary trend in reaction to the technological developments and a self-need to increase teaching precision, effectiveness, and relevance[2]. Artificial intelligence's technological integration fuels the contradictory movement of the instruction in civics and political science courses, driving its internal elements to dovetail precisely and collaborate efficiently, and promoting the high-quality development of Civics and Political Science class education the path of accuracy, thereby offering a fresh perspective for resolving the practical issues in the instruction of civics and political science [3]. Research on artificial intelligence technology to optimize the way that civics classes are taught in colleges. Literature [4] argues that the application of artificial intelligence can effectively improve the affinity of ideologic and politic education, the precision of ideologic and politic education, and provide a more scientific, effective and fine working method for ideologic and politic education in decision-making and management. The literature [5] argues that to the supportive position of AI technology in the college Civic Science course, We should be aware of the possibility that artificial intelligence may become more prevalent as a result of its application in civic science

courses. The literature [6] believes that the future era of "precision education" profound combination of AI technology and education will define it, and it is necessary to promote the upgrading and transformation of teachers to intelligent teachers. intelligent construction of thinking class.

Six components make up the framework for the implementation of artificial intelligence-driven specific teaching of ideologic and political theory in colleges and universities: specific learning recognition and portrait, specific teaching content customisation options and attempting to push, specific teaching exercise design, specific learning monitoring and prediction, specific teaching evaluation, and specific teaching conscious choice. Building an all-weather, all-channel, all-coverage, and all-process big data archive and integration process of university ideologic and politic education, establishing and improving a guarantee mechanism for the specific teaching of university ideologic and politic theory class, and establishing an integrated technical support system for the precise teaching of university ideologic and politic theory are all necessary for artificial intelligence-driven specific teaching of university ideologic and politic theory.

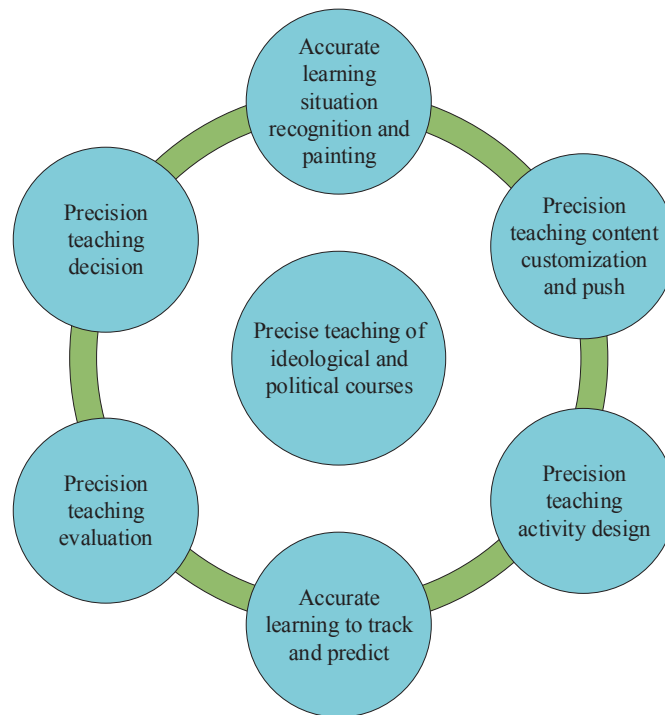
## **2. THE FEASIBILITY OF ARTIFICIAL INTELLIGENCE-DRIVEN PRECISION TEACHING IN COLLEGE CIVICS COURSES**

As a key component of accurate thinking and administration, accurate teaching in college Civics courses refers to precise design and customization of teaching contents and activities, precise tracking and prediction of teaching process, precise evaluation of teaching effects and precise teaching decisions, in order to specifically satisfy the individualized learning requirements of college students taking civics courses and to strengthen their mission duties.

According to their purposes, the information utilized for accurate instruction can be separated into three groups: the first one is basic student data, which is mainly used for accurate learning situation identification. The second category is process data, which is mainly used for accurate tracking, prediction and evaluation of students' learning process. The third category is the result data, which is mainly used for accurate teaching evaluation and decision making. Online teaching platform, independent learning platform, online assessment system and many other platforms have already gone to the actual ideologic and politic education teaching scene, and a large volume of teaching and learning data converge in these platforms, which provides the most fundamental information to ensure that civics and political science lessons are taught accurately.

## **3. ARTIFICIAL INTELLIGENCE-DRIVEN FRAMEWORK FOR THE IMPLEMENTATION OF PRECISE TEACHING IN COLLEGE CIVICS COURSES**

The implementation framework of AI-driven precision teaching in college Civics is shown in Figure 1. The six modules in the framework for AI-driven accuracy teaching in college civics are specific learning recognition and portrait, specific teaching content customisation options and push, specific teaching activity design, specific learning monitoring and prediction, specific teaching assessment, and specific teaching choice.



**Figure 1.** Implementation framework of precision teaching

### 3.1 ACCURATE LEARNING IDENTIFICATION AND PROFILING

The foundational task to support the effective teaching of college civics is the precise identification of students' learning circumstances. For a college civics course, it's important to accurately grasp not only the knowledge structure, learning preferences, and general learning status of the students, but also their thought demands and behavioral trends, as well as their thought demands and theoretical needs. It's also important to accurately identify their modes of acceptance and expression. To make accurate identification of students' learning conditions, we must first of all tap into the basic data of the student body. Secondly, we should dig and analyze students' preorder behavior data. Learning behavior data mainly refers to the historical behavior data left by students in the process of both online and offline education, and these data could directly reflect the characteristics of students' antecedent learning behavior. Daily behavior data refers to all kinds of data generated by students in their daily life behaviors, and these data can be used as an aid and reference for learning behavior analysis. Finally, students' thought data should be mined and analyzed. Thought data are scattered in discussions, assignments and student-related social media content, and semantic analysis and text sentiment analysis must be used to mine students' thought dynamics, emotional states and theoretical needs from these implicit texts.

### 3.2 ACCURATE TEACHING CONTENT CUSTOMIZATION AND PUSHING

The modification and distribution of content that accurately reflects the learning preferences of students is referred to as correct content modification and distribution. For example, the content can be customized and delivered at different levels of difficulty according to students' knowledge mastery, and the content can be delivered in different representations according to students' preference of teaching media. When customizing and pushing teaching contents, we should ensure the "three characteristics": firstly, we should ensure the matching of content pushing, accurately grasp the cognitive, ideological and behavioral characteristics of students through learning situation identification, and accurately customize teaching contents according to the characteristics of learning situation. Secondly, we pay attention to the relevance of content delivery, and carefully customize the teaching contents that can really improve students' theoretical knowledge and ideological, political and moral quality. Finally, enhance

the interest of the content itself, and infiltrate the teaching content into the center of teaching media expressions in a form that is pleasing to students.

### 3.3 ACCURATE LEARNING TRACKING AND PREDICTION

Precision education tracking and prediction is the process of accurately recording in real-time the level of learning achieved by both individuals and groups of participants as well as making predictions about their prospective performance and learning habits. An artificial intelligence era, there are a variety of tools and instruments available to capture the various information and data left behind during the teaching and learning process. In a physical classroom setting, data on student learning behaviors, motivations and attitudes can be captured using scales, questionnaires and other devices such as wearable devices and sensors. In the online teaching environment, students' login behavior, resource browsing behavior, question and answer behavior, discussion behavior, assignment submission behavior, etc. can be obtained from the backend system. These collected online and offline data can be statistically analyzed after pre-processing steps, which can present the whole picture of students' learning process in Civics class from different dimensions.

## 4. CURRENT STATUS OF TEACHING ROLES

The education of higher education Civics class is influenced by artificial intelligence technology. The advancement of education through the use of artificial intelligence is shifting to a "student-centered" teaching model, whether it is adaptive learning, intelligent classroom construction, all based on the learning needs of the educated. The implementers of political and ideological education in higher education institutions are civics instructors, thus teachers must adapt to the new educational paradigm. Therefore, the teaching role of the teachers with the application of artificial intelligence will certainly be influenced by the technology. Through the survey, the role perception of teachers on teaching level under the application of AI technology in college Civics class, as shown in Table 1, more than 45% of the surveyed teachers think that the current AI has a greater impact on the college Civics class teaching. Just 8.06% of college civics and political science instructors thought that the impact was less. It indicates that to a certain extent the teachers have clearly perceived the influence of AI technology application, Civics and Political Science at academic institutions are going to be increasingly influenced by AI technology as the interaction between AI technology as well as the design of the educational system gets closer and closer.

**Table 1.** Influence of artificial intelligence on ideologic and politic teaching

	<b>Very large</b>	<b>larger</b>	<b>In general</b>	<b>smaller</b>	<b>no</b>
At present	5.33	40.73	26.48	18.17	9.29
In the future	27.54	37.29	21.24	8.08	5.85

It can be seen that the educational changes triggered by the request of artificial intelligence technology in Civics class have achieved a certain consensus among college Civics teachers' groups. The request of artificial intelligence affects the development of teaching activities of college Civics class, and will also implicitly affect the role of Civics teachers. Therefore, teachers should grasp the development demands of the times of ideologic and politic education, recognize the request of AI technology in Civics class teaching to adjust their roles and promote professional development.

## 5. CONCLUSION

The innovation of Civic Studies under AI technology is different in nature from innovation of traditional Civic Studies. It has produced disruptive changes to educators, educated people, the teaching process, the educational environment and the educational system, which on the one hand has led to an innovation in the concept of teaching talent cultivation, delineating a new level of technological literacy and professional demand for Civics and Political Science education practitioners in Smart Connections era. Nonetheless, it also makes more sophisticated arguments, scientific and even more personalized requirements for the teaching classroom of Civics, thus making the practitioners of ideologic and politic education to re-examine the current teaching system of Civics. Therefore, college Civics should take the initiative to meet the changes of the times and explore the teaching innovation path of Civics in the new era of artificial intelligence.

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# THE SPATIAL DEVELOPMENT AND INNOVATIVE PATH OF COMMUNITY EDUCATION IN THE PERSPECTIVE OF LIFELONG EDUCATION

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## **ABSTRACT**

Developing community education under the guidance of the concept of lifelong education is conducive to building an education system that serves lifelong learning for all, promoting the construction of “lifelong learning communities” and the formation of “lifelong learning culture”. In order to promote the sustainable development of community education, it is necessary to practice the concept of lifelong education and lifelong learning, clarify the positioning of community education, realize the parallelism between “top-down” and “bottom-up”, and strengthen the “learning and researcher The construction of a team of “learning researchers”, “instructors” and “lifelong educators”, the promotion of urban and rural community education development with historical, systematic, subjective and differential thinking, the promotion of balanced and coordinated construction of community education experimental and demonstration zones In addition, we will further improve the supervision and evaluation mechanism of community education, and deepen the theoretical research of community education with the construction of community pedagogy as the grip.

## **KEY WORDS**

Lifelong education; Community education; Learning culture; Faculty development; Educational supervision; Educational evaluation

## **1. INTRODUCTION**

Community education has emerged with the needs of the times and has been promoted by the development of society. Especially in the context of today's emphasis on the importance of lifelong learning and efforts to construct a learning society, the concept of promoting lifelong learning has been put into practice and has become a basic way to build a learning society, etc. [1-3]. Obviously, there are still many problems in the development of community education, and there is a large gap between the development of modern urban and rural areas, community education is not practically developed in some areas, and there are not enough teachers and resources for community education, etc. [4]. From the trend of community development and the value of individual survival, the future society is bound to be a learning society, and community education plays an important role in promoting it, and the concept of lifelong learning is one of the important concepts guiding the construction of a learning society [5-6].

This paper conducts an in-depth investigation into the implementation strategies of community education under the concept of lifelong learning. (1) Emphasize the practical value of community education. Specific measures are to take the concept of lifelong learning as the



guide, deeply understand the value of community education, promote the whole society to establish the concept of lifelong learning, promote the lifelong education law, and form a system of community education laws and regulations with consistent values, etc. (2) Clearly delineate the types of community education. The main three types of community education are normative community education, non-normative community education and self-directed community education. (3) Clarify the teaching contents of community education. The content of youth community education, middle-aged and young people community education, and senior citizen community education will be clearly defined.

## **2. THE VALUE IMPLICATION OF COMMUNITY EDUCATION DEVELOPMENT UNDER THE PERSPECTIVE OF LIFELONG EDUCATION**

### **2.1 IT IS CONDUCIVE TO BUILDING AN EDUCATION SYSTEM THAT SERVES LIFELONG LEARNING FOR ALL PEOPLE**

Lifelong education runs through all stages of life development and encompasses all stages and junctures of education. Lifelong education emphasizes the lifelong, universal, comprehensive, compensatory, open and developmental nature of education, which is the mainstream trend of modern education development. The purpose of building a lifelong education system is to promote the integration of various types of formal, non-formal, formal and informal education horizontally and to realize lifelong education vertically to meet the educational needs of different people at different stages of development. As a part of the lifelong education system, community education plays a pivotal role in it. Community education is not an appendage of school education, but a new way of comprehensive educational activities, and to a certain extent, an expansion and extension of school education.

### **2.2 PROMOTE THE CONSTRUCTION OF “LIFELONG LEARNING COMMUNITIES**

Community education led by the concept of lifelong education focuses on the integration of education and life, the interaction between education and life, and the interaction between education and society, reflecting the dynamic balance between educational development and personal development and community building. Community education provides opportunities for non-working people, laid-off workers, and mobile people to re-engage in learning. Secondly, community education creates an open platform for community residents to carry out social interactions and positive interactions. Thirdly, community education plays an important role in the dissemination of scientific knowledge and technology, the improvement of the quality of community residents, the improvement of the physical environment of the community and the construction of the spiritual culture of the community. Finally, in the interaction with school education and family education, community education gradually moves towards lifelong education and integration, and promotes the construction of “lifelong learning communities”.

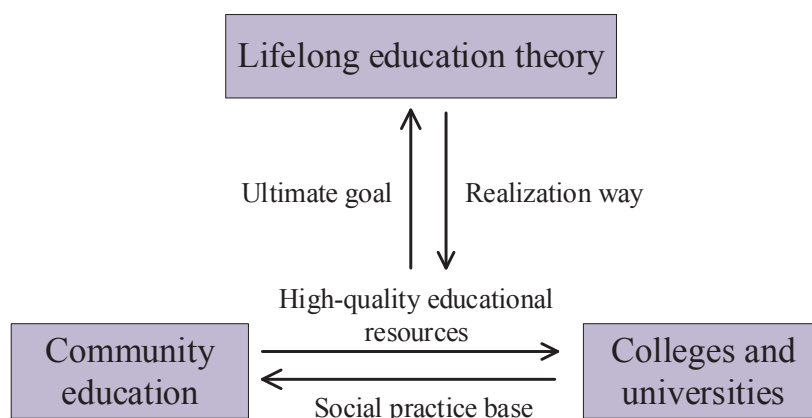
### **2.3 PROMOTE THE FORMATION OF “LIFELONG LEARNING CULTURE**

The formation of lifelong learning culture cannot be separated from the development of community education, and the prosperity of lifelong learning culture will also promote the development of community education. Community education is based on the community and oriented to all members in the community, aiming to promote the development of each member of the community and the benign operation of the community, and provide opportunities for the formation of lifelong learning culture, which is manifested in the formation of the concept of lifelong learning. In the process of community development, community residents are both the means and the purpose of community development, and whether residents have the awareness of lifelong learning depends on the effectiveness of community education, which in turn affects the pace of construction of the whole learning society.

## 2.4 PRACTICAL MODELS OF UNIVERSITY PARTICIPATION IN COMMUNITY EDUCATION

### 2.4.1 MANAGEMENT SYSTEM AND OPERATION MECHANISM OF UNIVERSITY PARTICIPATION IN COMMUNITY EDUCATION

The school is responsible for providing flexible and specific community education services for community residents as shown in Figure 1. Specific operational mechanisms include the establishment of special funds for community education in the district finances, forming a community education guarantee mechanism with government input as the mainstay and street input as a supplement. Strengthen the cooperation between community education and various social organizations and institutions, and form a mechanism of sharing educational resources with universities. Organized the National Lifelong Learning Activity Week and opening ceremony activities, carried out community education achievement display and practice propaganda, and formed a brand teacher and intensive effect. We have established an evaluation and incentive mechanism, and have selected a number of citizens' "learning stars", district-level model communities and experimental streets, model streets, to stimulate residents' enthusiasm and initiative to participate in community education and promote the balanced development of community education.



**Figure 1.** The relationship between colleges and community education

### 2.4.2 PHYSICAL CONSTRUCTION OF UNIVERSITY-ASSISTED COMMUNITY EDUCATION

The Community Education College, which integrates higher education, vocational education and adult education, is sponsored by the district government or educational administrative agencies and plays a leading role in community education. The college has a team of professional teachers and volunteers, and adopts an open and flexible mode of operation to provide residents with various learning activities for community residents, such as skills training for the disabled, skills training for laid-off workers, education for the elderly, leisure education, and education for infants and toddlers, in addition to school education, as shown in Table 1. since its establishment, it has achieved remarkable results and provided community residents with a full range of educational services.

**Table 1.** Community education work plan

Serial number	Job content
1	Complete the outsourcing budget of community education and training funds
2	Submit the outsourcing community education and training project for approval
3	Community education and training project bidding
4	Carry out community education joint supervision and guidance street characteristic project
5	Carry out community learning team incubation
6	Conduct community education lecture halls
7	Part-time teacher training class started
8	Start curriculum development
9	Community awareness programme training
10	Community education grand Prix
11	Community part-time teacher training
12	Collect and collate training and activity data

### **3. BREAKTHROUGH PATH FOR THE DEVELOPMENT OF COMMUNITY EDUCATION IN THE PERSPECTIVE OF LIFELONG EDUCATION**

#### **3.1 INSIGHT INTO THE CONCEPT OF LIFELONG EDUCATION AND LIFELONG LEARNING TO PROMOTE THE HIGH-QUALITY DEVELOPMENT OF COMMUNITY EDUCATION**

First of all, the government should play an important role in community education in terms of planning and guiding support, and make efforts to promote the practice of community education by introducing policies and regulations to promote community education, allocating funds for community education development, and calling for cooperation from other sectors. Secondly, schools should always clarify the position that “schools are schools of the community” and provide learning opportunities for the general public outside the school education system by opening up resources through social services, i.e., school-enterprise cooperation, school district cooperation, and school-school cooperation. Once again, the community should make it clear that lifelong education is initially a product of adult education practice, i.e., a supplementary educational activity for adults seeking careers, and the field of activity is the community. Finally, enterprises, institutions, social organizations and the general public should also take the initiative to participate in community education.

#### **3.2 DEEPEN THE REFORM OF COMMUNITY EDUCATION AND REALIZE THE DOVETAILING OF “TOP-DOWN” AND “BOTTOM-UP”.**

The combination of “top-down” and “bottom-up” community education management mechanism fully takes into account the multiple demands of community education developing countries, communities, schools, enterprises and residents, reflects the basic concepts of people-oriented, lifelong education and lifelong learning, enhances the acceptability, operability and effectiveness of various community education policies in the process of implementation and execution, and is the only way to promote the construction of lifelong education system.

#### **3.3 STRENGTHEN THE CONSTRUCTION OF “LEARNING AND RESEARCHER”, “GUIDE STUDENT” AND “LIFELONG EDUCATOR” TEAMS**

Enhance the awareness and ability of school teachers at all levels and types of schools to volunteer for community education and carry out lifelong educator qualification assessment

and recognition to seek the path of community education teacher team building. School teachers at all levels and types should have the awareness and ability to volunteer for community education. Schools of all levels and types should encourage teachers to carry out scientific research in the field of community education and actively engage in the practice of community education, and account for teachers' community education scientific research and practice into job performance to guarantee the long-term and stability of the partnership.

#### **4. CONCLUSION**

As a new mode of education development, community education is an important form of lifelong education to meet the material civilization and spiritual culture needs of community residents, to guarantee their right to lifelong learning, to promote the role of residents as subjects, and to promote the construction of a harmonious society. It has the characteristics of education for all, comprehensive education and full education, and with the development of practice, its connotation has been enriched, and the content of community education has become more diversified and personalized. Universities, as part of the community, rely on their teaching equipment resources, human resources, cultural resources and other educational resource advantages to actively participate in community education and develop their own community education practice models through continuous practice summaries.

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# RESEARCH ON THE PATH OF IMPROVING COLLEGE STUDENTS' ONLINE LITERACY BASED ON BIG DATA

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## ABSTRACT

Internet literacy is an important influencing factor of online culture ecology, and it has become an inevitable and important proposition for higher education institutions to strengthen college students' information quality cultivation and guide them to use the Internet correctly. This paper takes college students as the research object, discusses the problems of college students' Internet use based on the analysis of college students' online behavior big data, and proposes clear requirements and educational guidance programs from the perspectives of curriculum design, management services, Internet culture, assessment mechanism and educational philosophy, so as to provide theoretical support and experience reference for the cultivation of college students' Internet literacy in colleges and universities. Analyzing the overall level of youth Internet literacy, the average score of each dimension exceeds the passing mark of 3. Among them, the Internet norms application dimension and the critical and dialectical literacy dimension have exceeded 4 points, which are relatively close to the good level. Thus, the enhancement path has a practical effect.

## KEY WORDS

Network literacy; Big data; Curriculum design; Management services; Network culture; Assessment mechanism

## 1. INTRODUCTION

Network literacy is an individual's ability to creatively solve complex problems in the real world with the help of network tools, which emphasizes both the individual's cognitive level and ability to use the network, and also focuses on people's moral cultivation and behavior in the process [1-2]. With the advent of the Internet era and the increasingly close connection between the Internet and society, network literacy has become a basic literacy that everyone should have, and colleges and universities have a great responsibility in improving college students' network literacy [3]. The big data of college students' online behavior, i.e. the information data generated by college students' activities on online platforms, is precisely the objective expression of college students' thoughts and feelings, values and behaviors [4-5]. Literature [6] proposed to explore flexible and diverse learning methods, build a multi-level learning carrier platform, give full play to the role of the second classroom in network security

education, use multimedia means to carry out network security publicity and education activities, use typical cases to do network security theme meetings, invite experts in network security to carry out expert forums, and implement diversified forms of network security education.

In order to provide powerful support for universities to grasp college students' Internet literacy and formulate improvement strategies. This study adopts distributed deep web crawler technology, combined with data mining technology crawling plus manual sorting and coding, to obtain a total of 31684245 data from internet sites, news and information APPs, WeChat public numbers, microblog accounts, etc., and strives to outline the current situation of college students' online literacy scientifically and objectively through the in-depth insight of college students' online behavior big data The "digital picture".

## **2. STRATEGIES TO IMPROVE COLLEGE STUDENTS' INTERNET LITERACY**

As the main place of college students' education, colleges and universities should give full play to the nurturing function of curriculum design, management service, network culture and assessment mechanism to form a nurturing pattern for the healthy development of college students' network concept and behavior, and promote the network literacy training of college students on the ground.

### **2.1 SYSTEMATIC CONSTRUCTION OF NETWORK LITERACY EDUCATION CURRICULUM SYSTEM TO PROMOTE THE COGNITION AND PRACTICE OF CORRECT USE OF THE INTERNET**

Cognitive education plays an irreplaceable role in network literacy education. In view of the lack of judgment and participation of some college students in the face of network public opinion events, colleges and universities need to establish a network literacy education curriculum system to promote network literacy education. Integrating network literacy education into public courses has high popularity and operability. Themed class meetings and lectures can be combined with the courses of ideological and moral cultivation and legal foundation, computer foundation, etc. Teachers can promote students' deep understanding of the phenomenon of network misconduct through vivid forms such as cases and seminars, and promote their compliance with Internet usage norms. School network literacy education cannot be separated from the compilation of systematic professional teaching materials. Colleges and universities can purposefully and systematically explore the compilation of Internet literacy education course materials adapted to different stages of college students.

### **2.2 STRENGTHEN THE ROLE OF OPINION LEADERS' NETWORK LITERACY ROLE MODELS AND ORGANIZE COMMUNICATION ACTIVITIES TO ACHIEVE POSITIVE GUIDANCE**

As an authority on the Internet, the views and evaluation of opinion leaders will become the gate map of the direction of public opinion. Colleges and universities cultivate opinion leaders to publish various rational and diversified information on the Internet to attract the attention and interaction of college students, which can help guide the public opinion sentiment in a positive direction by making objective analysis based on the event itself and multi-dimensional and all-view interpretation when the college students are unaware of the truth or the group is outraged. The current college student group has a high sense of discernment, so colleges and universities can provide a place to express their opinions by carrying out book clubs and thematic meetings, so that students can have a dialogue of opinions in reality. At the same time, colleges and universities can invite teachers who have good evaluation in student groups to participate in exchanges, guide students to think and discuss rationally, and remind students

of the precautions of expressing opinions on the Internet when concluding speeches to realize positive guidance.

### **2.3 IMPROVE THE NETWORK SUPERVISION AND EMOTIONAL DIVERSION MECHANISM, SO THAT THE EXPRESSION OF DEMANDS AND VIEWS TEND TO RATIONAL AND STANDARDIZED**

Students' words and actions on the Internet are the mapping of their thoughts and real problems. Universities should pay great attention to students' mentality and demands, and grasp the psychological changes of students. Colleges and universities should build psychological guidance mechanism, set up psychological commissioners in classes, find out ideological problems at an early stage and provide psychological comfort and care, and coordinate the life and study problems faced by college students in special periods and help them with precise measures. By building a platform for expressing the interests of college students, college students can have the opportunity to express their needs and release their negative emotions through normal channels. By building a platform for expressing the interests of college students, college students can have the opportunity to express their needs and release their negative emotions through normal channels, so that the Internet will not become a place to vent their extreme opinions. Colleges and universities should improve the utilization of information data, analyze the hot topics that college students care about and their online participation behavior, and improve the perceived relevance of students' online behavior.

### **2.4 CONVEYING THE VALUE OF NETWORK EMPOWERING REALITY AND ENCOURAGING THE CREATION AND DISSEMINATION OF EXCELLENT NETWORK CULTURAL WORKS**

The Internet is an extension and refraction of the real society, and college students should have boundaries for their words and actions on the Internet, and should not vent their emotions freely. In order to enhance college students' network subject consciousness and improve students' motivation of using network, colleges and universities should pay attention to guiding college students to correctly understand the relationship between network and society, establishing the incentive mechanism of "promoting construction by network", guiding college students to be more rational and civilized in "network practice". Use the Internet to understand and spread information. Colleges and universities can make a convention on Internet civilization, guide students to pay attention to the value judgment and critical use of information, encourage students to express their opinions or views objectively and with evidence, and cultivate "four-haves" Internet users with high security awareness, civilized Internet literacy, law-abiding behavior habits and necessary protection skills. Students are encouraged to share or write positive and valuable online comments through online communication on social hot topics and online creation activities, so as to build a clear and clean campus online culture and play the role of peer role models to create a civilized, healthy and orderly online environment.

### **2.5 DEVELOP A DYNAMIC EVALUATION PROGRAM FOR THE CURRENT SITUATION OF INTERNET USE TO PROMOTE INNOVATION IN INTERNET LITERACY EDUCATION.**

Internet literacy of college students is a development process, with the change of Internet environment, as well as the growth of college students' knowledge degree, media demand and change of Internet habits, new characteristics and new needs will be formed in stages. Therefore, the cultivation and improvement of college students' Internet literacy is not temporary and static, but long-term and dynamic, and is a process of continuous development and improvement in practice. Evaluation is the means to test the effect of network literacy education, and it is also a powerful measure to promote the standardization of network literacy

education of college students and continuously improve the level of network literacy education. In order to improve the ability of network education, universities need to strengthen the coordination, establish the systematic and long-term cultivation goal of network literacy education, continuously expand and deepen the angle of data analysis, and more accurately. In order to improve network literacy education, universities need to strengthen the coordination, establish systematic and long-term cultivation goals, expand and deepen the angle of data analysis, more accurately grasp the situation of students' Internet use, examine the effectiveness of network literacy cultivation, continue the beneficial experience and break the path dependence with the times, research and develop more targeted and precise cultivation methods, and gradually form a joint mechanism of education guidance and students' self-improvement.

### 3. ANALYSIS OF COLLEGE STUDENTS' INTERNET LITERACY

As shown in Table 1, the overall mean score of the Internet Literacy Scale for college students was 3.91. Among the four dimensions of the scale, the mean score of the Internet Basic Knowledge dimension was 3.72, the mean score of the Internet Norms Application dimension was 3.98, the mean score of the Social Interaction and Collaboration dimension was 3.75, and the mean score of the Critical and Dialectical Literacy dimension was 4.27. The average score of the application dimension was the highest and the average score of the basic knowledge dimension was the lowest. If the median is used as the evaluation criterion, the results are similar to the mean, and the ranking of the dimensions does not change. This indicates that the standard deviation of the sample data is within a reasonable range and the data can effectively reflect the real situation. The Internet literacy questionnaire for college students uses a 5-point Likert scale with a minimum score of 1 and a maximum score of 5 for each question item. If the more accepted value of 60% is used as the passing standard, then the passing line of the questions should be 3 points. Based on this criterion, it can be seen that the overall average score of youth Internet literacy as well as the average score of each dimension exceeds the passing mark of 3. The higher scores for the Internet norms and critical and dialectical literacy dimensions exceeded 4, which is close to the good level.

**Table 1.** Average score of Internet literacy scale for college students

name	Sample size	Minimum value	Maximum value	Average value	Standard deviation	median
Adolescent Internet literacy	964	1	5	3.91	0.66	4.10
Basic knowledge of network	964	1	5	3.72	0.70	3.19
Network specification application	964	1	5	3.98	0.90	4.31
Social interaction and collaboration	964	1	5	3.75	0.81	3.78
Critical and dialectical literacy	964	1	5	4.27	0.68	4.10

### 4. CONCLUSION

Based on the analysis of college students' online behavior, this paper explores the problems of college students' online use and proposes clear requirements and educational guidance programs from the perspectives of curriculum design, management services, online culture, assessment mechanism and educational philosophy, so as to provide theoretical support and experience reference for the cultivation of college students' online literacy.

In the analysis of college students' Internet literacy, the average score of college students' Internet basic knowledge dimension is 3.72, the average score of Internet normative application dimension is 3.98, the average score of social interaction and collaboration



dimension is 3.75, and the average score of critical and dialectical literacy dimension is 4.27. Among them, the average score of Internet normative application dimension is the highest and the average score of Internet basic knowledge dimension is the lowest.

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# RESEARCH ON PERSONALIZED INFORMATION SERVICE SYSTEM OF UNIVERSITY LIBRARY IN THE CONTEXT OF BIG DATA

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## ABSTRACT

In the context of big data, the article makes a relevant feasibility analysis from the bottleneck of the development of personalized information service in colleges and universities. Further, it proposes the personalized information service model of college libraries, and also suggests that the process of personalized information service of college libraries needs to pay attention to the problems of users' privacy and data source constraints, which requires the application of Web data mining technology to target the target group at the technical level. College libraries should learn from the experience and lessons of domestic and foreign libraries in carrying out socialization services, combine their own advantages and characteristics, and actively promote the practice and exploration of their socialization services.

## KEYWORDS

Big data; University library; Feasibility analysis; Personalization; Information service system; Advantages; Data mining

## 1. INTRODUCTION

In recent years, domestic university libraries have devoted themselves to the development of personalized information service, which has been widely praised by teachers and students in universities as an emerging service mode with clear information orientation, strong service targeting and convenient use [1-2]. With the widespread promotion of personalized information service, how to adjust the information service strategy in real time according to the changing information demand situation of users and better reflect the "personalized" characteristics of information service has become an urgent problem for the development of personalized information service [3-4]. Through the targeted mining and analysis of these massive data, the current information situation of users can be truly reflected, and then provide reference for libraries to carry out personalized information services [5-6].

The paper [7] investigated 39 "985 Project" university library websites, and investigated the personalized information service of libraries in three aspects: library network interaction, library recommendation service and mobile library service. The paper [8] analyzed the problems of university library informatization construction from the current situation of university library informatization construction and proposed countermeasures based on big data informatization theory.

This paper analyzes the feasibility of establishing personalized information service system in college libraries under the big data environment, constructs a model of personalized information service system in college libraries and elaborates the functions of the model in view of the shortage of personalized information service in college libraries at present. It

ensures that the library information service system meets the access needs of school users, conforms to the objective logic of long-term development of library informationization, and improves the satisfaction of student groups.

## **2. FEASIBILITY ANALYSIS OF BUILDING PERSONALIZED INFORMATION SERVICE SYSTEM**

### **2.1 EXISTING SYSTEMS ARE INADEQUATE IN ANALYZING USER REQUIREMENTS**

#### **2.1.1 NON-REAL-TIME NATURE OF USER MODELING**

The existing personalized information service system obtains users' needs in a traditional way, and the results obtained will inevitably have certain deviations, because the existing personalized information service system obtains information needs by questionnaire or online interview, which itself is subject to whether the design of the questionnaire is reasonable, whether the user's expression is clear, and whether the user will be reluctant to cooperate for the protection of their privacy. This is subject to whether the design of the questionnaire is reasonable, whether the user's expression is clear, and whether the user is unwilling to cooperate out of privacy protection. The implementation of personalized information services based on these biased information demand results by university libraries is difficult to achieve the expected results.

#### **2.1.2 LACK OF SERVICE TARGETING**

Looking at the existing personalized information service system of university libraries, there are generally problems of disconnection with users' demands and low accuracy of service. The root cause is that the existing personalized information service system of university libraries cannot obtain users' information demands at any time, so it cannot adjust the service strategy anytime and anywhere according to the real-time users' demands. Unlike public libraries, university libraries mainly serve university teachers and students. Many factors lead to the inability of university libraries to obtain users' demands in real time and adjust the service contents according to the changes of teaching, learning progress and research tasks of teachers and students, which directly affects the relevance of personalized services of university libraries.

## **2.2 THE NEED FOR A PERSONALIZED SYSTEM THAT ANALYZES USER NEEDS**

### **2.2.1 REAL-TIME PERCEPTION OF USERS' INFORMATION NEEDS**

For university teachers and students, university libraries play the role of "information hub". When they have information needs in scientific research, teaching and study, they often use libraries and network for self-service of information resources. In the process of borrowing books, searching bibliography and downloading electronic resources, teachers and students in universities will generate a large amount of information behavior data, and library personnel can easily obtain the real-time information needs of users through in-depth mining and analysis of these behavior data. These data have very important reference value for personalized system to accurately analyze real-time user information needs.

### **2.2.2 HIGHLY DIFFERENTIATED TARGET GROUPS**

The primary challenge facing the personalized information service system of university libraries is to identify the target users. The system needs to track users' changing information needs and information acquisition behaviors at any time and anywhere, and analyze them, so as to target the target group and make accurate information pushing, which requires the application of Web data mining technology in the technical level. Due to financial constraints, the main service targets of university libraries are students and teachers, and the target group

is generally easy to identify, because most students and teachers have completed personal registration procedures in the library, and even if they use the intranet to access network resources outside the library, their computer IP addresses have been recorded in the campus network center.

### **3. PERSONALIZED INFORMATION SERVICE SYSTEM CONSTRUCTION**

#### **3.1 SYSTEM CONSTRUCTION OBJECTIVES AND MODELS**

The personalized information service system is based on the information service platform of university library, acquiring user usage traces and user retrieval records through different data warehouses, and applying Web data mining technology to obtain relatively accurate user information demands at this moment so as to complete the push service of university library information resources in a targeted manner. The goal of the personalized information service system model is to obtain users' real-time information needs, and its functions include integration and standardization of data, data analysis and information pushing.

#### **3.2 PERSONALIZED INFORMATION SERVICE SYSTEM MODULE FUNCTION**

##### **3.2.1 DATA INTEGRATION MODULE**

This module is mainly to prepare for the next step of data normalization. At the logical level, this module centralizes systematically the data records obtained from various sources with different formats and meanings. The information behavior data of university teachers and students are scattered in the information system of university library, the database of electronic resources in the collection and the campus network, etc. The data integration module is to finish the work of linking all these scattered data.

##### **3.2.2 DATA NORMALIZATION PROCESSING MODULE**

The flowchart of this module is shown in Figure 1, and the main purpose is to standardize the processing of the data integrated in the previous step to make it suitable for data analysis related algorithms.

###### **(1) Synthesis of records**

The automated systems used by university libraries are provided by various software developers, and the format and form of data representation in the databases of the systems to which they each belong are different, so it is necessary for university libraries to synthesize accordingly.

###### **(2) Data statute**

The purpose of this function is to unify the data with the same meaning but different identification names, in order to maximize the clarity of data management and remove obstacles for accurate data analysis.

###### **(3) Data cleaning**

The purpose of this module is to achieve the removal of noisy data, contaminated data, and incorrect or inconsistent data.

###### **(4) Data Transformation**

This module mainly transforms data in various formats into the data format required for the next information analysis algorithm in a unified manner.



**Figure 1.** Data normalization processing module flow

### 3.2.3 INFORMATION ANALYSIS MODULE

In the process of acquiring and utilizing information resources, students and faculty in higher education produce three formats of information: structured, semi-structured, and unstructured information.

#### Structured information

When users receive information services provided by university libraries, the corresponding database will store the relevant records in a tabular form, i.e. in a structured data format, in the process of the library's response to user information inquiries and feedback on the services submitted by users, and then this part of data is handled by the structured data analysis module.

#### Semi-structured information

When a user sends a request for information to a social network such as WeChat's circle of friends through a mobile terminal, this part of the data is processed by the mobile information analysis module. The purpose of the structured information analysis module is to refine the data into "granular" units according to different user information behaviors, so as to accurately distinguish the differences in information needs between different users' approximate information behaviors.

#### Unstructured information

Figure 2 shows the flow of web log analysis module. When users send information requests to social networks such as WeChat friend circle through mobile terminals, this data is processed by the mobile information analysis module. The web log analysis module analyzes the usage traces of users' access to the Internet to obtain their real-time information needs. After processing, the model yields user access logs as shown in Table 1. The user information behavior of the Internet has certain characteristics, if a user visits a page more frequently or stays longer, it reflects from one side that the page is very important to that user. To complete the effective docking of university library information resources and users' mobile terminals for users' hobbies.



**Figure 2.** Network log analysis module process

**Table 1. User Access Log**

Field name	Field value (example)	Comment resolution
Cookie	XXXXXX	Cookie Relevant information recorded in
Visit Frequency	36	Statistics of visit frequency of a page
Time taken	5M	Time spent by the user on the relevant page
channel	CET	Client
Time	5/36/2016	Access time
CRI inquire about	XXXXXX	The string used by the client to search
Access page	/lib/html	Page information visited
Response code	300	Status code returned when accessing the page
IP	196.1.XX.XXX	Locating users through computer IP

#### 4. CONCLUSION

Under the big data environment, the university library information service has generated a huge amount of user information behavior data. The author has designed a personalized information service system model for this purpose and completed the preliminary research work from the theory, but how the university library can coordinate deeply with the relevant network operators and reach an agreement on privacy protection with the users needs to be revised in practice many times in the future work to finally improve this personalized information service system.

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# THE CONSTRUCTION OF EVALUATION SYSTEM IN COLLEGE HYBRID ENGLISH TEACHING MODEL BASED ON BIG DATA PLATFORM

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## ABSTRACT

In the traditional college English teaching model, there are many problems in the evaluation system, such as ignoring students' subject status in learning, the lack of scientificity and flexibility in assessment and inadequate evaluation of learning process, etc. These factors reduce the effectiveness of teaching evaluation to some extent. Based on the big data platform, this paper actively explores and constructs an evaluation system in college hybrid English teaching model, in the hope of helping promote the overall development of students and the reform of college English teaching. To help teachers and students improve their work in college, the evaluation of English teaching must be multi-perspective and diversified in both online and offline classes. The evaluation should also be formative and summative in hybrid English teaching model, which is conducive to cultivating autonomous learners.

## KEYWORDS

hybrid English teaching model; evaluation system; multi-perspective; diversified evaluation; summative evaluation; formative evaluation; evaluation indicators

## 1 INTRODUCTION

College English teaching is now facing new challenges based on big data platform. Massive open online courses and micro-lectures are shared on the Internet, mobile learning applications for English springing up like mushrooms and almost every student in college owns a smart phone or a tablet computer. This situation makes it possible for students to learn English anytime and anywhere. The hybrid teaching model or the blended learning model, which organically combines network information technology and traditional classroom teaching, has become the new trend of college English teaching in this background [1]. Scholars home and broad have researched

on the model from various perspectives. Hu Jiehui probes into the evolution of Blended Language Learning (BLL), analyses the multi-layer BLL construct and points out that the future research needs to adopt an evidence-based approach to address key issues of learning mechanism, evaluation and system design, aiming to promote the development of BLL with Chinese characteristics [2]. Yang Fang, Wei Xing and Zhang Wenxia explore the practical use of blended teaching approach in EFL teaching and analyzes the unique characteristics of the teaching model in the course—English Communication in Daily Life [3]. Yen and Lee present a blended learning environment combining mobile learning, web-based learning and classroom teaching to provide realistic and practical opportunities for learners and teachers to engage in problem solving activities [4]. Among all the researches, the evaluation system in hybrid teaching model, however, hasn't received much attention. Evaluation, as is known, is a critical factor in learning and teaching. A comprehensive, objective, scientific and effective evaluation system helps both teachers and students improve their work. Therefore, to explore the learning evaluation system in the college hybrid English teaching model is urgent and pressing.

## **2 THE MAIN PROBLEMS IN CURRENT COLLEGE ENGLISH TEACHING EVALUATION SYSTEM**

The evaluation system is a crucial part in the promotion of college English education. There are still problems, however, in today's college English teaching evaluation system.

### **2.1. IGNORING STUDENTS' SUBJECT STATUS IN LEARNING**

In the traditional college English teaching evaluation system, one of the biggest problems is that students' principal status hasn't received enough attention and the evaluation of learning is mostly from teachers' perspective. The learning theory of Constructivism emphasizes that knowledge is not taught by teachers, but by learners in certain situations through the way of meaning construction with the help from teachers and companions. Students play a central role in the management of their language study. Their own reflection on study combined with teachers' guidance and the interaction with their partners play an important role in promoting their own knowledge construction [5]. The evaluation from teachers alone ignores students' principal role and thus should be replaced with multi-perspective appraisal.

### **2.2. THE LACK OF SCIENTIFICITY AND FLEXIBILITY IN EVALUATION**

In current college English education, the evaluation system is mostly result-oriented, in which English test scores are most important indicators. Many teachers consider the scores of periodical achievement tests as the only criterion in evaluation. For example, the scores of the final exams in each semester, the scores of College



English Test (Band 4 and 6) and the scores of Test for English Majors (Band 4 and 8) are the most valued. The evaluation of test scores, however, is a quantitative way to assess student learning, while the qualitative method is often ignored. Taking scores as the only indicator for evaluation is not reasonable and flexible, which is simple and not conducive to students' individual development, for students' performance and participation in class cannot be reflected truly. To be scientific in assessment, it is necessary to adopt both quantitative and qualitative means.

### **2.3. INADEQUATE EVALUATION OF LEARNING PROCESS**

In college English learning, students show individual differences and thus their English level varies. In the learning process, each learner shows his or her individual character, emotion, attitude, interest and learning efficiency, which cannot be totally manifested in test scores. Scores of the final exams cannot fully indicate students' hard work in the whole semester. Result-oriented evaluation gives poor feedback for the process of learning, which will not only reduce learners' enthusiasm, but also discourage them in English learning. On the contrary, the full assessment of individual learning process can well reflect learners' effort and exertion in their exploration of knowledge and construction of meanings. From this perspective, diversified evaluation methods can effectively mirror learners' performance in study and thus encourage them to be autonomous learners.

## **3 THE EVALUATION SYSTEM IN COLLEGE HYBRID ENGLISH TEACHING MODEL BASED ON BIG DATA PLATFORM**

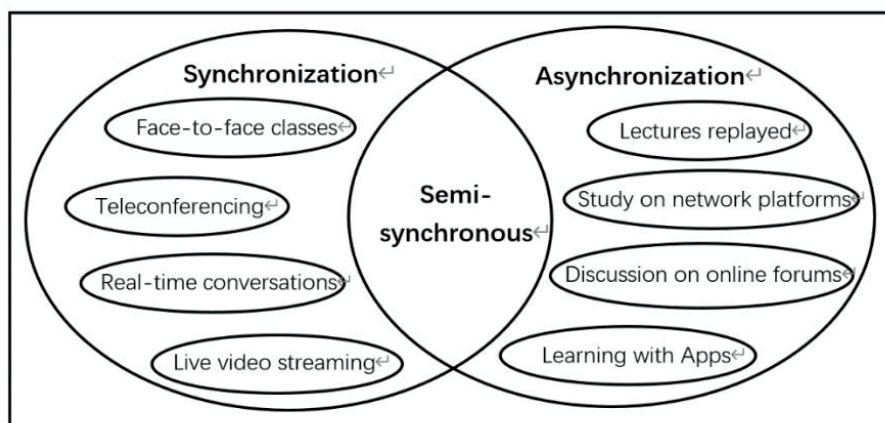
To construct effective evaluation system in hybrid English teaching model, it is necessary to learn the features of the hybrid teaching model in terms of time. Also, the exploration of different assessments is necessary.

### **3.1. TEMPORAL CHARACTERISTIC OF HYBRID TEACHING MODEL**

The hybrid teaching model or the blended learning model, being intermediate between traditional face-to-face teaching and online teaching, is both synchronous and asynchronous. Anders Norberg holds the view that blended learning is a combination of modern media, communication modes, times and places in a new kind of learning synthesis in place of traditional classrooms and technology with the teacher serving as a facilitator of a collective learning process. He proposes a new model of blended learning in which physical teaching environments give way to time. Time and synchronicity become the primary elements of the learning environments. [6].

Figure 1 shows the time and synchronicity in blended learning model. The blended learning model divides time into two main dimensions: the synchronous (face-to-face classes, live video streaming and real-time conversations online, etc.) and the

asynchronous (watching lectures replayed, study in network platforms and learning with Apps, etc.).



**Figure 1.** Synchronization and asynchronization in blended learning model

### 3.2. FORMATIVE AND SUMMATIVE EVALUATION

Since it is synchronous and asynchronous in the blended learning model, the formative evaluation and summative evaluation are necessary in hybrid teaching model, which consist of the evaluation system in teaching [7]. Formative evaluation focuses on students' learning process, which is a comprehensive assessment of students' performance, the results of students' tests, the development of students' emotion, the attitudes and strategies of students in learning. The information from formative assessment provides teachers and students feedback on their work, being helpful and effective both in teaching and learning [8]. Summative evaluation, however, usually comes after a period of study. The mid-term examination and the final examinations both belong to summative evaluation. Summative evaluation let teachers know students' learning achievements after a period of study. Students' performance in the learning process, however, cannot be provided in summative evaluation.

In hybrid teaching model, students attend class on and off the line, taking part in different learning activities, synchronously or asynchronously. In this situation, the combination of both formative and summative evaluation is more reasonable and logical.

### 3.3. THE CONSTRUCTION OF EVALUATION SYSTEM IN COLLEGE HYBRID ENGLISH TEACHING MODEL BASED ON BIG DATA PLATFORM

Today, lots of network learning platforms and some English leaning applications are well applied in college English teaching. The hybrid teaching model is widely accepted in college education, but the problems in traditional college English teaching also exist in hybrid English teaching, which calls for higher request in evaluation. To

construct a scientific evaluation system, comprehensive, multi-perspective and diversified evaluation methods should be adopted and taking advantage of the big data platform is instrumental.

### **3.3.1. EVALUATION IN STUDENTS' PREPARATION FOR NEW LESSONS**

Preparation for new lessons is an important link in college English teaching. Teachers could assign students different tasks to preview a new lesson. In the preparation for the new lesson, students can improve their autonomous learning ability. Based on the Flipped Class Model, students are usually provided with videos focusing on key points and difficulties in the texts to learn. They are required to study the texts by themselves with the help of the videos and then they come to the classroom with their own understanding and questions of the texts, to join in the interaction and discussion in class. [9] The preparation, in this way, is asynchronous and the evaluation must be formative. Teachers could take full advantage of the big data platform to help construct effective evaluation system. Diversified evaluation methods could be adopted for different learning tasks in this step. Students' learning activities on network platforms can be examined and evaluated online. The data collected make it possible for teachers to supervise and assess students' learning process. The network learning platforms and various learning applications are useful since almost all of them can provide channels for teachers to communicate with students. This makes it possible for teachers to give evaluation and gain the feedback from students, which in turn helps teachers to find out students' problems in the learning process and adjust the teaching plan timely.

### **3.3.2. EVALUATION IN OFFLINE FACE-TO-FACE CLASSES**

Evaluation in synchronous classes like traditional face-to-face class is an important part of students' comprehensive assessment. Teachers ought to effectively evaluate students' whole classroom performance instantly, while students need to give their feedback immediately. In this way, the learning and teaching process can be evaluated together, which enable both the teachers and the students to find out their deficiencies in class and correct them in time. To make the assessment efficient, teachers should adopt comprehensive and multi-perspective evaluation methods for various learning activities in class, which includes English presentations, public speeches, interviews, debates, dramas and so on. In carrying out these activities, the evaluation must be multi-perspective. Self-assessment is the first step, which helps students find the gap between English learning status and goals. Peer assessment is also crucial. In group work and pair work, students can get feedback from their partners, which is another way to help students find out the problems in learning English. Teachers' evaluation is at the core of evaluation system. Immediate and high-quality

feedback from teachers is conducive to the cultivation of autonomous learners.

### **3.3.3. EVALUATION IN REFLECTION AFTER CLASS**

Reflection after class is critical for students in English learning. By reflecting on what they've done and how they've performed in classes, students can evaluate how much they've learned in class. The big data platform makes the reflection more efficient and valid since almost all the activities can be recorded on the network platforms. With the data provided from the platforms or some learning Apps, students can write their own learning journals, in which they can effectively assess their study in a phase. The data could help them spot their learning problems and adjust the learning strategies. The teachers could also analyze the data provided, read students' journals and make digitalized learning portfolios for students. In this way, the evaluation system is more reasonable and scientific.

### **3.3.4. EVALUATION INDICATORS IN COLLEGE HYBRID ENGLISH TEACHING MODEL**

Since both formative and summative evaluations are necessary in hybrid teaching model, appropriate evaluation indicators for college English teaching model are needed. Table 1 shows the evaluation index system of the hybrid English teaching model. In the index system, class attendance, class participation, presentation, completion of assignments, quiz, the scores of mid-term exams and final exams are all important indicators in different proportions. Except the scores of the exams, the indicators can be evaluated in both online and offline classes and belong to the category of formative evaluation. Methods of summative evaluation, of course, are essential here. Scores of periodical achievement tests belong to the category of summative evaluation, accounting for 50% in the whole evaluation system. The new evaluation index system of the hybrid English teaching model is rational and logical, which will motivate students' interest and enthusiasm in learning English, encouraging them to be efficient and active learners.

**Table 1.** The evaluation index system of the hybrid English teaching model

Item	Class attendance	Class participation	Presentation	Completion of assignments	Quiz	Mid-term exam	Final exam
Percentage (100%)	5	10	10	15	10	10	40
Types of classes	Online/ offline class	Online/ offline class	Online/ offline class	Online/ offline class	Online/ offline class	offline face-to- face class	offline face-to- face class
Time and synchronicity	Synchronous/asynchronous	Synchronous/ asynchronous	Synchronous/ asynchronous	Synchronous/ asynchronous	Synchronous/ asynchronous	Synchronous	Synchronous
Category of evaluation	Formative evaluation	Formative evaluation	Formative evaluation	Formative evaluation	Formative evaluation	Summative evaluation	Summative evaluation

#### 4 CONCLUSION

The rapid progress in computer network technology today has brought new opportunities for college English teaching. The hybrid teaching model, in which the evaluation system should be emphasized, contributes to the fast development of English education. In construction of the evaluation system, both formative and summative evaluation should be adopted, quantitative and qualitative assessment included. Multi-perspective and diversified appraisal measures as well as various evaluative indicators should all be considered. The evaluation methods adopted, however, ought to be based on the features of classes and the learning platforms to meet individual need in learning. It is not easy to construct a comprehensive evaluation system in practice, and to work on it needs every effort. With the development of hybrid English teaching model, the evaluation system is to be intellectualized and systematic.

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# RESEARCH ON THE INNOVATION MECHANISM OF THE INTEGRATION EDUCATION MECHANISM BETWEEN CIVICS AND INFORMATION TECHNOLOGY OF COLLEGE STUDENTS IN THE ERA OF ARTIFICIAL INTELLIGENCE

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## ABSTRACT

In the background of the era of artificial intelligence, information technology has to a certain extent promoted the development of educational innovation mechanism of ideological and political courses in colleges and universities, however, there are also more problems in the practical application, such as over-reliance on technology and chasing technical equipment and other phenomena. In order to avoid the phenomenon of alienation and promote the deep integration of the ideology and politics curriculum with information technology, we must comprehensively improve teachers' information technology literacy and optimize the design of teaching methods. Ensuring that information technology can accurately dovetail with course content fundamentally enhances the effectiveness of teaching Civics courses. This study promotes the innovative development of the integration of the teaching of Civics and Modern Information Technology in colleges and universities in the new era, enhances the affinity and relevance of ideological and political education, and meets the needs and expectations of the growth and development of college students in the new era.

## KEY WORDS

information technology; educational innovation mechanism; college students; Civics course; deep integration

## 1 INTRODUCTION

The 19th Party Congress made a major judgment that socialism with Chinese characteristics has entered a new era, which opened a new journey to accelerate the modernization of education and build an educational power [1-2]. The Education

Informatization 2.0 Action Plan released by the Ministry of Education in April 2018 states: Education informatization is the basic connotation and distinctive feature of education modernization, and the Education Informatization 2.0 Action Plan is an effective way to accelerate the realization of education modernization [3-4]. Education informatization has the unique advantages of breaking through time and space limitations, rapid replication and dissemination, and rich presentation means, which will definitely become an effective means to promote educational equity and improve educational quality, and will become a powerful support to build a ubiquitous learning environment and realize lifelong learning for all people, and will bring about a significant improvement in scientific decision-making and comprehensive governance capacity of education [5-6].

The literature [7] summarized the characteristics and shortcomings of the current research on curriculum thinking and government, and then proposed four innovative paths in terms of strengthening the internalized research on curriculum thinking and government, expanding the multidisciplinary perspective of curriculum thinking and government research, promoting the systemic nature of curriculum thinking and government research, and innovating the practical application of curriculum thinking and government research results.

In the literature [8], under the guidance of "three comprehensive education", the information technology-based "curriculum thinking politics" in university English builds an ecosystem of foreign language curriculum thinking politics from the aspects of teaching concept, teaching mode and strengthening of thinking politics, and realizes the three elements of curriculum, thinking politics and information technology. This paper focuses on cultivating students' ideological and political literacy.

The main purpose of this paper is to promote the development of the innovative mechanism of the integration education of students' thinking and politics courses and information technology with the orientation of cultivating students' ideological and political literacy, mainly to meet the requirements of society and enterprises on the ideological and political values of talents, to highlight the main position of students in teaching based on the scientific attributes of students' thinking and politics courses and information technology, to implement the practical teaching link into each course, and to improve students' ideological and political quality and ability. political quality and ability.



## **2 STRATEGIES FOR THE DEEP INTEGRATION OF EDUCATION AND TEACHING IN HIGHER EDUCATION CIVICS AND MODERN INFORMATION TECHNOLOGY**

### **2.1 HIGHLIGHTING THE CONNOTATION AND LEADERSHIP OF TEACHING IDEAS**

The high degree of integration of college Civic and Political Science courses with modern information technology must adhere to the people-oriented concept and effectively deal with the relationship between the subject and carrier, the whole and the part between the integration of the two. It can show the content of college Civic and Political Science education through information technology. By applying modern information technology, it can enhance the infectious and expressive power of teaching contents, however, the charm of Civic and Political Science theory will directly affect the effect of the integration of Civic and Political Science education and modern information technology. The content of Civic and Political Science teaching not only includes theoretical knowledge, but also should focus on the transmission of mainstream values. Focus on value leadership in the process of knowledge teaching, deal with the relationship between systematic learning and fragmented learning, and reasonably control the application of real classroom and virtual classroom.

### **2.2 INSIST ON THE TEACHER'S CLASSROOM LEADERSHIP AND GUIDANCE**

Teachers should give full play to their leading and guiding roles in carrying out teaching activities, and the above factors are factors that have an important impact on the integration of Civic and Political Science courses with information technology. Under the background of information technology development, teachers should always carry out teaching activities around students and improve their ideological and moral level and cultural literacy comprehensively. Teachers not only need to impart theoretical knowledge in teaching activities, but also should design and organize teaching tasks that can gradually guide students to participate in teaching activities. In the process of rapid development of artificial intelligence technology, the challenges facing the education of Civic and Political Science courses are mainly fast food and fragmented knowledge, which can help improve students' thinking and discernment ability through emotional communication between teachers and students.

### **2.3 IMPROVING TECHNICAL SKILLS AND OVERALL LITERACY IN THE CLASSROOM**

By improving the technological literacy of educational product development and management personnel, it helps to promote a high level of integration between college and university civic education programs and information technology. Since technology

has social and natural attributes, users cannot change the physical structure of technology, however, they can realize social functions through technological creativity. Information technology can not only change the original educational environment, but also establish a new educational ecology, so the constructive and deconstructive ability of information technology must be given full play, so that the positive value of information technology can be brought into play. Technology can not only play the role of a medium, but also has certain educational functions. So it is that we should actively participate in the training activities of modern information technology design and application capabilities, comprehensively strengthen teachers' awareness of the integration of curriculum education in the field of information technology, and enhance the effectiveness of Civic and Political Science curriculum education through modern technology.

#### **2.4 OPTIMIZING THE PROCESS OF INNOVATIVE TEACHING METHODS**

Modern information technology has the concept of openness and sharing, and enhancing the popularity of modern information technology can help enrich the content of Civics and Political Science teaching. Therefore, classrooms should innovate the content and teaching methods of Civics courses through mechanical technology, enhance students' interest in learning through a variety of teaching modes, and also avoid the negative effects of information technology on teaching effectiveness. It is that you can develop corresponding education programs in accordance with the physical and mental development characteristics of different students as a way to enhance the effect of Civics education, but rather the need to promote students' independent learning through information technology. So to explore and analyze the path of integration of the two, we need to start from ways and means to effectively combine ability cultivation and perceptual experience to bring into play the positive effects of information technology.

#### **2.5 ENHANCING STUDENT ENGAGEMENT**

In the process of rapid development of modern information technology, the information acceptance ability and literacy of students have been enhanced accordingly. Through the deep integration of information technology and Civic Education, it helps to enhance students' sense of teaching experience and active participation in teaching education, which can play an enriching role in teaching content and form and establish good teacher-student relationship. So classrooms should look for ways for students to participate in multimedia teaching as well as in blended teaching mode, and by improving students' modern information technology literacy, they can effectively eliminate the problems of learning passivity and blindness.

### 3 THE CONSTRUCTION OF INNOVATIVE MECHANISM FOR CURRICULUM THINKING AND POLITICAL SCIENCE COURSES IN COLLEGES AND UNIVERSITIES

#### 3.1 THE FOCUS OF THE CIVICS CURRICULUM IN HIGHER EDUCATION

Figure 1 shows the ratio of the focus of carrying out curriculum thinking politics. The construction and implementation of curriculum thinking and politics requires the strength of all parties, and the focus of carrying out curriculum thinking and politics should be carried out from many aspects. Forty-four percent of the teachers think that schools should pay attention to curriculum thinking and politics, do a good job in top-level design, and organize activities such as model curriculum thinking and politics teaching courses. 56% of the teachers think that teachers should improve their own thinking and politics awareness and ability, and learn to dig deeper into the suitable thinking and politics elements in the teaching materials. 42% of the teachers think that curriculum thinking and politics should be carried out by reforming teaching methods and making the curriculum thinking and politics "more interesting". The teachers think that they should reform the teaching methods and integrate the course Civics into the curriculum in a "silent" way; 35% of the teachers think that they should also establish a corresponding evaluation mechanism for the course Civics.

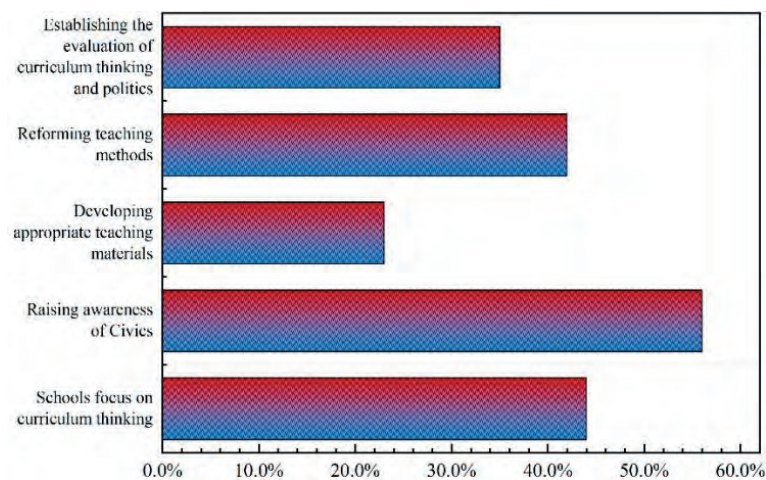
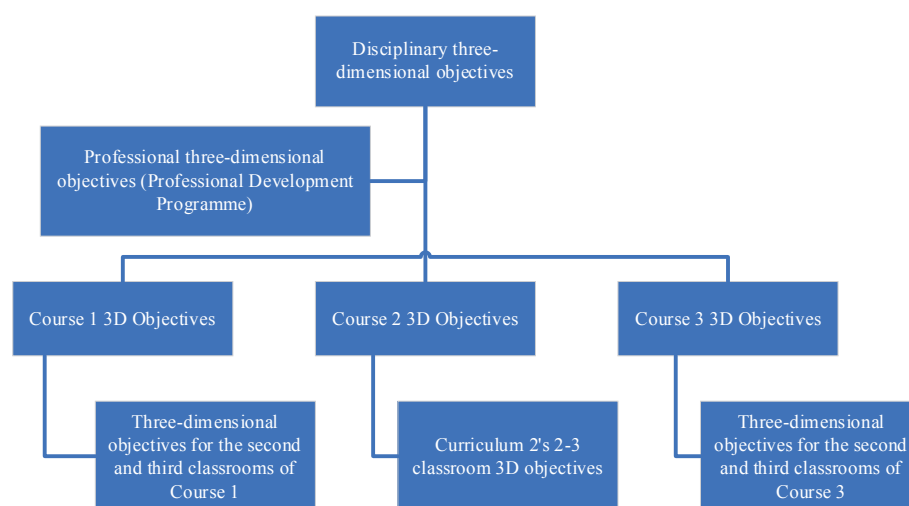


Figure 1 Percentage of focus on conducting curriculum thinking

#### 3.2 INTEGRATING THREE TYPES OF CLASSROOM IDEOLOGICAL AND POLITICAL EDUCATION OBJECTIVES

Figure 2 shows the three-dimensional goal-integrated design of the three types of classroom ideas. The professional teachers of the first classroom should consider the general objectives of the course and the subobjectives of the class time, how each objective can be reached through the first classroom narration and the second classroom practice, and also how to respond to the various voices on the network of

the third classroom. The second classroom should consider the purpose of the activity, whether it can integrate the knowledge of the first classroom into the design of the activity, whether it meets the psychological characteristics of students, whether it meets the development requirements of the times, and whether it is feasible, etc. Attention should also be paid to combining the hot issues of students' concern in the third classroom, so that students can perceive and experience them in practice; the third classroom should grasp students' interests and hobbies and take the initiative to The third classroom should hold on to students' interests and hobbies, take the initiative to open relevant self-media and public numbers, express in students' favorite language, expressions and ways, and respond well to the first and second classrooms. We can also use the knowledge, ability and value gained in the second and third classrooms to support what we learn in the first classroom, so as to truly realize a comprehensive and three-dimensional curriculum of Civic Science.



**Figure 2** Three-level 3D goal-integrated design

#### 4 CONCLUSION

Continuously promote the deep integration of information technology and education, and promote the improvement of two levels. Promote the higher-order evolution of education informatization from integration application to innovation development, and the deep integration of information technology and intelligent technology into the whole process of education to promote improvement of teaching, optimization of management and performance enhancement. Comprehensively improve the information literacy of teachers and students, promote the expansion from technology application to competence quality, make them have good information thinking, adapt to the requirements of the development of information society, and the ability to apply information technology to solve problems in teaching, learning and life become the essential basic quality. This points out the general direction for the integration and innovative development of the teaching of college Civics and modern

information technology in the new era. The curtain has just been drawn, and there is still a long way to go.

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# STUDY ON THE DEVELOPMENT STRATEGY OF CROSS-BORDER E-COMMERCE AND LOGISTICS SUPPLY CHAIN INTEGRATION BASED ON SCOR MODEL

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## ABSTRACT

Relying on SCOR model, cross-border e-commerce and logistics supply chain are integrated and developed, and the general process of fresh agricultural products logistics supply chain is analyzed. Through the analysis of the existing problems of each participating body of the cross-border e-commerce logistics supply chain, suggestions are made that cross-border e-commerce sellers should establish logistics supply chain thinking, logistics enterprises should establish domestic and international logistics alliances, and strengthen information construction, in order to bring some contributions to the development countermeasures of cross-border e-commerce logistics supply chain.

## KEYWORDS

SCOR model; cross-border e-commerce; agricultural products; logistics supply chain; development countermeasures

## 1 INTRODUCTION

In recent years, the problems of excessive circulation links, long circulation chains and high operating costs in China's fresh agricultural products supply chain have been widely concerned, and the state has repeatedly issued relevant policies and measures on the integration and optimization of agricultural products supply chain [1-2]. The rapid development of the Internet has brought new opportunities to the development of fresh agricultural products supply chain, and various places have also introduced relevant policies to promote the rapid development of "Internet + logistics" [3-4]. In order to provide continuous and high-quality energy for cross-border e-commerce transactions, it is necessary to study the optimization of cross-border e-commerce logistics supply

chain [5-6].

The literature [7] investigated the path of integration development of cross-border e-commerce and logistics in China based on the perspective of supply chain stability. The core idea is to build internal stability mechanism and external stability mechanism based on the integration of cross-border e-commerce and logistics in technical business and operation. The literature [8] addresses the cross-border e-commerce logistics supply chain, which is the backbone of accelerating the development of cross-border e-commerce and providing comprehensive benefits for the cross-border circulation of commodities, while policy support is the key way to promote its synergistic development.

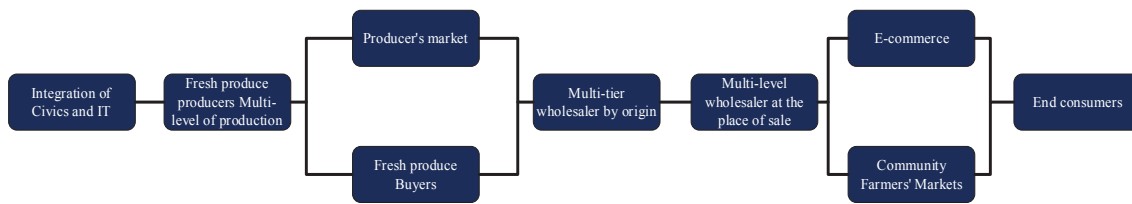
In this paper, from the perspective of the SCOR model logistics supply chain, both for cross-border e-commerce and logistics supply chain process operation, have evolved into a chain to match. Based on the SCOR model logistics supply chain, the smooth operation of the chain can be ensured through the full combination of many requirements. Obviously, a brief analysis of cross-border e-commerce logistics supply chain synergy development has a positive role in promoting the sustainable development of cross-border e-commerce.

## **2 AGRICULTURAL LOGISTICS SUPPLY CHAIN PROCESS AND SCOR MODEL**

### **2.1 LOGISTICS SUPPLY CHAIN PROCESS**

Figure 1 shows the agricultural logistics supply chain process. The participants of fresh agricultural products in China mainly include agricultural suppliers, fresh agricultural products producers, origin distribution centers, wholesalers at all levels, terminal retailers and consumers. Among them, origin distribution centers generally consist of origin markets and buyers, and terminal retailers generally consist of supermarkets and community farmers' markets.

The concentration of production of fresh agricultural products in China is low and shows a high degree of non-standardized characteristics, while with the improvement of living standards. People's demand for fresh produce is gradually increasing, and the end retailers need stable quality, high standardization and diversified products. This "small farmer". The contradiction of big market makes it need a huge circulation link to play the role of collection and distribution of fresh agricultural products, which makes the flow speed of fresh agricultural products decrease, thus leading to a decrease in sales efficiency and logistics flow speed. As a result, product loss increases and quality decreases, while the excessive intermediate chain levels and information asymmetry will aggravate the problem.



**Figure 1** Agricultural logistics supply chain processes

## 2.2 SCOR MODEL

The SCOR model, the Supply Chain Operations Reference Model, is published by the American Supply Chain Association. The third layer is the process element layer, which is a refinement of each process in the second layer and defines the required inputs and possible outputs of each process element.

## 3 CROSS-BORDER E-COMMERCE AND LOGISTICS SUPPLY CHAIN OPTIMIZATION MEASURES

### 3.1 CROSS-BORDER E-COMMERCE LOGISTICS INDUSTRY DEVELOPMENT HISTORY

Table 1 shows the development history of the cross-border e-commerce logistics industry. With the increase of China's foreign trade activities, the logistics industry, as an important part of the cross-border e-commerce logistics supply chain, has also developed and grown. Its development has gone through three main stages, namely, the start-up stage, the optimization stage and the evolution stage.

**Table 1** Cross-border e-commerce logistics industry development history

Time	2004-2007	2007-2016	2016- Now
Industry Developments	Start-up phase	Optimisation phase	Evolutionary Stages
Industry features/typical events	Some traditional freight forwarders transformed into cross-border logistics service providers	2011 China Post launches international e-bao products: China-European train opens	UPU terminal fee increases have prompted service providers to launch new businesses such as "dedicated" logistics products

### 3.2 CROSS-BORDER E-COMMERCE SELLERS SHOULD ESTABLISH LOGISTICS SUPPLY CHAIN THINKING

Cross-border e-commerce sellers should establish logistics supply chain thinking, to fully understand the importance of the logistics supply chain, not only to pay attention to the logistics and transportation process after the transaction is reached, but also to understand that procurement, inventory, distribution is a whole set of systems, as far as possible from the source to control the amount of goods laid, to play the purpose of reducing inventory.



### **3.2.1 PLATFORM SELLERS**

If it is a platform seller, then the decision should be made in conjunction with the logistics companies that the platform cooperates with. For example, if stationed in the speed sell platform, most of its parcels through the Chinese post or foreign postal direct, and every e-commerce holiday, postal logistics network will be paralyzed, so such sellers should pay more attention to logistics network stability and channel security.

### **3.2.2 SALES ITEM TYPE**

To see their own sales categories, with the development of cross-border e-commerce, many sellers began to sell from the sale of cheap small goods to sell some large categories, then the logistics channels should also be upgraded, choose more suitable for the existing categories of logistics companies to transport.

### **3.2.3 DESTINATION ITINERARY**

The tariff barriers brought by trade frictions between China and the U.S. will make the cost of sellers higher, so some enterprises will choose to use direct commercial express or postal parcel to export to the U.S., which is a good way to avoid local consumption tax and tariff by turning the whole into zero. In addition, many scholars have researched and established criteria and methods for logistics service provider selection and logistics mode selection, which provide reference for cross-border e-commerce sellers' decision making.

## **3.3 LOGISTICS SERVICE INTEGRATORS SHOULD IMPROVE THEIR ORGANIZATIONAL CAPABILITIES**

As a core member of the cross-border logistics supply chain, the logistics service integrator needs to have the ability to "take the overall picture and coordinate all parties", and the selection of logistics service providers, the setting of the overall logistics plan, the handling of unexpected events in the process, and the coordination among members all need to be completed under the leadership of the integrator. The integrator's organizational capability should be strong. The integrator can take the following measures to improve the organizational capability.

### **3.3.1 BUILD LOGISTICS INFORMATION NETWORK**

The integrator should build an information network consisting of all parties in the logistics supply chain to strengthen information sharing among members so that the integrator can understand the operation status of the supply chain in a timely manner and facilitate immediate communication among members to improve the quality of supply chain management. Second, the integrator can introduce management talents.

### **3.3.2 INTRODUCTION OF MANAGEMENT PERSONNEL**

Integrators can bring in management talent. "Professional things need professional people to do, although this will increase certain costs, but will improve the core competitiveness of the organization. Integrator enterprises can cooperate with universities to train cross-border e-commerce logistics supply chain management talents. Third, develop a good cooperation program. The cooperation program is the guide and constraint of each member's operation, once the cooperation program reached agreement, then each member should act according to the agreement. The cooperation program should be especially elaborate for the part of breach of contract, specifying the responsibilities of all parties and the penalties after breach of contract, so as to facilitate the management of integrators afterwards.

### **3.4 PERFORM QUALITY CONTROL OF LOGISTICS SUPPLY CHAIN SERVICES**

In this logistics supply chain, the cooperation between logistics service integrators and logistics enterprises is the most important, the two share the benefits and risks, if they can cooperate well, the quality of the logistics supply chain will be greatly improved. At present, there are more situations between the two is the quality of control of the integrator for the supplier and the logistics enterprise breach of contract. In the process of cooperation, there is often a situation that one party pursues its own interests to maximize the interests of other cooperative members at the expense of the other, which shows that quality management is still weak. To solve the above problems, the following suggestions are made.

(1) Some problems can be solved at the root by strengthening the inspection of the qualification of cooperative enterprises, choosing those with a strong sense of cooperation and responsibility to cooperate, and taking measures such as performance management.

(2) Enhance the professionalism of the part on breach of contract disputes in the contract, and establish a corresponding accountability mechanism to prevent the two from shifting responsibilities to each other.

(3) The first one formulates a reasonable responsibility-sharing contract. Cross-border e-commerce logistics supply chain involves a variety of complex links and many participating subjects, so clarifying the scope of responsibilities of each participating subject is conducive to restraining the behavior of all parties.

## **4 CONCLUSION**

This paper analyzes the current situation and problems of the development of each main body of cross-border e-commerce logistics supply chain and puts forward some development strategies. First, as the core members of the cross-border logistics

supply chain, cross-border service integrators should improve their own organizational capacity and supervision of logistics enterprises. Second, cross-border e-commerce enterprises should make good planning for laying goods at the source, establish supply chain thinking, and not overly rely on integrators. As the last implementer of logistics and transportation solutions, the service quality of logistics enterprises is related to the quality of supply chain services, and logistics enterprises should improve the level of information technology, pay attention to the construction of logistics infrastructure in underdeveloped areas and strengthen cooperation with foreign logistics suppliers. Thirdly, the quality of supply chain services should be controlled and punished for the "inaction" of the integrator and the breach of contract of logistics enterprises.

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# EXPLORING THE CULTURAL HERITAGE OF COLLEGE ART EDUCATION IN THE NEW ERA UNDER THE BACKGROUND OF BIG DATA

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## ABSTRACT

This paper first introduces the relationship between contemporary Chinese art and traditional culture, and puts forward the argument that traditional culture is the humanistic foundation of contemporary art as well as contemporary art has enriched the connotation of traditional culture. Then it analyzes the cultural sources of art education in colleges and universities in the new era, mainly Chinese excellent traditional culture, revolutionary cultural tradition and advanced socialist culture. Then the current situation of traditional culture in contemporary Chinese art is studied, as well as the effective path of integrating Chinese culture into college art education is explored. In the integration path, the main methods are: organizing teaching contents, reasonably conducting curriculum, infiltrating art culture, expanding cultural literacy and cultural infiltration according to the characteristics of the curriculum.

## KEYWORDS

big data; art education; cultural heritage; traditional culture; cultural sources

## 1. INTRODUCTION

Under the background of multiculturalism, art education in colleges and universities in the new era is faced with many value choices, and a variety of cultural elements intervene in art education, which enriches the cultural connotation and expression form of art education in colleges and universities, expands cultural boundaries and international vision, while also brings a certain degree of challenges to art education in colleges and universities [1-2]. As an art, the teaching content of art is rich in humanistic connotations and bears the responsibility of cultivating students' ideological and moral qualities and cultural self-confidence [3-4]. The literature [5] proposes that art and design education is a product of recent social development and

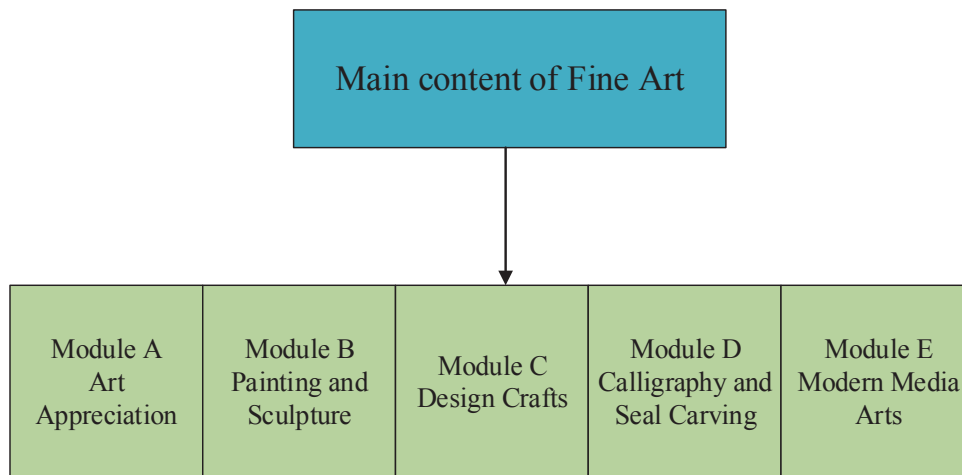
a special form of training this talent. The literature [6] proposes that art is a creative activity of using certain material materials and techniques, applying certain artistic means, and conceiving and planning in accordance with the laws of beauty to transform them into practical objects with specific use functions, external forms, human-machine relationships, and cultural meanings.

This paper first introduces the relationship between Chinese art and traditional culture, and proposes that contemporary art enriches the connotation of traditional culture and that traditional culture is the humanistic foundation of contemporary art. Then it explores the current situation of traditional culture in art and the effective path of integrating Chinese traditional culture into art education in colleges and universities.

## **2. THE RELATIONSHIP BETWEEN CONTEMPORARY CHINESE ART AND TRADITIONAL CULTURE**

### **2.1. TRADITIONAL CULTURE IS THE HUMANISTIC FOUNDATION OF CONTEMPORARY ART**

The source of humanistic flavor and cultural heritage in art creation is China's traditional culture. Without cultural heritage, art creation is soulless and is only an empty reproduction of shapes and objects, so in the process of art creation, creators need to fully draw on the essence of traditional culture and enrich the cultural connotation of art creation in order to improve the discourse of contemporary Chinese art in the international arena. In this era of rapid changes, we need to fully learn, understand and utilize traditional Chinese culture and apply it to art creation, which is an innovative form and an important method to improve the humanistic value of contemporary Chinese art, as well as a prerequisite for the development of contemporary Chinese art. This is not only conducive to the diversified development of contemporary Chinese art, but also to its finding its own niche in the historical context of globalization and having its own nationalized art language. Figure 1 shows the main contents of art education.



**Figure 1** Key elements of art education

## **2.2. CONTEMPORARY ART ENRICHES TRADITIONAL CULTURAL CONNOTATIONS**

These new and active elements inject fresh blood into contemporary culture and art, making it burst into vigorous life, and also promote China's traditional culture to adapt to the development of the times and make corresponding additions and improvements. Culture is epochal, and the culture of any period is the accumulation of culture in previous historical changes, and has the spirit of the times and historical language corresponding to the times, which plays a role of reference and guidance for future generations.

## **3. THE CULTURAL SOURCE OF ART EDUCATION IN UNIVERSITIES IN THE NEW ERA**

Literary artists should create and produce more excellent works that spread contemporary Chinese values, embody the spirit of Chinese culture, reflect the aesthetic pursuit of Chinese people, and have an organic unity of ideology, artistry and ornamentation. This is the noble mission and value of literary artists in the new era, and it is also the directional guidance for art education in colleges and universities in the new era to clearly cultivate what kind of talents. This requires that in the process of innovation and development, art education in colleges and universities in the new era is always rooted in the fertile soil of Chinese culture, contains the essence of revolutionary culture, and follows the development law of advanced socialist culture with Chinese characteristics.

### **(1) Excellent Chinese traditional culture**

Art education in colleges and universities in the new era, both at the material level

and at the spiritual level, is always shining with the light and wisdom of the excellent Chinese traditional culture. Firstly, art education in the new era inherits and develops traditional Chinese art forms, such as paper-cutting, embroidery, sculpture and so on. These art forms have a long history and contain the reverence and worship of the ancestors for life and nature, showing the unique spiritual quality and cultural tradition of the Chinese nation. The art education of colleges and universities in the new era fully inherits the art forms in the excellent Chinese traditional culture and injects the new spirit of the times, which is the embodiment of inheriting the excellent culture of the Chinese nation and also shows the inherent need of the Chinese and national characteristics of the art education of colleges and universities in the new era. Secondly, the art education of colleges and universities in the new era inherits and develops the way of thinking of traditional Chinese aesthetic education. Table 1 shows the classification of traditional culture.

**Table 1** Classification of traditional cultures

Category	Contents
Philosophy of Thought	Cultural awareness of Confucianism, Buddhism, Miscellaneous, Zongheng, Taoism, Mohism, Legalism, and Bing.
Traditional Literature	The Book of Songs, Chu's Analects, Journey to the West, Dream of the Red Chamber
Food	Tea ceremony, wine culture, Chinese cuisine, eight major cuisines, etc.
Martial Arts	Taijiquan, Wing Chun, Wudangquan, etc.
Traditional Festivals	Mid-Autumn Festival, Qingming Festival, Dragon Boat Festival, etc.
Drama	Beijing Opera, Yue Opera, Qin Opera, Chao Opera, Kunqu, Xiang Opera, Huizhou Opera, Hebei Bangzi, Shadow Play, Beijing Opera, Yue Opera, Qin Opera, Chao Opera, Kunqu, Xiang Opera, Huizhou Opera, Hebei Bangzi, Shadow Play
Chinese Music, Chess, Calligraphy and Painting	Erhu, Guzheng, Chinese chess, Chinese Go, Chinese calligraphy, seal carving seals, Four Treasures of Literature, Chinese painting, landscape painting, etc.
Architecture	Pavilions and pagodas, gardens and temples, bell towers and temples, pavilions and pavilions, etc.
Medicine	Chinese medicine, Chinese herbal medicine, the Yellow Emperor's Classic of Internal Medicine, and the Acupuncture and Moxibustion Classic, etc.
Folk Crafts	Chinese medicine, Chinese herbal medicine, the Yellow Emperor's Classic of Internal Medicine, and the Acupuncture and Moxibustion Classic, etc.

## (2) Revolutionary cultural tradition

Classic revolutionary art works are the epochal representations of art creation in the revolutionary era, with strong educational functions and politicized tendencies, and are one of the important contents of the art education curriculum in the new era of colleges and universities, and also provide a model for strengthening the creation of

revolutionary themes for art students in the new era of colleges and universities. The classic images of the revolutionary era are examples of art serving the cause of the Party and the country, and their qualities of reflecting the characteristics of the times and spreading political concepts with national independence and people's liberation as the main line are useful references for art education in new-age colleges and universities to clarify "for whom to train people. The integration of revolutionary culture tradition into the art education of new era colleges and universities is conducive to highlighting the party and people's nature of education, shaping students' "people-centered creation, promoting the main theme, expressing the will of patriotic struggle, and exerting the guiding power and influence of mainstream ideology.

### (3) Advanced Socialist Culture

Advanced socialist culture enhances the cultural confidence and self-awareness of art education in colleges and universities in the new era. In the context of increasingly close international art exchanges and dialogues, the art education of colleges and universities in the new era should grasp its own cultural character and symbolic meaning in the depth of history, shape its character internally and cultivate the essence of the culture of the times, learn from the advanced educational experience of others externally, actively study the excellent cultural concepts of foreign countries, and at the same time tell the story of Chinese college art education to the world, enhance the status of China's college art education in the world. In addition, we should realize the communication, intermingling and exchange of higher art education in the cultural level.

## **4. AN EFFECTIVE PATH FOR INTEGRATING CHINESE CULTURE INTO COLLEGE ART EDUCATION**

### (1) Organize teaching content and rationalize curriculum

In the teaching process, teachers should consciously integrate teaching into the relevant cultural background and make full use of the art curriculum to infiltrate culture, thus exerting a subtle influence on students. A variety of forms should be adopted to integrate cultural quality education into the classroom, such as work seminars on canal culture, work observation, masterpiece appreciation, and perusal of art works, in order to continuously improve students' cultural literacy. In addition, in order to cultivate students' humanistic consciousness and improve their cultural quality, teachers must first improve their own humanistic consciousness and cultural quality. If teachers do not have deep cultural cultivation, they cannot integrate more cultural background knowledge into art teaching, much less provide effective humanistic quality education to students.



## (2) Infiltrating art culture and expanding cultural literacy

Infiltrate humanistic spirit into the art curriculum, and view art as a kind of cultural learning rather than simple skill training. In teaching, teachers should pay attention to the introduction of art culture so that students can consciously recognize humanistic knowledge inside and outside this subject and continuously improve their level of artistic cultivation. It is also necessary to combine art with a rich humanistic background so that students can have a comprehensive understanding of what they are learning and thus better promote their artistic creation. Therefore, in the teaching process of elementary school art, students should be actively guided to reasonably analyze the painting techniques of famous paintings and also understand the stories behind the works.

## (3) Cultural infiltration according to the characteristics of the curriculum

In order for elementary school students to understand the profound connotations of culture and achieve good results in art learning, it is important to select content that is compatible with students' lives and learning, which is interesting to them and easy to understand and accept. When teaching "color" in elementary school, first of all, we should talk about the knowledge of color use. Art teachers can introduce students to traditional Chinese colors, such as crab shell green, lead white, honey, azure, moon white, bamboo green, water green, navy blue and so on. In ancient times, the literati and scholars recited poems, painted, tasted tea, drank wine, and played chess, and always enjoyed the elegance, even the names of the colors were poetic. In elementary school art education, Chinese painting has always been an important teaching content, which is directly related to the development of students' creative ability. If students are detached from the creation technique of Chinese painting itself, they cannot do well in creating excellent Chinese paintings, thus making their artistic creation level drop greatly. Therefore, strengthening the teaching of Chinese painting creation techniques is the current focus of elementary school art education, which means that certain key techniques and methods of Chinese painting should be infiltrated so that students can create Chinese paintings on their own. It also enables students to gain a sense of accomplishment in the learning process and stimulates their interest in learning Chinese painting.

## 5. CONCLUSION

This paper mainly explores the current situation of cultural heritage in art education as well as studies the relationship between contemporary Chinese art and traditional culture, and proposes an effective path for the integration of Chinese culture into college art education. It is concluded that the main paths of integration are: organizing teaching contents, rationalizing curriculum, infiltrating art culture,

expanding cultural literacy, and infiltrating culture according to the characteristics of the curriculum.

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# CONSTRUCTION AND APPLICATION OF EVALUATION MODEL OF MENTAL HEALTH COURSE EDUCATION EFFECT IN COLLEGES AND UNIVERSITIES UNDER THE BACKGROUND OF BIG DATA ANALYSIS

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## ABSTRACT

In order to objectively grasp the educational effect of mental health courses in colleges and universities. This paper constructs an evaluation model of the educational effect of mental health courses in colleges and universities based on big data analysis technology, and establishes evaluation indexes of the educational effect of mental health courses by summarizing and sorting out the behavioral data of students and teachers through data collection and analysis technology. The simulation practice results show that the accuracy and efficiency of the evaluation model are as high as 92% and 97%, respectively, with five primary indicators as well as several secondary indicators. It can be proved that the evaluation model constructed in this paper has formed a set of reasonable evaluation index system, which makes the teaching of psychological courses get a more fair, objective and comprehensive evaluation.

## KEYWORDS

Big data technology; Data collection; Effect evaluation model: evaluation metrics; Accuracy

## 1. INTRODUCTION

With the advent of the era of big data, big data technology, which is an important force of the fourth industrial revolution, is becoming more and more mature and applied in various fields. It opens a new field for the further development of mental health education evaluation in colleges and universities, and moreover helps to promote the continuous optimization of the evaluation standards, methods and mechanisms of mental health education in colleges and universities [1-2]. With its ability of analyzing and mining huge amount of data, big data technology embodies the characteristics of immediacy, correlation, equality and biphasicity in data analysis [3-5]. Thus, it provides a new technical support to effectively play the diagnostic function, guidance function, regulation function and motivation function of mental health education evaluation in colleges and universities.

Under the development trend of big data, the evaluation of mental health education in colleges and universities is also changing gradually. Literature [6] proposed a fuzzy evaluation method for teaching quality, gave the basic principles and implementation methods, and developed an index system. The Gaussian function is used to determine the index affiliation, and the fuzzy decision method is applied to calculate the evaluation results quantitatively. The literature [7] introduced Markov chain model into the evaluation of students' teaching effectiveness of mental health courses through example analysis, and explained the whole process of the method to evaluate the teaching effectiveness and to predict the teachers' teaching effectiveness. The literature [8] applied the basic steps of the weighting method to evaluate the teaching effectiveness of mental health courses and designed two examples of evaluation calculation methods to evaluate the teaching quality and learning effectiveness of mental health courses by the weighting method. The methods in the above literature are one-sided, all belong to the evaluation of process and conditions, not the evaluation of higher education quality, and are not a real evaluation of teaching effectiveness.

Based on this, this paper constructs an evaluation model for the effectiveness of mental health course education in colleges and universities based on the background of big data analysis. In the design process, big data collection techniques are used to make a diagnosis of the quality of mental health course teaching in colleges and universities. Based on this, five primary indicators as well as several secondary indicators are established through the analysis of students' and teachers' behavioral data. And the practical effect of the model is verified through simulation practice, which illustrates that the evaluation model of mental health course education effect constructed based on the background of big data can examine the output results of college education and teaching from different levels, reflecting different evaluation orientations and values.

## **2. BIG DATA ANALYSIS TECHNOLOGY AND EVALUATION MODEL**

### **2.1 BIG DATA ANALYSIS TECHNOLOGY**

**Data collection and cleansing:** The basic data needs to be extracted from the information management system to establish multiple assessment indicators. In order to ensure data quality, data cleansing is required for the collected fragmented data. A unified data storage format is established first, and then the data is proofread and verified, with the aim of removing duplicate information and merging intersecting data sets. Errors that exist are corrected to guarantee the correctness, consistency and integrity of the data.

**Data storage and sharing:** The cleaned data is finally stored in the data center according to a uniform format. These data are only used for data exchange to realize data sharing between each independent management system. Each management system can only add, delete, change and check operations on its own basic information base, and call the basic data of other management systems with parallel relationship, and only have query authority.

**Data analysis and management:** Firstly, by sorting, classifying and summarizing the data obtained through extraction and integration, relatively independent data subject domains are organized. Then data trend analysis is conducted to establish a reasonable model for evaluating the educational effectiveness of mental health courses, projecting data similarity, and verifying data patterns and hidden correlations. Thus, statistical predictions and judgments are provided for teaching managers. Finally, a corresponding early warning mechanism is formulated for mental health teaching contents with low evaluation grades, so that improvements can be made in subsequent teaching, thus achieving the goal of improving the teaching effectiveness of mental health courses.

## 2.2 CONSTRUCTING AN EVALUATION MODEL FOR THE EFFECTIVENESS OF MENTAL HEALTH COURSE EDUCATION

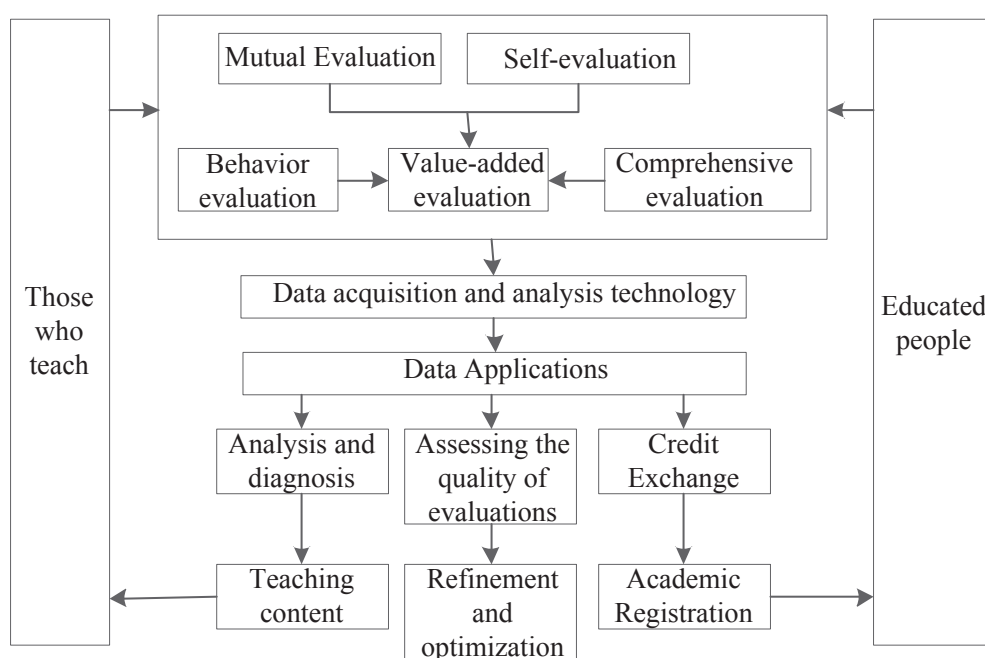
In this paper, five primary indicators as well as several secondary indicators are established through data collection techniques, as shown in Table 1.

**Table 1.** Weighting table of indicators at each level

Level 1 indicators	Organizational management and institutional set-up	1.Target setting 2.System improvement 3.Work planning
	Faculty Development	1.Full-time teachers 2.Teacher Training
	Educational activities and research	1.Psychology Foundation Course 2.Placement in public foundation courses Mental health education content 3.Teaching staff to conduct Training
	Advice and Counselling	1.Measure and create a psychological profile of the student 2. Online consultation 3. Establishing a mental health treatment system
	Security of Conditions	1.Workplace 2. Instrumentation

As can be seen from Table 1, this paper first decomposes each secondary index to form specific contents, and determines the evaluation criteria of each index with reference to some provincial and municipal index systems, relevant regulations of the Ministry of Education and feedback from two expert questionnaires. The existing indicators are clustered according to certain criteria, and further categorized and organized through big data analysis technology on the basis of the proposed indicator system to form a set of system after it is organized. At the same time, through big data sharing technology, the actual work structure of a group of colleges and universities with better mental health education work is decomposed level by level, and the main factors decomposed are used as evaluation indexes by combining the statistical data of the Ministry of Education.

Mental health education evaluation is an important means to test the quality of mental health education and a difficult part of mental health education [9-10]. The evaluation model of mental health course education effect constructed in this paper, and the model structure is shown in Figure 1.



**Figure 1.** Structure of evaluation model

Analysis of Figure 1 shows that the evaluation model implements evaluation analysis through the analysis of student and teacher behavior data and constant monitoring of the process, and each higher education institution can truly achieve accurate governance based on big data analysis, process monitoring, trend prediction and risk warning. At the same time, the early warning process of the platform is used to build an evaluation cycle and realize the flow of process data step by step. It encourages teachers and students to participate in the teaching diagnosis and improvement work together.

### 3. SIMULATION PRACTICE OF EVALUATION MODEL

In this paper, based on the background of big data, we constructed an evaluation model for the effect of mental health course education and established evaluation indexes by using big data collection and analysis technology. In order to verify the effectiveness of the model, we selected universities for practical analysis and compared with the traditional evaluation methods, and the specific data are shown in Table 2.

**Table 2.** Information comparison results

Evaluation methods	Evaluation indicators	Evaluation techniques	Average evaluation accuracy rate	Evaluation efficiency
Traditional evaluation methods	4	Questionnaire	44%	33%
Big Data Technology Evaluation Model	5+Several	Big Data Analytics Technology	92%	87%

Analyzing the comparison results in Table 2, we can see that the traditional way of evaluating the effectiveness of mental health course education uses questionnaires, and the accuracy rate of this evaluation method is only 44%, which does not accurately reflect the evaluation of mental health course education. Moreover, there are only four evaluation indexes in the traditional way, and the effective rate is only 33%, which is not in line with the actual evaluation work and does not achieve a reasonable and effective evaluation effect. In contrast, the evaluation model of mental health course education effectiveness constructed in this paper based on the background of big data uses big data collection technology to build evaluation of five primary evaluation indicators, as well as several secondary indicators. The evaluation accuracy rate of the model is as high as 92%, and the efficiency rate is also 87%.

### 4. CONCLUSION

This paper takes the evaluation of the educational effect of mental health courses in colleges and universities as the starting point, uses big data analysis technology, constructs an evaluation model of the educational effect of mental health courses, and verifies the application effect of this evaluation model in practical application. For the traditional evaluation method, the evaluation model constructed in this paper has evaluated five primary evaluation indicators, as well as several secondary indicators, with accuracy and efficiency rates of 92% and 87% respectively. It proves that the evaluation model constructed in this paper can better optimize the education work of college students' mental health, and then promote the development of college students' mental health education work.

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# THE VALUE ORIENTATION OF STALIN'S ETHNIC POLICY IN CENTRAL ASIA AND ITS IMPACT BASED ON BIG DATA ANALYSIS

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## ABSTRACT

To recognize the effectiveness of the implementation of Stalin's ethnic policy. This paper analyzes the value orientation and impact of Stalin's ethnic policy in Central Asia based on big data analysis. In the process of big data analysis, data collection is used to standardize the policy value data. Combined with machine learning algorithms, information on the value impact of ethnic policies in the value data is mined. The simulation results show that the accuracy of its value orientation classification is above 94.8% on average, and that big data analysis has a positive effect on the analysis of the impact of Stalin's ethnic policy. Thus, it can be seen that big data analysis is beneficial for dynamic judgment of the orientation-related impact of Stalin's national policy.

## KEYWORDS

Big data analysis; Stalinist national policy; Machine learning algorithms; Data collection; Classification accuracy

## 1. INTRODUCTION

The theoretical sources of Stalin's national policy are pluralistic, and its content contains three principle policies of equality, unity, and prosperity and three target policies of anti-separatism, advocacy of centralization, and politicization [1-2]. Stalin's national policy has an obvious duality, and it has important theoretical and practical significance as an important part of the Stalinist socialist Soviet model [3-4].

Currently, there is a growing body of research on Stalin's national policy. For example, the literature [5] examines the value of Soviet civic life based on Stalin's preferences. The preferences of Stalin's national policy were modeled and illustrated to structurally estimate the accepted value of Stalin's willingness to reduce the risk of death of citizens. The literature [6] expands on international policy under Stalin through Stalin's national policy. The development trajectory of a region is viewed through the lens of Stalin's terror and marginalization. The literature [7] explains the sudden revival of Stalinism in practice, in its historical form and style, as a reactionary shift in the Soviet temporal culture, i.e. across all spheres of social and political life. Its expression of Stalinism as a timeless, utopian self-description. In summary, the Stalinist national policy studied so far has remained only in terms of policy content and direction of implementation, without interpreting the policy in



terms of value orientation and impact, and in the process of research, lacking the support of information technology.

Based on this, this paper analyzes the value orientation and impact of Stalin's ethnic policy in Central Asia based on big data analysis. In the process of big data analysis of ethnic policies in Stalin's Central Asian region, firstly, data collection is used to obtain normative data on policy implementation and unify the data types and formats of the value impacts of Stalin's ethnic policies. Secondly, several machine learning algorithms are selected and trained on the training set to mine valuable information on ethnic policy orientations. Finally, the practical effectiveness of the analysis methods in this paper is tested experimentally. The results demonstrate the positive effect of big data analysis on the analysis of the value orientation and impact of Stalin's national policy.

## **2. THE WORKING MECHANISM OF BIG DATA ANALYSIS**

### **2.1 DATA ACQUISITION**

Data collection is the process of collecting, filtering and cleaning data from data warehouses or various databases [8]. In the process of big data analysis of the ethnic policy of Stalin's Central Asian region, the purpose of data collection is to obtain normative data that can be directly used for data analysis [9-10]. Therefore, applying big data analysis to the value orientation analysis of the ethnic policy in Stalin's Central Asian region requires, first of all, data generation, listing various types of data generated in the process of policy value orientation analysis, such as policy orientation data and impact data. Secondly, the various types of data are explored, and the data of low data quality are discarded, and the positive ethnic policy data are selected as much as possible. The ethnic policy value orientation data are examined according to the rules, and the low-quality data are processed in a corresponding way. In addition, it is necessary to unify the data types and data formats of the value impact of Stalin's ethnic policy and standardize the data to meet the legitimacy and authority of the data and obtain the normative data to be analyzed.

### **2.2 DATA VALUE CREATION**

Data value creation is mainly to take the normative data to be analyzed, combine with machine learning algorithms, analyze the valuable key information from the massive normative data, and dig out the value information of ethnic policy impact implied in the data. In the process of data analysis, various types of machine learning algorithms are evaluated, firstly, the performance indexes of machine learning algorithms need to be defined, and usually different algorithmic models correspond to different performance indexes. Then the data set is divided into a training set and a test set, and multiple machine learning algorithms are selected to be trained on the training set. Finally, based on the performance indexes of each machine learning algorithm, the machine learning algorithm with the top ranking in each performance index is selected as the optimal method to ensure the algorithm has high stability and generalization ability.

### **2.3 DATA VALUE REALIZATION**

The purpose of data value realization is to develop global, accurate, and long-term strategic decisions for the value impact of Stalin's national policy, thereby providing a sustainable impetus for Stalin's national policy. Data value realization requires a combination of strategic decision modeling, strategic decision analysis, and strategic decision refinement, and each stage needs to be based on data analysis to obtain valuable policy impact information.

## **3. DATA-BASED RESULTS ANALYSIS OF POLICY VALUE IMPACT**

Based on big data analysis, this paper collects and analyzes data on the value orientation and influence of Stalin's ethnic policy in Central Asia, and compares this analysis method with traditional methods to verify its analytical effect.

### 3.1 ACCURACY OF VALUE ORIENTATION CLASSIFICATION

Based on big data analysis, this section collects 1000 data on the value orientation of ethnic policies in Stalin's Central Asian region. The results of their classification accuracy compared with traditional data collection methods are shown in Table 1.

**Table 1.** Comparison results of value orientation

	Big Data Analytics	Traditional analysis methods
National Unity and Unity	96.2%	76.2%
Ethnic Area Development	94.8%	81.9%
Concentration of ethnic power	97.8%	78.3%

From the accuracy comparison results in Table 1, it can be seen that the classification accuracy based on big data analysis reached 96.2% on the value orientation of national unity and unity, which improved the classification accuracy by about 20% compared with the traditional data collection method. The value orientation of Stalin's ethnic policy based on big data analysis has a classification accuracy of 94.8% on the value orientation of regional development of Central Asian ethnic groups. In the value orientation of ethnic power concentration, the classification accuracy is 97.8%, which is 12.9% and 19.5% higher than the traditional data collection method, and has a better classification accuracy of orientation.

### 3.2 STRENGTH OF POLICY INFLUENCE

The data value analysis of the impact of Stalin's ethnic policy in Central Asia based on big data analysis was conducted, and the statistical results obtained are shown in Table 2.

**Table 2.** Strength of influence of Stalin's national policy

Factors	Policy Impact Strength
Ethnic Region Economy	13.2%
Ethnic Culture and Education	1535
Number of ethnic minority cadres	697
Affiliate System	Yes
Social Stability	3

Analysis of the strength of the policy impact in Table 2 shows that the value impact of Stalin's national policy in Central Asia after its implementation includes five aspects. Using big data analysis, it can be concluded that Stalin's ethnic policy has a positive impact on the regional economy, which has increased the economic growth rate of Central Asia by 13.2%. The impact of Stalin's policy on ethnic culture and education is also significant. The analysis of big data shows that after the implementation of Stalin's ethnic policy, the number of primary education schools in Central Asia increased by 1,535, the number of ethnic minority cadres increased to 697, and a union system with ethnic characteristics was established. Thus, it can be seen that the impact of Stalin's ethnic policy can be analyzed more comprehensively based on big data analysis, which is conducive to the interpretation of the expected effects of the policy.

#### 4. CONCLUSION

Based on big data analysis, this paper analyzes the value orientation and impact of Stalin's ethnic policy in Central Asia from the perspectives of data collection, data value creation and realization, and verifies the analytical effectiveness of the method in the process of practical application. Compared with the traditional method, the classification accuracy of the value orientation of Stalin's ethnic policy based on big data analysis is over 94.8% on average, which improves the classification efficiency by nearly 12.9%. Moreover, using big data analysis, it can be concluded that Stalin's ethnic policy has a positive impact on both regional economic and ethnic cultural development. It indicates that based on big data analysis, the content of Stalin's ethnic policy can be understood more precisely and comprehensively, and it has certain generalizability in the field of policy analysis.

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# INTELLIGENT TEACHING OF INTEGRATED ENGLISH READING AND WRITING COURSES IN UNIVERSITIES BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

This paper firstly introduces the feasibility and methods of combining English reading and writing teaching, through the input of "reading", building the foundation of "writing", and using the combination of reading and writing to cultivate students' habit of writing and stimulate students' interest in writing. Then the implementation path of English reading and writing integration is introduced. Then we compared the results before and after the experiment of the integrated teaching method and analyzed the effect of the integrated teaching on students' motivation to write. 70% of the students agreed with the integrated teaching model and expected to improve their writing skills through this teaching model. After the experiment, the average score of the experimental class was 25.6, and that of the control class was 21.1. The average score of the experimental class was significantly higher than that of the control class, so the effectiveness of the teaching mode on writing improvement could be confirmed.

## KEYWORDS

big data technology; college English; integrated reading and writing; intelligent teaching; teaching mode

## 1. INTRODUCTION

At present, the teaching of English in high schools is basically input-based, i.e., listening and reading are emphasized, while speaking and writing are neglected, which leads to the unsatisfactory writing skills of many high school students. With the rapid development of global economic integration and the increasing demand for spoken English, English learners and teachers have started to pay attention to and improve English learning and teaching methods [1]. The literature [2] argues that the process models of reading comprehension can be broadly classified into three

categories, namely, bottom-up models, top-down models, and interaction models. The literature [3] argues that the process of reading is not a precise perceptual process, a series of processing processes, but a process of selection, a process of making tentative decisions, and a process of anticipation. The literature [4] argues that readers need both low-level skills (recognizing letters and words, etc.) and high-level knowledge (common sense and knowledge of the topic) to understand a text. The literature [5] argues that reading is a process of using the knowledge schema already in the brain to interpret local language, in which the reader first finds the best matching mental schema bottom-up based on the cues provided by the text, then makes expectations about the content of the subsequent text based on that schema, and then adjusts the expectations based on the cues of the subsequent text.

## **2. THE NECESSITY AND IMPLEMENTATION PATH OF ENGLISH LITERACY INTEGRATION**

### **2.1. THE NEED FOR INTEGRATED ENGLISH READING AND WRITING INSTRUCTION**

It is necessary to teach reading and writing together. Through the input of "reading", we can build the foundation of "writing". In students' minds, the ability to write is important, but because they "can't write" and are "afraid of writing", they are more and more intimidated by writing, so they can't love writing. However, the development of writing skills cannot be achieved by imitating a few model essays. With the input of reading and more imitation on the basis of reading, students will not be afraid of "writing". By combining reading and writing, we can cultivate students' habit of writing and stimulate their interest in writing. The teachers' teaching and evaluation methods for writing also prevent students from experiencing the joy of "writing". In the classroom, writing training, students feel the need to take the test, although the test is an important ability, but as mentioned above, it is not the whole composition teaching. Writing is also the expression and communication of ideas, emotions. Therefore, through reading, stimulating students' willingness to express their ideas, and then falling into writing, such regular writing training should be combined with daily teaching. Thus, students will develop the habit of writing.

### **2.2. THE IMPLEMENTATION PATH OF "READING AND WRITING" COURSE**

First of all, colleges and universities can offer reading and writing courses from the first semester to the fourth semester, the first semester mainly teaches the more basic knowledge of reading and writing such as the characteristics of various genres and chapter layout, focusing on the "input" of reading and writing knowledge. The second semester and the third semester are combined with different themes of reading materials to carry out "read-write combination" teaching activities, focusing on the

combination of "input" and "output". The fourth semester focuses on writing training, with emphasis on improving students' writing skills and "output". The reading and writing course should form the teaching mode of "imitation - proficiency - innovation" to improve students' reading and writing ability.

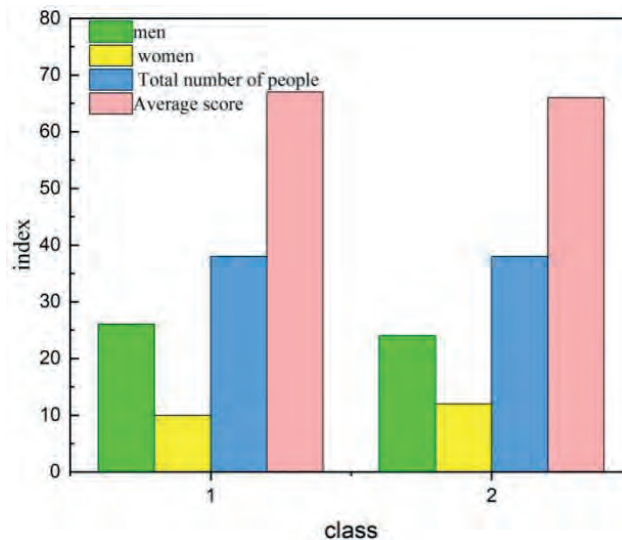
Secondly, in terms of teaching content, there are no good teaching materials suitable for reading and writing courses, partly because most colleges and universities have not yet integrated reading and writing courses. Therefore, colleges and universities should actively try to integrate reading and writing into one course and pay attention to the combination of reading and writing.

Again, in the teaching process, teachers should use information technology flexibly and extensively in order to improve the teaching effect of reading and writing courses. On the one hand, teachers should provide more valuable reading materials for college students through multimedia equipment and network technology, and integrate these materials and show them to students for memorization.

Finally, in terms of teaching evaluation, teachers need to evaluate not only students' reading ability, but also their writing ability. In the process of evaluation, teachers need to adopt scientific and reasonable evaluation methods and diversified evaluation activities. In addition, the teaching goal of the combined reading and writing course is to improve students' creative writing ability through a lot of reading input. Therefore, teachers should strengthen the process assessment and urge students to increase the amount of reading input and writing output. The teaching assessment should have diversity and evaluate students' reading and writing ability from a multidimensional perspective.

### **3. THE IMPACT OF READING AND WRITING INTEGRATION ON STUDENT LEARNING**

After questionnaire distribution and data analysis using spss software, the results of the analysis are as follows: this questionnaire was distributed to the experimental and control classes before and after the experiment, respectively, and the questionnaire design included 32 questions. The study was conducted between two parallel classes. During the study one of the two classes was used as the experimental class and one as the control class with a total of 72 students. The experimental class was taught by applying mind mapping and using the teaching model of reading and writing integration, and the control class was taught by using the traditional teaching model. Figure 1 shows the subjects of the investigation.



**Figure 1** Survey respondents

### 3.1. COMPARISON OF PERFORMANCE BEFORE AND AFTER THE EXPERIMENT

Two sets of English writing tests with comparable difficulty coefficients were administered to the experimental and control classes before and after the instructional model intervention, and the papers were scored out of 40. The same marker was used to ensure consistent marking standards.

**Table 1** Results of the pre-test and post-test in both classes

	Pre-test average	Post-test average	Comparison of pre and post-test averages.
Experimental Classes.	21.4	25.8	4.4
Control Classes	20.8	21.1	0.3

As can be seen from Table 1, before the experiment, the average scores of the two classes, the control class and the experimental class, were basically the same and could

as the control class, and after the experiment, the average performance of the experimental class was significantly higher than that of the control class, so the effectiveness of the teaching mode on writing improvement could be confirmed.

### 3.2. THE EFFECT OF READING-WRITING TEACHING MODEL ON STUDENTS' MOTIVATION TO WRITE

As can be seen from Table 2, in November 2015, there was little difference between the experimental class and the control class in terms of motivation and confidence level in writing at the beginning of the experiment of the integrated reading and writing teaching model. 60% of the students thought that writing in English was a burden. 70% of the students agreed with the integrated reading and writing model and

expected to improve their writing through this teaching model. 60% of the students thought that the biggest obstacle to writing was not knowing how to organize language in English. 70% of the students did not feel confident in improving their writing. 90% of the students thought that the writing session needed teacher's evaluation to help improve their confidence in writing. 95% of the students wanted positive evaluation from the teacher. 75% of the students felt lost about the mistakes made in their compositions. 75% of the students thought that the writing template served to open up their ideas. 55% of the students wanted writing to be discussed in class and review of essays. Only 20% of the students were satisfied with the current writing instruction. Pre-experimental questionnaire findings: Students perceive writing as a burden and have low self-confidence because they do not know how to organize their language. Expectation of teacher's evaluation, approval and peer's help. Students have low recognition of the current writing teaching and hope to make progress by trying to integrate reading and writing teaching mode.

**Table 2** The impact of reading and writing integration on students' writing

	Serial No.	Grade 1		Grade 2		Grade 3		Grade 4		Grade 5	
		Experimental classes	Controlled Classes	Experimental classes	Controlled Classes	Experimental classes	Controlled Classes	Experimental classes	Controlled Classes	Experimental classes	Controlled Classes
Attitudes towards writing	2	29	32	27	21	5	15	18	15	6	9
Recognition of reading and writing	3	14	38	21	35	8	41	15	9	6	3
Difficulty in writing	5	35	41	21	21	41	12	15	9	12	6
Confidence in learning	6	12	65	5	18	12	16	18	18	15	18
Teacher assessment	7	62	17	24	21	19	1	0	3	0	0
Acceptance of assessment	8	65	35	32	24	18	33	9	3	0	0
Emotional factors	9	50	21	24	27	39	22	6	6	3	3
Template factors	10	38	21	32	41	29	15	6	6	6	3
Discussion and evaluation	11	24	9	12	35	25	41	27	6	21	24
Satisfaction	12	12	9	27	15	18	12	18	24	6	9



#### 4. CONCLUSION

This paper explores the feasibility and specific measures of integrating English reading and writing, as well as the effect of realizing the integration of English reading and writing on students' achievement and writing motivation. Through the integrated teaching of reading and writing, students' performance was obviously improved, with 25.6 in the experimental class and 21.1 in the control class. the integrated teaching of reading and writing had a facilitating effect on students' motivation to write.

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# RESEARCH ON REAL-TIME ANIMATION GENERATION OF DENTAL ANATOMY TEACHING VIDEO BASED ON DIGITAL TWIN TECHNOLOGY

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## ABSTRACT

This paper extracts facial feature points from the captured oral data, establishes the connection between low-level facial feature points and high-level expression semantics using digital twin technology, and realizes the animation generation method for virtual character oral teaching using forward kinematic method to establish virtual human model with topological skeleton structure. The results show that the real-time animation generation based on digital twin technology applied to dental anatomy teaching video has an animation generation delay of 0.5s and can respond to the outside world in real time to generate interaction with students in real time. And the teaching performance achieved by the combination of traditional teaching and laparoscopic anatomy video teaching materials was the average student score ( $84.51 \pm 4.51$ ). The combination of traditional teaching and laparoscopic video teaching materials is better than traditional classroom lectures and can effectively promote the teaching reform of anatomy classroom.

## KEYWORDS

digital twin technology; forward kinematics; topological skeletal structure; video teaching; animation generation; oral anatomy

## 1. INTRODUCTION

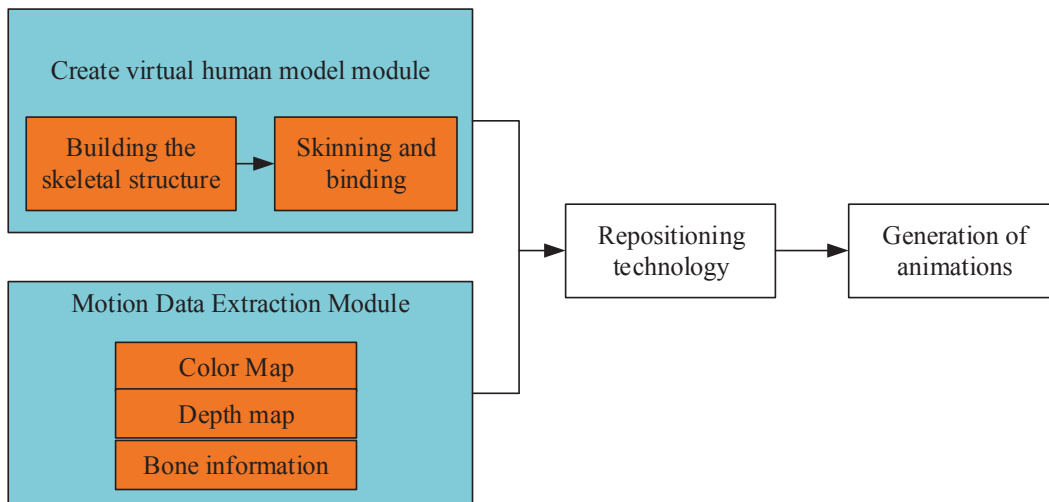
Anatomy is an important and fundamental course in medical science, and human anatomy is also a subject with a long history and tradition, which is a necessary

prerequisite for learning good clinical practice [1-2]. However, many students are not interested in this course because the content of anatomy is tedious and boring and difficult to memorize and the visceral specimens have irritating odors, so the simple lectures will make students feel mentally exhausted, thus affecting the teaching quality of anatomy courses [3-4]. In order to improve the quality of teaching and promote teaching reform, we need to start from classroom teaching [5-6]. The literature [7] argues that to stimulate students' interest in anatomy courses, then introducing laparoscopic video teaching materials into classroom teaching combined with traditional teaching is an attempt to reform anatomy teaching, which is the recording of laparoscopic surgical procedures into videos.

In this paper, 100 college students in the class of 2018 were selected as the study subjects and randomly divided into 50 each of observation group and control group, and the control group was taught anatomy by traditional teaching method, while the experimental group used real-time animation of dental anatomy teaching video based on digital twin technology to teach while watching laparoscopic video teaching materials, and analyzed and compared the influence of the two teaching methods on teaching effect.

## **2. VIRTUAL ANIMATION GENERATION BASED ON DIGITAL TWIN TECHNOLOGY**

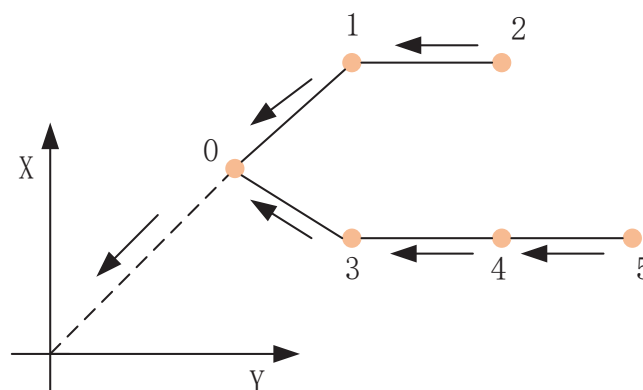
The system is divided into functional modules based on the execution process for the system in order to carry out the software development work as shown in Figure 1. It can be divided into the following steps for implementation: (1) Virtual human geometry model creation module. This module consists of building the skeleton part and the skeleton skin binding part. (2) Kinect real-time motion skeletal data capture module. It includes the 3-dimensional coordinates and orientation information of 20 joints under the skeletal coordinate system. (3) Using repositioning technology to map the motion data captured by Kinect to the virtual human model, which in turn drives the virtual human. (4) The translation compensation mechanism and distortion processing method module to ensure the plausibility of the virtual human in the virtual scene.



**Figure 1** Execution flow of the system

## 2.1 REDIRECTIONAL TECHNIQUES FOR POSITIVE KINEMATICS

Bone motion update is mainly related to two matrices, as shown in Figure 2. The former represents the initial position of the skeleton, while the latter is mainly used to calculate the various motions of the skeleton, and the two together realize the update of the skeleton position. According to the principle of skeletal motion animation, the frame-by-frame rendering of the virtual human model requires updating each skeletal joint point every frame. Using the hierarchical nature between the bones upper parent node motion is passed to the child joints in motion. Forward kinematics uses a given deterministic state vector to calculate the position of each joint according to the forward kinematic equations. The forward kinematics is solved by applying only translation and rotation matrices to update the state for the transformation of the root node, while for the child nodes the rotation matrix is traversed from the root node to the target child node step by step to calculate the 3D position and rotation of each joint in the model coordinate system.



**Figure 2** Joint structure in model coordinates

Mathematically, the model space pose ( $j \rightarrow M$ ) of a joint can be calculated by

traversing from that joint to the root node and multiplying its local pose ( $j \rightarrow P(j)$ ) at each joint. Taking the mid-level order as an example, the parent node of the root node is defined as the model space, i.e.,  $M(0) = M$ . the model space pose of joint  $j_2$  can then be written as:

$$M_{2 \rightarrow M} = M_{2 \rightarrow 1} M_{1 \rightarrow 0} M_{0 \rightarrow M} \quad (1)$$

Similarly, the joint  $j_5$  model space pose can be written as:

$$M_{5 \rightarrow M} = M_{5 \rightarrow 4} M_{4 \rightarrow 3} M_{3 \rightarrow 0} M_{0 \rightarrow M} \quad (2)$$

The global pose of any joint  $j$  can be written as:

$$M_{j \rightarrow M} = \prod_{i=j}^0 M_{i \rightarrow p}(i) \quad (3)$$

In the bone update, the transformation of the joint  $j$  is simply multiplied by  $M_{j \rightarrow p}(j)$  from the initial matrix.

## 2.2 REAL-TIME ACQUISITION OF ORAL PARAMETERS

Oral parameters with semantic information are associated with facial feature points and facial expression units, so real-time acquisition of expression parameters is the key to drive the animation of expression-based generation. Existing algorithms for acquiring oral expression parameters generally require learning a priori knowledge from the user's pre-captured expression sequences to decouple the user's head pose and oral cavity. Therefore, the universality and ease of use are poor, and the user must have expertise in acquiring expressions and setting up the system. In contrast, the biggest advantage of an unsupervised approach to capture the user's facial expressions in real time is that it does not require any supervised training of the user to be captured. The user's facial expression parameters can be extracted by automatic data analysis which makes the facial animation generation algorithm based on this approach more universal and easy to use.

## 3. RESULTS AND ANALYSIS OF THE APPLICATION OF ORAL ANATOMY TEACHING VIDEOS

### (1) Experimental methods

The cadavers provided by the anatomy teaching and research department were used for experimental dissection, and the laparoscopic video teaching materials

consisted of surgical videos of laparoscopic cholecystectomy, laparoscopic choledochotomy with "T" shaped tube drainage, laparoscopic appendectomy and laparoscopic splenectomy from Qujing First People's Hospital, all of which were produced according to the teaching needs using All the videos were processed and produced with the computer software Photoshop and Echo, so that they could meet the needs of classroom teaching.

The total learning time of the control group was 150 min, and the total learning time of the control group was 150 min, and the content of anatomy knowledge was exactly the same as that of the experimental group.

## (2) Experimental results

The mean score of the control group was (67.12±6.21), while the score of the observation group was (84.51±4.51) by the combination of traditional teaching method and laparoscopic video teaching material. 1 shows.

**Table 1** Comparison of academic performance achieved by students in the two groups

Group	n	Achievement
Control group	54	67.12±6.21
Observation group	52	84.51 ± 4.51
P		P<0.05

The above findings show that the teaching method combining traditional lecture anatomy teaching with laparoscopic animated video teaching materials has good teaching effect, while the teaching effect of pure traditional lecture anatomy teaching in the control group is relatively poor.

## 4. CONCLUSION

In this paper, we propose a real-time animation generation algorithm for teaching oral anatomy using digital twin technology based on reorientation technique of forward kinematics and color images to achieve real-time extraction of feature points inside the oral cavity. The feature points are then geometrically measured and stored as a geometric metric sample set, and the sample distribution is automatically analyzed in an unsupervised manner to infer the change interval of each expression unit to achieve real-time oral parameters extraction. By combining traditional teaching with oral anatomy animation video teaching, the teaching method of combining traditional lecture anatomy teaching with oral anatomy animation video teaching was effective. And the teaching effect of the control group of pure traditional lecture anatomy teaching is relatively poor, which can effectively promote the teaching reform of oral anatomy classroom.

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# RESEARCH ON THE CONSTRUCTION OF ECOLOGICAL CIVILIZATION UNDER THE DUAL DRIVE OF "BIG DATA+" AND "GREEN FINANCE+"

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## ABSTRACT

A key strategy for the sustainable growth of the Chinese nation is the establishment of ecological civilisation. This paper takes the view that "big data+" provides advantages for the structure of ecological civilization that are difficult to be compared with small data, and its rich data sources make the information boundary blurred, and the diversification, convenience and intelligence of data collection help information integration become more orderly. Secondly, the influence factors of "green finance+" about the development of ecological sustainability in economic growth are explored. The findings demonstrate that the development of an ecological sustainability through the dual drive of "big data+" and "green finance+" improves per capita GDP by 84.14% and reduces energy ingesting per unit of GDP by 73.15%. This paper improves the integration mechanism of green finance and economic growth, improves the guidance mechanism of green low-carbon development, and increases green finance to support the development of an ecological civilisation through economic growth.

## KEYWORDS

ecological civilization construction; big data+; information integration; green finance+; double drive; GDP



## 1. INTRODUCTION

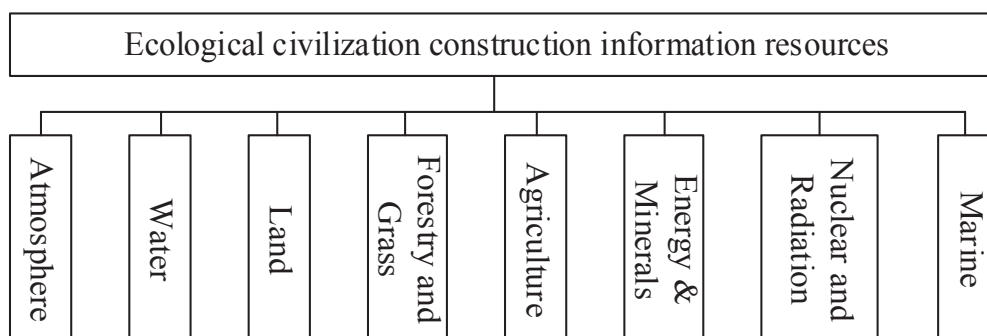
In recent years, ecological civilization study has increasingly drawn the interest of people from all walks of life due to the dire circumstances of tightening resource limits, substantial environmental contamination, and ecosystem destruction [1-3]. Literature [4] emphasizes the need to promote the development and application of ecological and environmental big data and establish an ecological and environmental data integration and sharing mechanism. It promotes the integration and interconnection of information resources and data open sharing to provide data support for ecological environmental protection decision-making, management and law enforcement [5]. These focus on the high importance that the state attaches to the use of big data in the development of ecological civilisation, and provide a guarantee for the de-siloing of information resources and the open sharing of data for ecological civilization creation [6]. The creation of ecological civilization requires huge amounts of capital, and the required funds are far from enough to rely on government financial support and social contributions alone, and cannot be separated from financial support and participation. Vigorous support for green development and ecological civilization construction is not only the proper duty and purpose of the Chinese financial sector, but also a successful strategy for advancing the sector's long-term growth [8].

In this paper, we first analyze the formation mechanism of collaborative governance of multiple subjects, and focus on the systematic construction of five aspects, including the interaction mechanism of subjects, resource integration mechanism, interest coordination mechanism, supervision and punishment mechanism and institutional guarantee mechanism. It also systematically designs the realization path of collaborative governance of multiple subjects in ecological civilization construction from three levels of concept, mechanism and action, and proposes the construction of "big data +" and "green finance +" double-driven mode to promote ecological civilization construction.

## 2. "BIG DATA+" ELIMINATES INFORMATION SILOS IN THE CONSTRUCTION OF ECOLOGICAL CIVILIZATION

The traditional Internet new media built by computer technology and fixed network technology, and the mobile Internet new media built by mobile Internet smart terminals and wireless network technology have given rise to Big Data in the contemporary sense. Big data's primary impact is that it creates a common world for us, a world that we can only share together anyway. A world where there is no outside, no exit, no other. The significance of big data technologies, the establishment of big data dissemination carriers and big data sharing platforms has made it possible to eliminate information silos.

Figure 1 illustrates how data and knowledge on the development of ecological civilization have been separated and isolated over a long period of time based on categories, industries, agencies, and regions, and the natural correlation and coupling between various types of data and information belonging to the same spatio-temporal object has been cut off and forgotten, with serious information siloing, duplication of construction and waste of resources, leading to high administrative costs, hindering the performance of government functions, affecting administrative efficiency, and destroying organizational Cohesion.



**Figure 1** Ecological civilization construction information resources and their sectors

## 2.1 DIVERSIFICATION OF "BIG DATA+" COMMUNICATION SUBJECTS AND CARRIERS

In the diversified data dissemination carriers, the data sources of ecological civilization construction are more abundant, and every actor such as government, enterprises, social organizations and individuals may become the subject of data collection, publication and sharing. Different data dissemination carriers will have different forms of expression. Under the mobile Internet, the media dissemination carrier is no longer a pure website form alone, but becomes a diversified form such as independent APP, news client, microblogging and weibo.

Using new technologies such as Internet of Things and mobile Internet, national ecological environment basic database can be established, such as population basic information database, legal person unit resource database, natural resources and spatial geography basic database and other different forms of national basic data resources, in order to improve the ability of universal perception and real-time monitoring of multiple environmental elements and various pollution sources. In addition to official data carriers, civil society organizations also provide new channels for ecological civilization construction data sources.

## 2.2 APPLICATION OF BIG DATA PROCESSING TECHNOLOGY

The use of technology for big data analytics makes data acquisition more diversified, intelligent, convenient and low-cost, which can greatly improve

management efficiency and bring about significant changes in environmental management and environmental decision-making.

The development and maturity of technology for big data analytics has accelerated the flow of data, increased the frequency of interconnection and interoperability, and the use of a large number of sensing devices can realize real-time, accurate and comprehensive monitoring and collection of various data and information related to the creation of ecological civilization, while emphasizing the capture of dynamic information, so that environmental monitoring data, enterprise pollution emission data, meteorological data, ecological governance data and other environmental data and related natural is greatly shortened.

The growth of the Internet, Internet of Things, cloud computing, mobile Internet and other knowledges has made the data carrier of ecological civilization construction more diversified, more convenient dissemination, more three-dimensional storage space, data access beyond the previous time and space limitations, through the Internet can obtain relevant data and information. The establishment of the big data platform has brought the various functional departments of ecological civilization construction closer together, with more frequent information exchange and sharing, and more timely data collation and transmission.

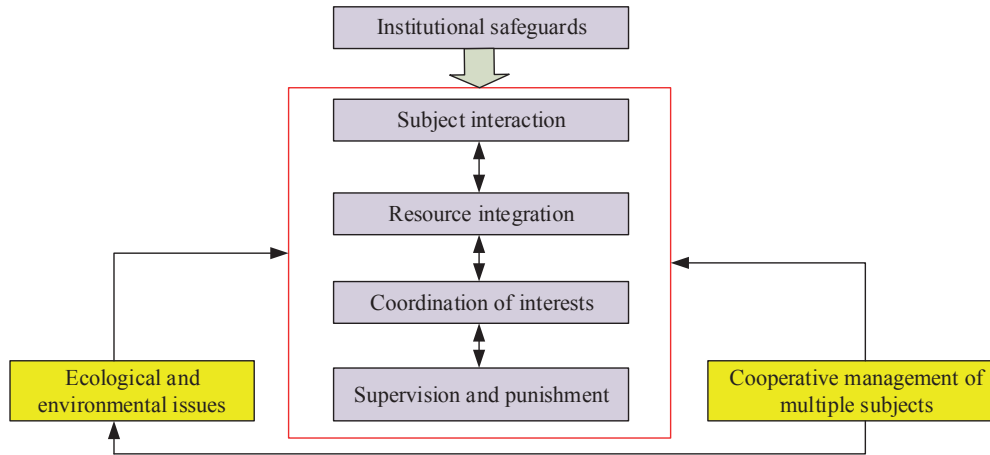
### **3. "GREEN FINANCE+" TO PROMOTE ECOLOGICAL CIVILIZATION CONSTRUCTION**

Green finance is a key tool for resolving the conflict among the preservation of the environment and economic advancement with its features of allocation of resources, environmental risk management, and green investment advice. It also plays a significant role in advancing ecological protection and the development of an ecological civilization.

#### **3.1 "GREEN FINANCE+" AND ECOLOGICAL GOVERNANCE AND PROTECTION MECHANISM**

The main goal of green finance is to become capable of directing and optimize the use of financial resources in order to maximize their Pareto potential for advancing ecological conservation, economic growth, and social advancement. Green finance can guide the flow of capital and optimize the efficiency of capital allocation. The strict implementation of environmental protection clauses by financial institutions in credit approval and loan issuance can promote the flow of social capital from high-pollution and high-energy-consuming industries to green, clean, energy-saving and pollution prevention and control policy-supported areas. At the same time, it can reduce the investment in high pollution and high carbon emission energy-consuming projects and

inhibit the start-up and production of polluting projects. Subject interaction, resource integration, interest coordination, supervision and punishment, and institutional protection are important formation mechanisms for the collaborative governance of multiple subjects in ecological civilization construction as shown in Figure 2.



**Figure 2** Green finance+ formation mechanism for ecological civilization construction

### 3.2 THE ENGINE MECHANISM OF "GREEN FINANCE+" TO PROMOTE THE DEVELOPMENT OF GREEN INDUSTRY

"Green finance+" is an important financial booster for transforming green mountains into silver mountains. The green economy, with "low energy consumption, low pollution and low emission" as its typical characteristics, has become an unavoidable choice for China's industrial structure to alter from rough and loose to intensive, and to realize the linked economic and ecological development. Green industries are usually a collection of knowledge-intensive and asset-intensive industries, which require large amounts of capital and scientific research support and are highly dependent on financial services. Green finance can influence the growth of green industries and the rationalization and modernization of industry sector from two perspectives by realizing the efficient deployment of funds and through value discovery function.

First, green finance boosts the growth of emerging green industries. The incorporation of green finance and advanced technology can identify and locate core and leading green technologies, screen out green industries that represent the future development direction, and guide the transfer of capital and resources from backward industries to advanced green industries. At the same time, green finance will raise and gather funds from multiple channels and parties for energy preservation and environmental safety, clean energy, green transportation, green construction and other developing green businesses with high technological content and environmental

degradation and minimal resource use, which will support the growth of green industries, as well as the improvement and modernization of industrial structure.

Second, green finance promotes the transformation of traditional industries into green. Under the influence of green development concept, the development of traditional industries with serious pollution and backward technology will be restricted in all aspects, and the pressure of survival promotes such traditional industries to accelerate technological research and development and green transformation.

#### **4. CONCLUSION**

As a higher stage of information technology development, "Big Data+" has to a certain extent made up for the absence of technical conditions of small data, and plays a significant part in fostering the development of ecological civilisation, breaking "departmental fragmentation" and eliminating "information silos" It plays a significant part. The rapid growth of "green finance +" is a major highlight of China's financial reform, and an essential lever for the financial sector to support supply-side structural transformation and more effectively support the development of ecological civilisation. In order to promote national development objectives, battle pollution, advance green economic and social growth, and advance the establishment of an ecological civilization, green finance is essential.

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# THE ENABLING ROLE OF ARTIFICIAL INTELLIGENCE TECHNOLOGY FOR RURAL FINANCIAL REFORM IN THE CONTEXT OF RURAL REVITALIZATION STRATEGY

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## ABSTRACT

Rural financial reform is characterized by obvious government exogenous push, and its own modification energy is insufficient. This paper uses artificial intelligence and blockchain to significantly change the traditional financial industry information collection, risk pricing model and investment decision-making process, improve the accuracy, accessibility and sustainability of financial services, and empower rural financial reform at three levels: operational foundation, financial products and business model. The results show that rural financial institutions can use artificial intelligence, blockchain and other technologies to achieve 41.25% matching time between financial service demand and supply, significantly reduce transaction costs by 23.6%, and further expand the boundaries of financial services. This paper provides the maximum scope of rural finance to achieve real-time information sharing, enhance financial credit, and prevent financial risks.

## KEYWORDS

rural financial reform; artificial intelligence; blockchain; traditional financial industry; investment decision making; financial services

## 1. INTRODUCTION

The key link and basic step of rural revitalization strategy lies in revitalizing rural industries and promoting agricultural modernization, focusing on strengthening village and township construction, improving rural infrastructure and promoting rural industrial development, which naturally gives rise to a huge demand for capital [1-2]. Financial services are the source of power for economic development, and to realize

the rural revitalization strategy, we must enhance financial support for agriculture and benefit agriculture, broaden the channels of rural financial services, and innovate rural financial services, while rural financial reform is the fundamental way to achieve this goal [3-4]. According to literature [5], China's rural financial system has gone through three stages: restoration and reconstruction, embryonic appearance, and gradual improvement. At present, a rural financial system with mutual coordination among policy-based finance, commercial finance and cooperative finance has been initially established [6]. However, in general, the reform is not effective enough, and there are still problems that need to be solved, such as incentive incompatibility and multi-objective conflict, in rural financial reform [7].

This paper firstly uses artificial intelligence, big data, cloud computing, and blockchain to empower the reform of rural finance through three levels of operational foundation, financial products, and business models, so as to improve the accuracy, accessibility, and sustainability of financial services. Secondly, four directions for deepening rural financial reform are proposed: deepening market-oriented reform, realizing the match between rural development paradigm and rural financial paradigm, designing incentive-compatible power mechanism, and using financial technology.

## **2. THE ENABLING ROLE OF ARTIFICIAL INTELLIGENCE FOR RURAL FINANCIAL REFORM**

The core of the problem of lack of momentum facing rural financial reform is the issue of transaction costs. If we can reduce transaction costs and improve risk identification, the corresponding problems will be solved. In recent years, technology has been deeply integrated with financial business, and the resulting fintech has brought solutions to the dilemma of traditional finance. Through the use of fintech tools such as artificial intelligence and blockchain, the traditional credit collection, risk pricing and investment decision-making processes of financial institutions can be substantially changed, empowering rural financial reform at three levels: operational foundation, financial products and business models.

### **2.1 ARTIFICIAL INTELLIGENCE ENABLES LOWER TRANSACTION COSTS FOR RURAL FINANCIAL SERVICES**

First, fintech uses mobile Internet technology to complete real-time interconnection of all locations, all times and all objects. Financial service demanders can directly log into the interconnection platform and release their financial demands. Financial service providers screen directly on the platform and provide credit services. This makes financial services free from the restrictions of the geographical distribution of physical outlets, greatly expanding the scope of services and reducing operating costs. Second, fintech, through the use of blockchain technology, can not only



significantly enhance data security, but also effectively reduce clearing costs between financial institutions and significantly improve transaction processing efficiency. Finally, the use of artificial intelligence in the financial industry can effectively reduce human repetitive work and make financial business realize process batching and automation, thus enhancing work efficiency and further reducing transaction costs.

## **2.2 ARTIFICIAL INTELLIGENCE MAKES INFORMATION NETWORKED AND TRANSPARENT**

Information production in the financial system is carried out in two main ways: it is information disclosure by market players themselves in accordance with laws, regulations or mandatory requirements of relevant government departments, such as accounting standards and auditing requirements. It is professional information producers such as securities companies and credit rating agencies that collect, collate and evaluate information on the production and operation status, asset and liability levels and investment value of capital demanders. Then it is provided to the capital suppliers for a fee. The high cost of information acquisition, information asymmetry and insufficient matching of information demand and supply are problems that are difficult to avoid in the traditional information system. By using big data analysis, blockchain and other technologies, FinTech can fully collect information and then analyze it intelligently by using cloud computing technology, which not only broadens the sources of information, but also incorporates people's interests and behavioral habits into the analysis. At the same time, the use of blockchain realizes the selective real-time sharing of effective information among transaction stakeholders, which greatly increases the efficiency of effective information acquisition by users and makes information networked and transparent.

## **2.3 ARTIFICIAL INTELLIGENCE RECONSTRUCTS THE FOUNDATION OF RURAL FINANCIAL OPERATION**

(1) Integrate rural fragmented financial markets through online interconnection platforms to reduce the cost of financial services.

Financial institutions use financial technology to develop online banking, mobile banking and other convenient financial services interconnection platforms. It can effectively break through the limitations of geography and distance, integrate the fragmented financial market in rural areas, and allow many agricultural producers in areas previously not covered by physical outlets to enjoy financial services conveniently and quickly. At the same time, financial institutions can use artificial intelligence and blockchain technology to achieve timely and effective matching between financial service demand and supply, making the transaction process more transparent, significantly reducing transaction costs and further expanding the

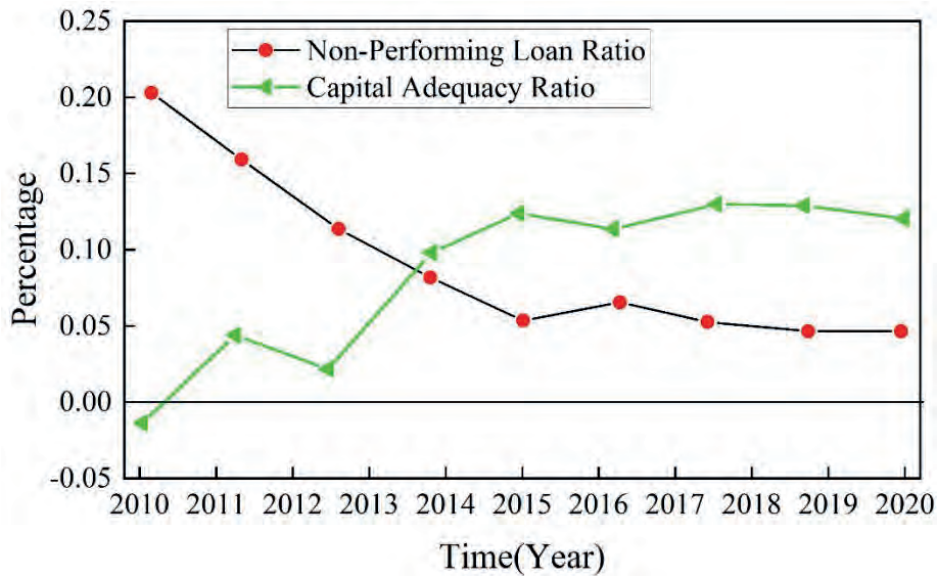
boundaries of financial services.

(2) Using big data, cloud computing and blockchain technology to improve and perfect the rural credit information system.

At present, there are still shortcomings and blank areas in the construction of information system platforms in rural areas, and there are problems of difficulty and high cost in acquiring credit information. In the context of financial technology, financial institutions can use big data technology to extensively mine and integrate the scattered credit information of agricultural producers from their daily life transactions and performance information, and realize effective rating of credit status through artificial intelligence technology. By using blockchain technology to form an open, transparent and untamperable credit database, and by exchanging data information through blockchain, they can break through information silos and realize real-time information sharing to the maximum extent, enhance financial credit and prevent financial risks.

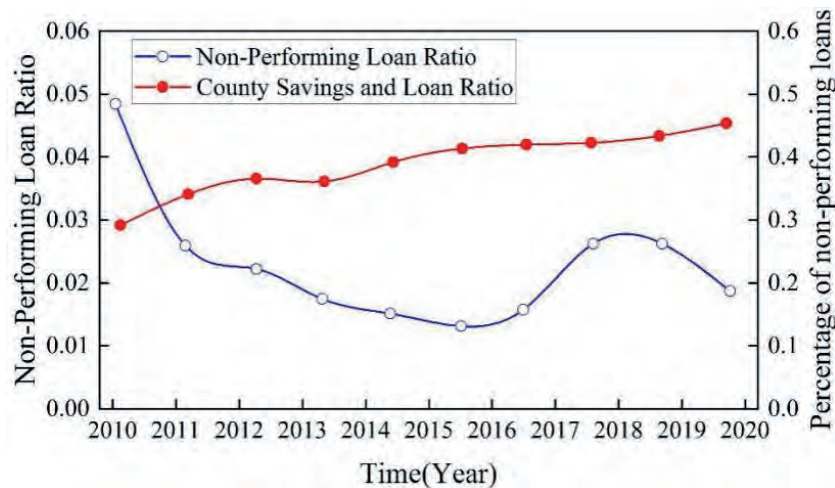
### **3. ANALYSIS OF THE EFFECTIVENESS OF ARTIFICIAL INTELLIGENCE ON RURAL FINANCIAL REFORM**

Various types of rural financial institutions have carried out market-oriented reforms to meet the needs of rural market economy construction. In the case of agricultural credit cooperatives, first of all, the problem of excessive baggage left by history has been solved. Since 2005, when agricultural credit cooperatives turned losses into profits, by the end of 2020, the national agricultural credit cooperatives had made a cumulative profit of 1168 billion yuan. Secondly, the quality of assets and operating financial situation has been improved. As of the end of 2020, the balance of non-performing loans was 1,501.8 billion yuan, the non-performing loan ratio was 7.15%, and the capital adequacy ratio was 10.71% compared with 2008, a decrease of 841.7 billion yuan, a decrease of 16.17 percentage points and an increase of 11.17 percentage points, respectively, as shown in Figure 1. Further is the size of the funds and credit allocation increased significantly, its various loan balances, agriculture-related loans to farmers and farmers loan balance, respectively, increased to 24.57 trillion yuan, 9.27 trillion yuan and 4.57 trillion yuan. Finally, the reform of the property rights system has been steadily promoted. By the end of 2016, 2,704 county-based unified corporate agricultural credit cooperatives, 4,244 agricultural commercial banks and 50 agricultural cooperative banks were built.



**Figure 1** Trend of Non-Performing Loan Ratio and Capital Adequacy Ratio of Rural Credit Unions

In terms of large commercial banks, Agricultural Bank has actively explored an effective model for large commercial banks to serve the three rural areas, and has carried out the reform of the Three Rural Finance Division since 2010, releasing operating rights to county branches and strengthening its status as the main business entity in the three rural areas, and has achieved significant results through the reform. Figure 2 shows the analysis of the non-performing loan rate after the reform of the three rural finance departments since 2010, and it can be found that as of the end of 2020, the balance of county loans reached 7.52 trillion yuan, which is 2 percentage points higher than the growth rate of the whole bank's loans, and increased by 243.2112 billion yuan compared with the end of 2010. The changes in the deposit to loan ratio in counties of Agricultural Bank's Three Rural Finance Division can be seen that the overall deposit to loan ratio is on an upward trend, indicating that the efficiency of its rural financial services is gradually improving. The non-performing loan ratio of the entire county financial business was on a downward trend. the non-performing loan ratio was 4.1% at the end of 2020, 5.2 percentage points lower than that in 2010.



**Figure 2** Agricultural bank county non-performing loan ratio and county deposit to loan ratio

#### 4. CONCLUSION

Through the use of fintech tools such as artificial intelligence, big data computational analysis, cloud computing, and blockchain, this paper can significantly change the traditional credit collection, risk pricing, and investment decision-making processes of financial institutions, empowering rural financial reform at three levels: operational foundation, financial products, and business models. The results show that through the real-time interconnected data analysis provided by fintech, the market feedback of various financial products can be grasped in a timely and accurate manner, so that financial products and financial services can be improved and adjusted in a more timely manner, making rural financial services more dynamic in the market.

#### FUNDING

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# THE ARTICULATION PROBLEM AND STRATEGY OF COLLEGE ENTRANCE EXAMINATION BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY

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## ABSTRACT

In the era of big data, artificial intelligence technology has been greatly developed and widely used in many fields of society, and has achieved remarkable application results. In this paper, we analyze the policies related to G college entrance examination, analyze and compare the content and question types of higher mathematics examination, propose the review method of higher mathematics examination, and give the articulation strategy and review suggestions of specific college entrance examination through artificial intelligence technology. The results showed that the articulation optimization strategy of college entrance exam based on artificial intelligence technology improved students' average score by 12.5% and saved 23.5 revision time. This shows that the AI technology-based adaptation and optimization of college talent training program makes the college talent training more suitable for social needs and students' own learning situation.

## KEYWORDS

big data; artificial intelligence technology; college entrance examination; higher mathematics; articulation optimization strategy; talent cultivation

## 1. INTRODUCTION

Lu Xin, former Vice Minister of Education, said at a press conference on "Reform and Development of Vocational Education" at the State Information Office in 2014 that the reform of vocational education will be further promoted to open up the pathway for students from middle school, college, undergraduate to graduate school [1-2]. Innovative vocational education models of all levels and types will be implemented in the process of education and teaching, innovation of curriculum and teaching materials,

internship and practical training, and cultivation of professionalism and vocational skills in the cultivation of diversified talents [3]. Build a bridge for everyone to achieve success and strive to give everyone the opportunity to excel in life [4]. Therefore, students who are willing to enter applied undergraduate institutions for professional upgrading should be encouraged. The examination for excellent college graduates from general colleges and universities to enter the undergraduate level (hereinafter referred to as college education) has been carried out for more than ten years, and a large number of excellent college students have entered higher-level institutions for further study, which has cultivated a large number of high-quality technical and skilled talents for society [5-6].

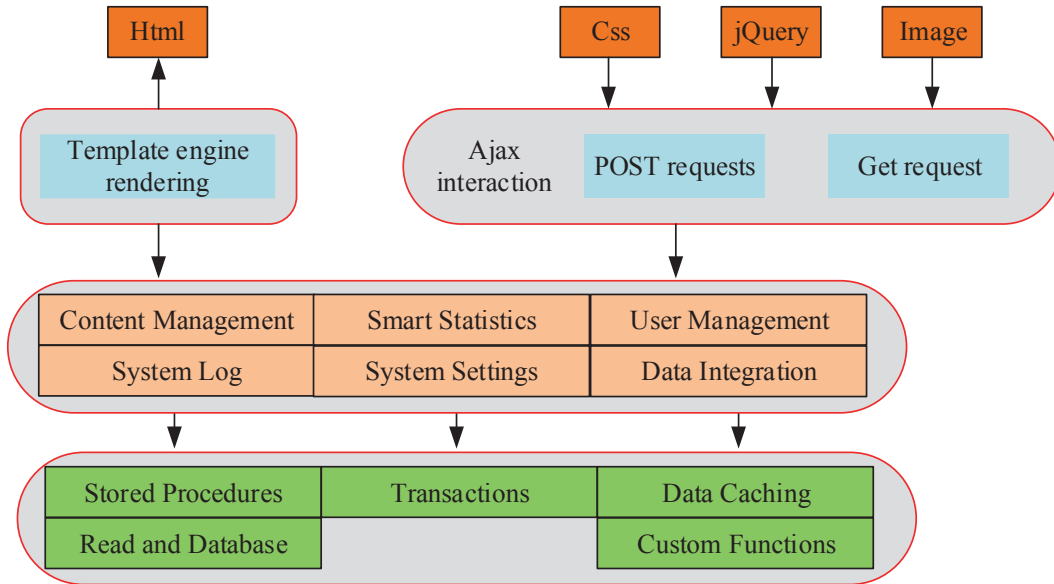
In this paper, for the purpose of improving the quality of file management and analysis, combined with the actual business of the author's unit of work, the analysis of various files management of self-study examinations is used as an example to explore the problems of various types of file management in the development of self-study examinations. Speaking with data and oriented with intelligence, it aims to provide a more intelligent, convenient and accurate service for file management and analysis. Thus, it makes a comprehensive simulation analysis for the further improvement of candidates' learning and provides decision support for the further development of the college entrance examination.

## **2. APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN COLLEGE ENTRANCE EXAMINATION**

### **2.1 IMPLEMENTATION OF BIG DATA STORAGE, STATISTICAL ANALYSIS**

Artificial intelligence is an intelligent technology that imitates human memory, recognition and processing, and its main purpose is to use machines to perform various complex tasks instead of humans. The main purpose of AI is to replace humans with machines that can perform complex tasks and achieve convenience, efficiency and intelligence. Artificial intelligence technology is a new technology resulting from the reproduction of computer information technology. It is a network information processing technology that imitates people's recognition, storage, calculation and processing by putting a set programming language into intelligent machines. The file management system of self-study examinations in higher education in the context of big data is combined with the search and memory system and intelligent data processing system of artificial intelligence, and the big data of candidates' files are logically analyzed by artificial intelligence. Thus, we can conclude to realize intelligent management of candidates' files and explore new ideas, directions and dynamics more suitable for contemporary self-study examinations in higher education for the higher education self-study examination function. Explore new ways to enable candidates to

use their time after school to gain more knowledge and acquire more skills while receiving school education. The system architecture of web-based management and analysis of higher education self-study examination files using artificial intelligence technology in the context of big data is shown in Figure 1.



**Figure 1** System architecture of file management of college entrance examination

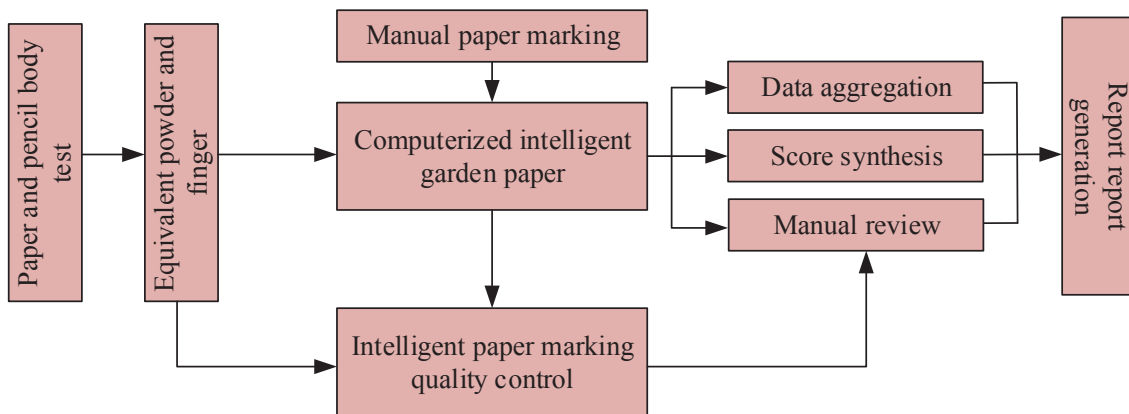
This model not only allows you to achieve a higher level of education while you are in school, but also to learn something and better train and export talents for society, as an opportunity to provide a convenient way for three-year college students to take the graduate school. To achieve these purposes and goals, it requires a lot of big data as support, using artificial intelligence technology for analysis, and through the efforts of all parties to progress and improve together.

## 2.2 THE REALIZATION OF A NEW MODEL OF ARTIFICIAL INTELLIGENCE MANAGEMENT

According to the steps of registering for the examination, the first thing to see is whether the candidate meets the conditions for applying for the Higher Education Self-Study Examination Intensive Practical Ability Training Test, that is, whether the candidate's school is a pilot institution approved by the provincial examination authority with the qualification of student assistance. Candidates can apply for the examination only if they meet the conditions, otherwise they can only register for the higher education self-study examination as social candidates. The pilot institutions will collect and report the information of eligible students to the local and municipal examination institutions, and the local and municipal examination institutions will integrate and process the information of eligible candidates from the pilot institutions and report it to the provincial examination institutions, and the provincial examination institutions will store and file the examination registration information to form the examination



registration file of candidates as shown in Figure 2.



**Figure 2** Flow chart of computerized intelligent marking of subjective questions

After candidates have passed all the courses in all professional programs, those who meet the graduation conditions can declare their graduation through the Internet. After the successful declaration, the pilot institution will instruct the candidates to fill out the graduate identification form and collect it and deliver it to the local municipal examination institution to which the university belongs in a unified manner, and the local municipal examination institution will be based on the candidates' online declaration. Use big data technology to retrieve candidates' grades, electronic test papers and other information, and then organize staff to compare the handwriting, grades and courses of the graduate identification forms filled out by individual candidates, and to query and extract the old files of candidates who need to retrieve their old files in the early days.

### 3. OPTIMIZATION STRATEGY FOR THE CULTIVATION OF TALENTS BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY FOR POST-SECONDARY EDUCATION

There is still a certain dilemma in the cultivation of talents in general undergraduate colleges and universities, and there is an urgent need for effective design and reconstruction from different aspects such as training program setting, subject system construction, curriculum content selection, teaching materials selection and evaluation methods. Finally, we return to the common sense and reality of talents cultivation for college education and build a talent cultivation model suitable for the school situation, learning situation and professional characteristics.

(1) To set up talent training program oriented to the cultivation of application-oriented talents

Although there are many colleges and universities with different specialties, the goal is to cultivate high-quality applied talents who can directly face the society,

production, management, service and other front-line needs. Therefore, the training of talents should be built "application-oriented" talent training program and curriculum system support. Talent training program as a whole should show its application characteristics, to adapt to the needs of society, the market as the main goal. In this regard, the choice of enrollment majors should be biased towards application-oriented majors and avoid academic majors as much as possible. In the organization of the curriculum system, we should consider the comprehensiveness and integration of the students' knowledge system, to the degree of "can use" and "enough", and have the conditions to jointly develop courses with enterprises, to carry out talent co-education and implement mutual recognition of school-enterprise credits. In the curriculum, to follow the logic of application, to enhance students' social practice ability for the purpose, theoretical courses should be closely linked to the cultivation of students' practical skills.

(2) To cut the subject content and optimize the faculty by taking the practical value as the measure

In general, the cultivation of talents in college emphasizes more on practicality and application, and pays attention to the close combination of disciplinary theoretical knowledge and social practice, and uses disciplinary theory to guide practice. To a certain extent, this determines the practical value orientation of the cultivation of talents for college education. Although different disciplines have different professional characteristics and disciplinary logic, some focus on application, some focus on theory, but ultimately need to return to the logic of practical value.

(3) Change education evaluation methods and focus on students' academic value-added evaluation

Under the traditional teaching paradigm, the evaluation of talent cultivation quality is mainly centered on schools and teachers, and the achievement of teaching objectives is emphasized, but the "value-addedness" of students' learning results is often neglected. It is especially important to pay attention to the value-addedness of students' learning outcomes.

#### **4. CONCLUSION**

This paper analyzes, retrieves, compares and simulates human thinking patterns through artificial intelligence technology to give the final analysis results needed by candidates and the most data-driven suggestions to guide users to make judgments, and then through a new round of instructions, big data analysis is conducted inside the device drawing on other factors to make the best optimization strategy for post-secondary candidates that ultimately simulates human logical thinking. By speaking

with data and guiding with intelligence, it aims to provide more intelligent, convenient and accurate services for file management and analysis. Thus, it makes a comprehensive simulation analysis for further improvement of candidates' learning and provides decision support for further development of self-study exams.

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# RESEARCH ON ECOLOGICAL DESIGN IN MUSEUM DISPLAY DESIGN BASED ON BIG DATA ANALYSIS

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## ABSTRACT

In order to test the feasibility of an eco-museum design approach that combines rural industrial integration with original cultural preservation. This paper takes the ancient village as the research object and uses the coding technique in the rooting theory which analyzes the relevant diary interview data on the website to establish a conceptual model between the five main factors affecting the tourism of the ancient village: historical resources, cultural preservation, peripheral linkage, tourism development, and tourism experience. Combined with the latest successful third-generation eco-museum construction study, it was found that the functional value, emotional value, cultural value, aesthetic value, and artistic value scored 4.7, 4.23, 4.63, 4.57, and 4.43, respectively, through the tourists' evaluation of the eco-museum survey, and the evaluation results were all more satisfactory and achieved the expected results. It can be shown that the application of big data analysis to eco-museum design is more helpful to the sustainability of rural development as well as cultural continuity.

## KEYWORDS

rural industrial integration; ecological museum; rooting theory; coding technology; big data analysis; sustainability

## 1. INTRODUCTION

Eco-museums are the protection and preservation of cultural heritage in the original ecological environment, bringing cultural museums to life in local social life,

and maintaining good sustainability between tangible heritage, intangible heritage, natural ecological environment, and tourism and economy, resulting in open environmental areas regarded as eco-museums as a whole [1-3]. Since the 1980s, when the eco-museum concept was brought to China through the journal *China Museum*, edited by Su Donghai, it has undergone three theoretical iterations, and in each iteration of the development of eco-museums in China, it has continued to improve its suitability for the tourism industry in an attempt to use this as a viable set of models for tourism development [4-5]. The literature [6] considers this as a fortuitous event in the decade-long development downturn of eco-museums. The literature [7] argues that China has a different rural context than Europe, where the creation of ecomuseums was based on environmental destruction due to economic development, while rural areas in China are accompanied by deep-rooted poverty and backwardness. The current stage of development requires it to consider the economic purpose of poverty alleviation and face a new development model.

This paper creates an ecological museum combined with cultural preservation through the design of spatial scenes under multiple perspectives and strengthening the experience of display scenes. In order to explore the feasibility of applying the eco-museum model for tourism development in natural villages represented by ancient villages, the rooting theory is adopted to analyze the characteristics it possesses in the real tourism development. Finally, according to the big data processing capability and reasonable architecture, the online natural ecological museum is constructed to provide a completely realistic visiting experience, simulating the real exhibits from the multi-dimensional sensory perspectives of sight, sound, touch and smell, giving visitors a visiting experience that is different from that of offline museums.

## **2. ECOLOGICAL MUSEUM DESIGN BASED ON ROOTING THEORY CODING TECHNOLOGY**

In order to explore the feasibility of applying the eco-museum model to the tourism development of natural villages represented by ancient villages, the rooting theory is adopted to analyze its characteristics in the real tourism development. Root theory is mainly applied to social research, aiming to systematically obtain and analyze data to discover the most scientific and qualitative research method of theory. The first step is to break up the original data in the substantive coding stage and to conceptualize the semantic understanding of the data. That is, open coding is performed to form preliminary abstract categories after multi-layer conceptualization. The second step of selective coding sorts out the initial categories and then establishes the core categories and the various connections between them. Finally, in the theoretical coding stage, the different interrelationships implied by the core categories are clarified, and a well-

founded and fully developed theoretical construction is constructed. It is then verified in the primary sources and explained in real-world problems.

## 2.1 SELECTIVE CODING PHASE

In the next step of selective coding, we need to analyze the association between each category in internal nature and external environment, categorize them into 4-8 main categories, and establish the logical relationship between main categories and sub-categories. Finally, this paper outlines five main categories: historical resources, tourism development, cultural preservation, tourism experience, and peripheral linkage, and the connotations of each main category and corresponding categories are shown in Table 1.

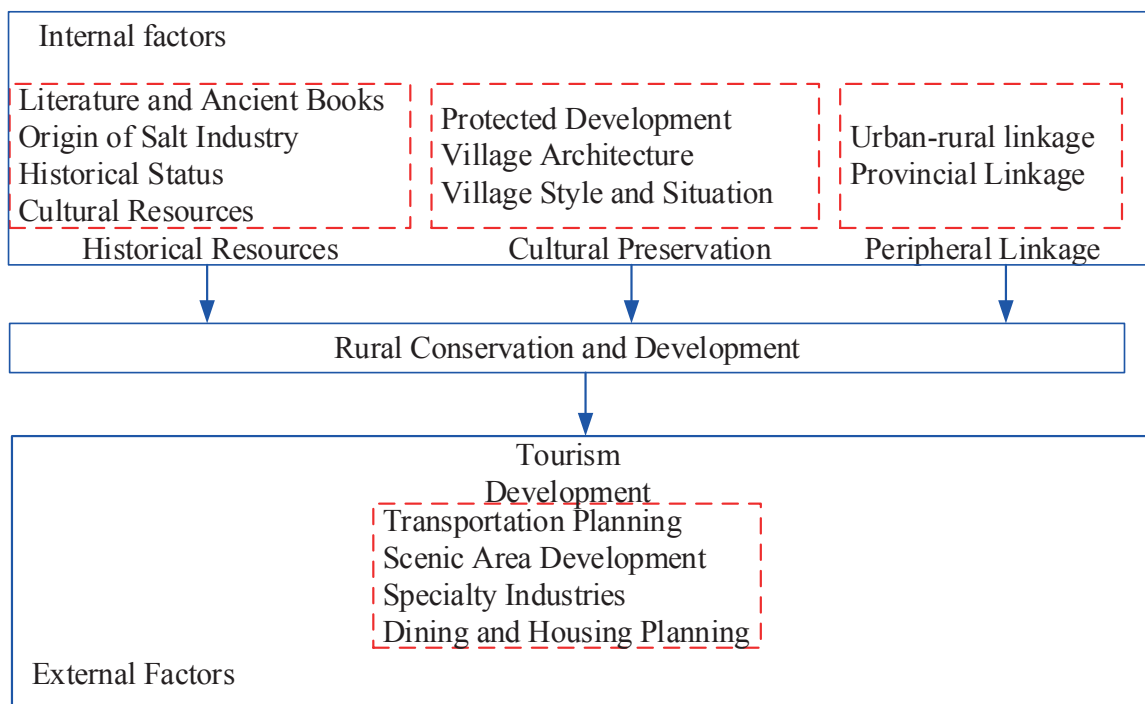
**Table 1** Main categories and their corresponding connotations

Main Category	Preliminary scope	Main Category	Preliminary scope
Historical Resources	Literature and Antiquities	Tourism Development	Protective development
	Origin of Salt Industry		Village Style and Situation
	Historical Status		Tourist Portrait
	Cultural Resources		Tourism Access
	Transportation Planning		Destination Image
	Scenic Area Development		Tourist Expectations
	Special Industries		Urban-Rural Linkage

Narrative and space are often closely linked, and the use of three-dimensional space to record the plot and tell the story of the narrative form is called spatial narrative. In the field of design, spatial narrative due to the depth of the three-dimensional space itself, the narrative form of the story is not limited to the spatial content of the chronological, there will be a variety of forms of expression to show the scene and its spatial spiritual properties.

## 2.2 THEORETICAL CODING STAGE

The above five main categories basically cover all the necessary internal and external elements affecting rural conservation and development, and thus enter the theoretical coding stage. Based on the clear lineage between the main categories, the study constructed a "theoretical model of rural conservation and development model" as shown in Figure 1. It has several components: historical resources, cultural preservation and peripheral linkages mainly act as internal factors for the conservation development of the countryside, while tourism development acts as an external factor for the countryside from the outside to the inside, and the level of development of the countryside will be reflected in the tourism experience. At the same time, the tourism experience as an independent element acts on the conservation and development of the countryside, forming a situation of mutual influence.



**Figure 1** Theoretical model of rural conservation and development model

Finally, the saturation test of the constructed conceptual model was performed, and the coding of the four saturation test materials set aside showed that no new categories or relationships emerged. The developed theoretical model can explain the factors influencing rural conservation and development in the information, so the conceptual model is judged to be theoretically saturated.

### 3. INTERACTIVE DESIGN OF DIGITAL MEDIA ART FOR ECO-MUSEUMS

In the era of artificial intelligence, the form of information dissemination has changed a lot. New information platforms supported by the Internet and digital media have greatly improved the efficiency of information processing and information dissemination. The information data carrying capacity, analysis and processing efficiency, and dissemination range of emerging digital media have been greatly enhanced, and have changed the way people receive information and learn.

With the help of specific computer programs, visitors can even visit and see exhibitions in the cloud without leaving home, through the official media of the Museum of Nature and Ecology, supported by multifunctional interactive technologies. Through the systematic study of digital media technology on the traditional museum information presentation form and the use of model innovation of the ecological museum digital media art interactive design is summarized as follows.

(1) Keeping up with the times and exploring the integration of digital media and natural ecological content.

The positioning of the natural ecological museum is to transmit natural ecological knowledge to the public, reveal the current state of the ecological environment, and show the achievements of ecological and environmental protection technology development, ecological civilization construction achievements.

(2) Based on practice, show the strength of information interactive technology cultural communication.

Digital interactive technology can extend the human visual and audio sensory capabilities, through advanced virtual technology equipment for special processing of information, is the basic form of the current intelligent visit to the Museum of Nature and Ecology.

(3) excellence, to explore the future direction of the digital nature and ecology museum.

With the support of a large number of digital technologies such as virtual technology, human-computer interaction and 3D technology, the current content presentation of nature and ecology museums has been greatly changed, thus also revolutionizing the dissemination of ecological culture and greatly enhancing the efficiency of ecological culture dissemination.

#### **4. CONCLUSION**

In the context of cultural and tourism integration, it brings new development opportunities for eco-museums' cultural and creative products, in order to improve the cultural connotation and regional characteristics of museums' cultural and creative products, as well as consumers' satisfaction with them. This paper takes consumers' value perception as the starting point to evaluate the cultural and creative products of ecological museums. We propose optimization strategies and conduct case studies to verify the feasibility of the strategies in terms of functional, cultural, emotional, aesthetic and artistic values. It will provide reference for the development and innovative design of other ecological museums' cultural creations, further promote the transmission and dissemination of national culture, and contribute to the preservation of the diversity of Chinese excellent traditional culture.

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# RESEARCH ON THE INTEGRATED COMMUNICATION STRATEGY OF CHANGSHA CITY BRAND IMAGE IN THE ERA OF BIG DATA

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## ABSTRACT

The study of the communication of city brand image is of great significance to the comprehensive development of cities. Based on the characteristics of city brand image, this paper proposes the method of constructing city brand image based on CIS system. On this basis, through the analysis of the current situation of Changsha city brand communication, the corresponding communication strategy is proposed. The most urgent problem of Changsha city brand image is the lack of communication implementation and brand synergy, which accounts for 26.92%, and the implementation of Changsha city brand communication activities also presents the problem of scattering and disorder. This study has guiding significance for the communication of Changsha city brand image.

## KEYWORDS

Changsha city brand; image communication strategy; CIS system; brand synergy

## 1. INTRODUCTION

In the competition of cities, sociologists have proposed the concept of city brand image in order to distinguish the uniqueness of different cities [1-2]. In order to gain a favorable position in the competition, cities must carry out good city image shaping and communication. A good image is the most valuable intangible asset of a city, reflecting a city's connotation, development status and civilization [3-5]. The added value brought by city image will become an excellent bargaining chip for city development.

The concept of city branding has become increasingly popular among domestic and international marketing scholars and urban management practitioners, although there is an increasing number of studies involving the field of city branding [6-7]. However,

in general, the research on city branding in academia is still in its initial stage, and relevant studies are mainly scattered in the theoretical studies of city marketing and city branding. The literature [8] suggested that social media promoting word-of-mouth has become the most influential city branding communication channel. The literature [9] proposed a method to measure the effectiveness of city branding based on insights from personal interviews with international experts. The paper [10] proposed the concept of "slow city" and used an empirical method to investigate the influence of its brand association type on the behavioral intention of potential tourists. Based on the above research, this paper analyzes the communication dilemma of Changsha city brand image and discusses the communication strategy under the framework of CIS system.

## **2. CITY BRAND IMAGE AND COMMUNICATION STRATEGY**

### **2.1. CITY BRAND IMAGE**

#### **2.1.1. BRAND IMAGE**

The original meaning of brand image refers to the personality characteristics of a brand in the market and in the mind of the public, which reflects the evaluation and perception of the public, especially the consumers of the brand. Brand is an objective thing, while image is the impression of the thing in people's mind. Brand image and brand are inseparable, and brand image reflects the strength and essence of the brand, so image is the foundation of the brand. Brand image is produced by consumers in the process of long-term contact with the brand, and is strengthened by consumers' brand association. The ultimate goal of brand management is to establish the brand image desired by its company in the minds of target consumers.

#### **2.1.2. CHARACTERISTICS OF CITY BRAND IMAGE**

City brand image is an intangible asset that cities try to create in order to gain advantages in the competition. With the intensification of urbanization, the competition among cities for social resources is becoming increasingly fierce, and the city brand and city brand image born under such circumstances naturally need to reflect the special characteristics of the city in order to gain advantages in the competition. In other words, the implementation of city brand image shaping and communication must be based on the marketing perspective, taking city brand image shaping and communication as an important means to improve the competitiveness of the city, discovering and refining the unique attractiveness of the city, creating unique brand assets for the city, and making the city have a unique resource.

### **2.2. CIS-BASED CITY BRAND IMAGE CONSTRUCTION**

All communication activities are aimed at spreading certain contents, so the

content of communication is the basis for communication to happen. The first problem that needs to be solved when studying the communication of city brand image using communication science approach is the definition of communication content. The core task of city brand communication is to establish a city brand image that reflects the unique core value of the city. In order to accurately express the city brand image, a comprehensive and accurate theoretical positioning and system framework is needed. For this reason, this paper introduces the CIS system framework and optimizes this system so as to adapt to the requirements of city brand image communication.

CIS is the city characteristic image recognition system. With the development of cities towards a high degree of informationization, it has become extremely common for cities to use information communication media to participate in fierce market competition and improve the overall effectiveness of cities. The city identity image is an important intangible asset of the city, and in order to make the city identity image occupy a place in the minds of a larger public, it is necessary to establish a city identity system and implement CIS strategy. the contents of city brand communication under CIS are shown in Table 1.

**Table 1** City brand communication content

Content of city brand communication	Behavioral Identity of City Branding	Overall quality of citizens
		Industry organization regulation
		Government Regulations
	Conceptual identity of the city brand	City Core Values
	Visual Identity of City Brand	City Natural Landscape
		City Signs
		Urban Public Facilities

### 3. CHANGSHA CITY BRANDING AND COMMUNICATION STRATEGY

#### 3.1. CHANGSHA CITY BRAND IMAGE

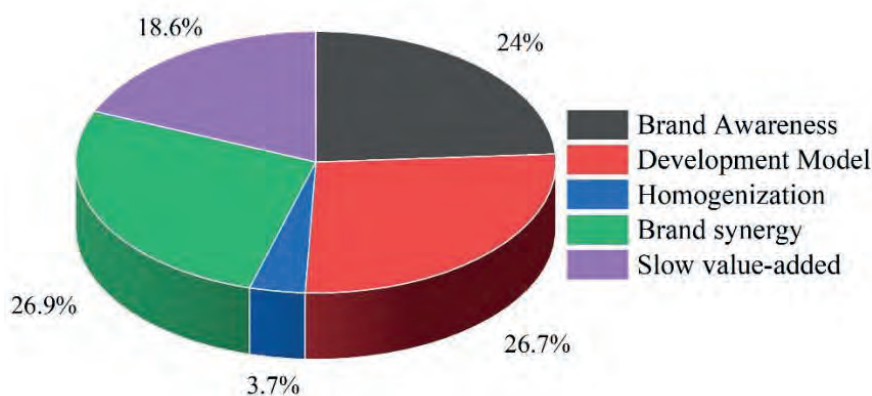
Changsha is the capital of Hunan province and the center of politics, economy, culture, education, science and technology, transportation, communication and finance of the province. In the cultural accumulation and economic development, Changsha presents its unique characteristics from city economic strength to appearance scenery, from city culture to city spirit, which has accumulated rich resources for the construction of Changsha city brand.

Based on the integration of many elements such as city brand resources and brand personality, Changsha city policy makers have proposed "Central Leisure and Entertainment Culture Capital", "Regional Consumption Center", "International Cultural City ", "entrepreneurial capital, livable city, happy home" and other development visions, and accordingly established for Changsha "great man's

hometown", "mountainous continental city ", "Landscape with lots of love and sparkling star city", "Leisure Changsha, cultural capital", "Journey of civilization, charming Changsha", "Happy capital, mountain and water", "Happy city, cultural capital". City brand positioning such as "Happy City, Mountainous City of Continents".

### 3.2. ANALYSIS OF THE CURRENT SITUATION OF CHANGSHA CITY BRAND COMMUNICATION

The main problems faced by Changsha city brand communication are shown in Figure 1. The problems of lack of management planning and weak brand awareness account for 24.01%, the planning of the city brand image and the communication of the city brand have not been given enough attention. The problem of variable development mode and vague brand personality accounts for 26.69%, the development demands of the Changsha municipal government on Changsha city do not actively meet these qualities, and the concept of demands changes with the situation and environment. The problem of missing image identification and similar communication strategy accounts for 3.74%, the identification system of Changsha city brand is basically missing, there is neither core clear city concept positioning nor unified clear city behavior construction. The problem of weak communication implementation and insufficient brand synergy accounts for 26.92%, and the implementation of Changsha city brand communication activities also shows a scattered and disorderly problem. The problem of insufficient effect monitoring and slow brand value-added accounts for 18.64%, Changsha's current city brand communication activities still mostly use mass media, with simple one-way publicity and promotion, and lack of specialized agencies to actively monitor the communication effect, and the feedback on the image perception of the audience, i.e., the city's stakeholders, is not timely.



**Figure 1** The main problems facing Changsha city brand communication

### 3.3. CHANGSHA CITY BRAND COMMUNICATION STRATEGY

Each brand should have a unified name, logo and image concept, so that the

brand can play a role in marking and differentiation. If the brand image is not unified, the more brand communication activities, the more fragmented the brand image will be, and the more scattered the brand power. A unified city image comes from a unified image positioning, and depends on a unified "voice". As analyzed in the previous chapter of this paper, Changsha does not have a unified city logo, let alone a unified city image positioning, and the concept of image appeal is still complicated and diverse. To carry out effective city brand communication activities, Changsha should start from accurate positioning of city brand image, unified city brand message, and scientific planning of Changsha's city brand strategy.

City branding and communication is a long-term, holistic task, which is related to the competitive strength and long-term development of a city, and there should be corresponding regulations, policies and systems to ensure the comprehensive development of this work. This requires city decision makers in Changsha to have a clear understanding of city branding, and to set up a special city brand management organization based on strengthening brand awareness, and to formulate a city brand development plan and a city brand management manual and other related policies and systems.

#### **4. CONCLUSION**

Based on the CIS system framework, this paper analyzes the current situation of the communication of Changsha city brand image and proposes communication strategies in the era of big data in view of the existing problems. The folk construction of the city image is given by the pluralism of the current media environment, and the official discourse should pay attention to the growing folk power in the process of constructing the city image by timely incorporating new symbolic carriers to achieve the purpose of constructing a unique city image from a small to a large level. If Changsha can integrate city resources, accurately position the city image, and adopt integrated strategies to implement city brand communication scientifically and effectively, the city brand with unique Hunan charm and modern core competitiveness will be forged, and the continuous value-added of the city brand will be realized.

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# THE ROLE OF BIG DATA TECHNOLOGY IN THE PHYSICAL TRAINING OF AVIATION SAFETY OFFICERS UNDER THE CONCEPT OF THREE-WIDE EDUCATION

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## ABSTRACT

In the context of the rapid development of big data technology, along with the rapid improvement of China's economic level, people's lives have undergone radical changes. Under the concept of three-wide education, aviation safety officers should continuously improve their physical reserves in their daily training. Therefore, it is especially important to improve the current situation of physical training and strengthen the physical fitness level of safety officers. Then, based on the data mining of big data technology, we analyze the physical characteristics of aviation safety officers and the necessity of aviation safety officers' professional physical training and research. This study provides more targeted and scientific guidance for the professional physical fitness training of aviation safety officers, and provides theoretical and practical support for the construction of professional curriculum resource base.

## KEYWORDS

three comprehensive education concept; data mining; aviation safety officers; physical quality; physical fitness characteristics

## 1. INTRODUCTION

One of the job responsibilities of aviation security officers is to be able to effectively



respond to terrorist attacks and other sudden security incidents in case of emergency, thus effectively reducing economic losses and safeguarding people's lives and property [1-2]. In practice, the physical fitness of aviation security officers and their mastery of appropriate fighting skills have a positive effect on improving the quality of security officers' work [3-4]. As the basis of all skills, energy has also become a top priority in the training and assessment of wardens, and good physical fitness is the basis for wardens to be able to perform their defense work effectively and is one of the necessary conditions for their professional competence [5-6].

The literature [7] used scientific research methods such as literature, expert consultation, and mathematical statistics to analyze the performance of aviation safety officers' physical fitness assessment by statistical processing. The literature [8] analyzed the current situation of aviation safety officer physical fitness training by pointing out that there are problems such as poor physical quality foundation of the participants, tight time and heavy task of physical fitness training, and low achievement rate of physical fitness training, and further analyzed the misconceptions of aviation safety officer strength quality, based on which countermeasures to improve aviation safety officer strength quality training were proposed.

This paper analyzes the current situation of aviation safety officers' physical fitness training by using data mining of big data technology under the concept of three-wide education, studies the causes of insufficient safety officers' physical fitness training, and puts forward suggestions for improvement in response to the problems. This study is conducive to the physical fitness of aviation safety officers to fit the professional, to enrich the form and means of practice, and to improve the enthusiasm of practitioners in training. Only by improving the practicality of physical fitness training can the value of physical fitness training be better reflected.

## **2. CURRENT SITUATION AND IMPROVEMENT OF PHYSICAL TRAINING OF AVIATION SAFETY OFFICERS UNDER THE CONCEPT OF THREE-WIDE EDUCATION**

### **2.1. ANALYSIS OF THE CURRENT STATUS OF PHYSICAL TRAINING FOR AVIATION SAFETY OFFICERS**

In the process of daily management, scientific and reasonable physical training is an important condition to strengthen the physical condition of aviation safety officers and ensure that they have good physical quality. At the present stage, there are still some shortcomings in the process of carrying out physical fitness training for safety officers.

### **2.1.1. THE PHYSICAL FITNESS BASE OF SAFETY OFFICERS PARTICIPATING IN PHYSICAL TRAINING IS GENERALLY WEAK**

At the present stage, a large proportion of the initial training personnel for aviation safety officers are fresh graduates, in addition to veterans and those who have regained their initial training qualifications after having their licenses revoked. In general, veterans have a greater advantage in terms of physical condition and can demonstrate good physical condition in the initial training stage. However, recent and former graduates are weaker in terms of their physical foundation. This is mainly due to the heavy workload during their studies and the lack of physical training. This also makes it difficult to carry out the physical training of aviation safety officers.

### **2.1.2. LOW COMPLIANCE RATE OF PHYSICAL TRAINING**

In the process of physical training for aviation safety officers, instructors need to develop the training content according to the assessment items of the Civil Aviation Administration. The assessment items for safety officers are pull-ups, long jump, 3,000-meter run, sit-ups, jump rope, folding run, 100-meter run, bench press, squat, and bent-arm reach. Each assessment has a standard. However, at this stage, the pass rate of some trained safety officers is relatively low, which also makes it more difficult to improve the physical fitness of safety officers.

### **2.1.3. PHYSICAL TRAINING TIME IS TIGHT AND THE TASK IS HEAVY**

The physical fitness training of aviation safety officers has a certain time limit, and it is necessary to improve the physical fitness of safety officers within a limited period of time, so as to enhance the physical fitness state of safety officers. At present, in the process of carrying out physical fitness training, the self-exercise awareness of some aviation safety officers needs to be improved, and there are negative emotions during normal training.

## **2.2. IMPROVEMENT MEASURES OF PHYSICAL TRAINING FOR AVIATION SAFETY OFFICERS**

### **2.2.1. INTENSIVE SPEED AND STRENGTH TRAINING**

The ultimate goal of physical training is not only to improve the physical reserves of the safety officer and strengthen athletic endurance, but more importantly, to effectively improve the speed and strength of the safety officer through scientific and reasonable physical training subjects, so that he or she can better fulfill the responsibility of ensuring aviation safety. In the process of training to improve speed, instructors should clarify the source of human speed. The speed of muscle contraction is accelerated, which can significantly improve the motor unit in the same unit of time. In the process of training, the relevant staff should analyze the safety officer's own

physical conditions and achieve a progressive training effect by adjusting the training content.

### **2.2.2. GRASP THE PRINCIPLES AND METHODS OF GOOD PHYSICAL TRAINING**

Whether aviation safety officers have a good physical reserve or not has a positive effect on ensuring aviation safety. At the stage of carrying out physical training, the current stage of training should be analyzed in depth and the existing deficiencies should be identified. So as to better improve the way of physical training, make it scientific and efficient. For example, in the mechanical training, instructors should ensure that the machinery is easy to operate and can make the safety officer's muscle level improve to a certain extent; while in the confrontation training, physical training items such as push-ups and pull-ups should also be adjusted.

### **2.2.3. REASONABLE ARRANGEMENT OF PHYSICAL TRAINING SUBJECTS**

By adjusting the physical training subjects for aviation safety officers, the benefits brought by physical training can be effectively enhanced, thus enabling the safety officers to reach a higher level of physical reserve. According to the author's experience, in the process of conducting physical fitness training, instructors can adopt phased subject training to enhance the training effect.

## **3. BIG DATA-BASED TECHNOLOGY IN PHYSICAL TRAINING**

### **3.1. AVIATION SAFETY OFFICER CAREER PHYSICAL CHARACTERISTICS**

#### **3.1.1. COMBINATION OF BASIC AND SPECIAL PHYSICAL FITNESS**

Physical training is the basis of combat training, and for aviation safety officers physical training generally includes basic physical fitness and special physical fitness. The combination of basic physical fitness and professional physical fitness in the training process is conducive to the professionalization of aviation safety officers' physical fitness, the enrichment of practice forms and means, and the improvement of practitioners' training motivation.

#### **3.1.2. A COMBINATION OF PRACTICAL AND EASY AND EXTENSIVE**

Physical training is a complex process, in order to make physical training better for professional services, the training process needs to be more combined with the actual battle. Only by improving the practicality of physical training, can the value of physical training be better reflected. At the same time, too complex forms of exercises are not easy to promote, so simple and extensive physical training has more practicality and promotability.

## 3.2. AVIATION SAFETY OFFICER PROFESSIONAL PHYSICAL TRAINING METHODS

### 3.2.1. STRENGTH QUALITY

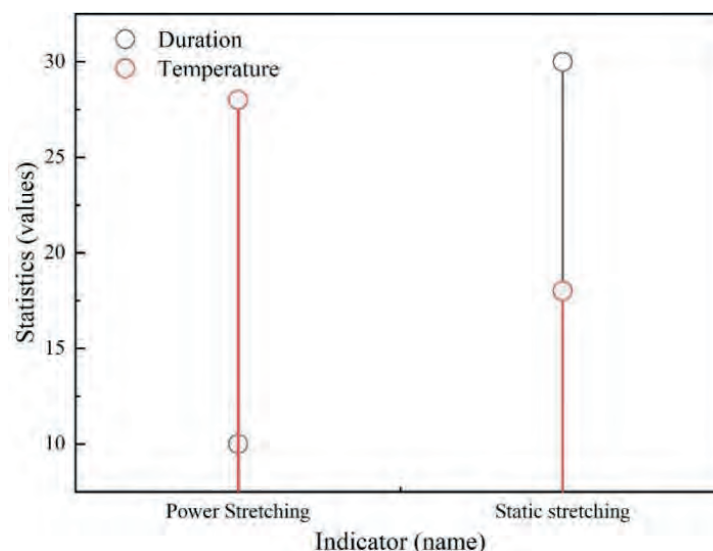
Table 1 shows the strength quality training methods. Strength quality refers to the ability of the human neuromuscular system to overcome or confront resistance during work. According to the characteristics of the strength quality required to complete different sports activities, can be divided into maximum strength, rapid strength and strength endurance, respectively, mainly corresponding to the aviation safety officer physical fitness assessment items in the weighted bench press, standing long jump and 2-minute deep squat stand.

**Table 1** Strength training methods

Strength qualities	Training method	Number of repetitions	Number
Maximum Strength	85% - 100% of maximum deadlift	1-3 times	6-10 groups
Rapid Strength	65%-80% of maximum deadlift	5-15 times	4-6 sets
Strength endurance	40%-60% of maximum deadlift	15-30 repetitions	2-4 groups

### 3.2.2. FLEXIBILITY QUALITIES

Figure 1 shows the flexibility quality training method. Flexibility quality refers to the ability of human joints to move in different directions and the ability to stretch muscles, ligaments and other soft tissues. Flexibility training generally uses the stretching method, including the power stretching method and static stretching method, as well as active and passive stretching. Generally speaking, when the external temperature is 18 °C flexibility quality performance is best.



**Figure 1** Flexibility training methods

## 4. CONCLUSION

In the background of the concept of three-wide education, based on the data

mining in big data technology to fully analyze and understand the physical fitness of aviation safety personnel, through physical training to effectively strengthen the physical fitness reserves of safety personnel, so that they can effectively respond to possible aviation safety accident problems. In the process of physical training, should pay attention to the principle of from shallow to deep, and grasp the scientific rationality of training, in the process of gradual progress, effectively strengthen the physical training effect of the safety officer, better play the safety officer's work responsibilities. Aviation warden physical training needs to start from the "teaching, training, competition, examination" link, according to the aviation warden physical fitness assessment items for targeted training, mainly divided into strength, flexibility and so on.

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# HOW CAN 5G+ BLOCKCHAIN TECHNOLOGY EMPOWER INNOVATION IN SUPPLY CHAIN MANAGEMENT

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## **ABSTRACT**

This paper proposes a supply chain management model based on blockchain technology under 5G-related technologies. Running a supply chain management under 5G requires a new management model that optimizes the process of information management and sharing based on cooperation mechanism and trust mechanism to make financial, personnel, and information exchange and sharing transparent. This model requires the implementation of handheld supply chain management based on 5G networks, through 5G network slicing technologies and applications. The new model will change the relationship of supply chain partners, improve the security and management efficiency of the supply chain, and make the supply chain management more open, transparent, and convenient.

## **KEYWORDS**

5G; blockchain technology; information management; information exchange; transparency; supply chain

## **1. INTRODUCTION**

U.S. anti-globalization policies have had a dramatic impact on global supply chains, and the impact of U.S.-China relations has further expanded the trade frictions faced by Chinese exporters - ZTE and Huawei's global supply chains have been plagued by U.S. intervention, and global supply chains have been adversely affected by the outbreak of COVID-19 in the spring of 2020 [1-3]. The restructuring of the global supply chain and non-contact production collaboration during the outbreak has placed higher demands on supply chain management. In this situation, it is imperative to enhance the trust between upstream and downstream supply chain entities, producers

and consumers, achieve production collaboration, and improve the transparency of supply chain management, and "blockchain technology" provides technical support to enhance the transparency of supply chain[4-6].

The ultra-high speed of 5G network will increase the speed of information transmission between supply chain companies by 100 times, which will create favorable conditions for information transmission between supply chain partners. PTZ devices are equipped with ultra-high definition cameras and automatic control devices that can automatically track (rotate, scale, stretch) moving targets and obtain and analyze information about moving targets [7-8]. With the support of 5G, PTZ and blockchain technologies, supply chain management is expected to be enhanced.

In order to explore how 5G + blockchain technology can promote supply chain management innovation, this paper first analyzes the problems of supply chain management and gives the corresponding hypotheses for the problems. Then it discusses the supply chain management mode under the new technology environment, and uses the cooperation mechanism and trust mechanism to realize the innovation of management mode. Finally, a technical framework of supply chain management model based on 5G+blockchain technology is given, using 5G network slices to realize information exchange and transparency and promote the innovation of supply chain management.

## **2. PROBLEMS AND ASSUMPTIONS OF SUPPLY CHAIN MANAGEMENT WITH 5G+BLOCKCHAIN TECHNOLOGY**

### **2.1 SUPPLY CHAIN MANAGEMENT ISSUES**

It is found that the following problems have emerged in the current supply chain management in the context of new technologies.

First, there is insufficient awareness of the application of new technologies. In recent years, 5G network slicing and PTZ ultra-high definition video automatic target capture technologies have developed rapidly. Blockchain technology applied to supply chain management has already had successful cases. The application of the three technologies can upgrade the supply chain and may become a new means, method, model, approach and kinetic energy for improving supply chain management. However, this possibility has not yet attracted widespread attention from the industry, and the awareness of 5G technology combined with PTZ technology and blockchain in supply chain management has yet to be raised.

Second, the management mechanism to adapt to new technologies needs to be innovated. The explosive growth of mobile terminals is driving the development of computer networks from wired Ethernet to 5G mobile ultra-high-speed networks. the

automatic capture capability of PTZ ultra-high-definition video and the operation mode of blockchain technology will change the organizational structure and operation mode of the supply chain system, thus leading to changes and updates in its working mechanism. Supply chain management mechanisms need to change and innovate to adapt to this new change.

Third, the application level of supply chain management information system adapted to the new technology needs to be improved. Entering the 21st century, the supply chain information system developed in the early years began to gradually "age" and lag behind. In recent years, 5G technology, PTZ, blockchain and artificial intelligence have been well applied in many industries. The technological transformation of the supply chain will drive the upgrade of supply chain information systems. A few examples of this are network acceleration, monitoring system upgrades and management changes.

## **2.2 ASSUMPTIONS OF SUPPLY CHAIN MANAGEMENT**

Based on the above reasons, this paper will study supply chain management under 5G blockchain-related technologies and put forward the following hypotheses.

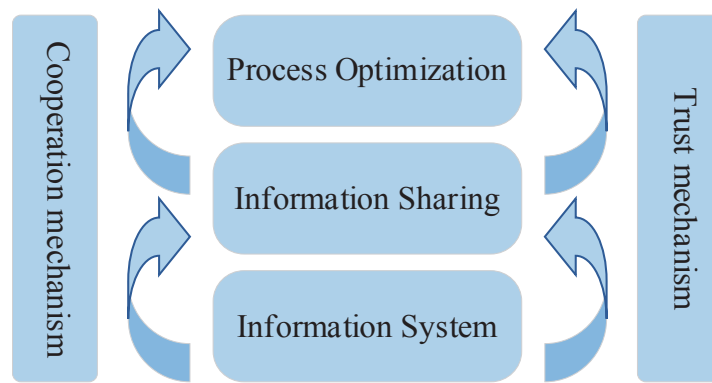
**Hypothesis 1:** Supply chain management can be realized by 5G network slicing technology, blockchain technology, PTZ technology and APP software to realize handheld supply chain management and open a new management model.

**Hypothesis 2:** Under 5G+PTZ+blockchain technology environment, supply chain management is based on cooperation and trust mechanism and information system as a platform to realize collaborative business, planning, production and marketing process, logistics, etc. through information sharing, which makes material supply and transportation, capital exchange and credit, and information exchange transparent. This model can change the relationship between supply chain partners and improve the security and management efficiency of the supply chain.

## **3. SUPPLY CHAIN MANAGEMENT MODEL IN THE NEW TECHNOLOGY ENVIRONMENT**

Optimizing the supply chain process, the supply chain management process should rely on cooperation and trust mechanisms through computer information systems (e.g., network, hardware and software) to achieve information resource sharing. Figure 1 shows the basic model of 5G supply chain management model.





**Figure 1** 5G Supply Chain Management Model

For a supply chain to operate efficiently, its production, sales and service processes need to be optimized, a process that involves information flow optimization. Information flow optimization in the supply chain utilizes an information system platform that integrates, shares and exports data with the organization as well as with partners. Partners exchange and share information across multiple information system platforms by acquiring, exporting and sharing information.

### **3.1 COOPERATION MECHANISM**

Under blockchain, the supply chain is a decentralized cooperative mechanism characterized by a federated blockchain model, with multiple subjects (enterprises) acting as information recorders. Pre-selected subjects (enterprises) (group decisions) jointly decide on the generation of each block. Other access nodes (enterprises) can participate in the transaction but do not ask about the bookkeeping process, and other enterprises can use the blockchain's open API (application programming interface) for eligibility queries. Supply chain cooperation here is a smart contract, based on a trusted blockchain mechanism that cannot tamper with data at will and can automatically enforce pre-defined rules.

### **3.2 TRUST MECHANISM**

For a long time, the supply chain has adopted a third-party-centered trust management model. With blockchain technology, companies can conduct transactions without knowing basic information about each other, enabling "trustless trust". Blockchain is a trust mechanism, which uses blockchain consensus mechanism to establish a mutually beneficial coordination and trust mechanism among multiple participants (enterprises) in the supply chain system. Under this mechanism, each entity operates independently and automatically forms a dynamic block supply chain alliance, which avoids the risk of trust crisis while realizing common value addition.

#### 4. TECHNICAL FRAMEWORK OF SUPPLY CHAIN MANAGEMENT MODEL IN NEW TECHNOLOGY ENVIRONMENT

We believe that the technology application of the new model should be carried out in the following aspects. First, 5G network slicing, aiming to build a 5G supply chain network. Second is 5G network slicing for supply chain business, which aims to build 4 slices of 5G network processes including production and sales, financial management, personnel management, and information exchange and sharing. The third is the APP software, which aims to realize handheld supply chain management.

##### 4.1 5G NETWORK SLICING DESIGN

The 5G end-to-end slice lifecycle management architecture is shown in Figure 2. The 5G end-to-end slice lifecycle management architecture includes the following main functions: First, it converts the service requirements of the supply chain into end-to-end network slices. Second, it responds to the request of communication service management for network slicing, generates slicing instances, converts them into requests for network subslicing, and then sends them to network subslicing management in order to realize network slicing. Third, it receives the network slice management requests and converts them into network subslice management requests.

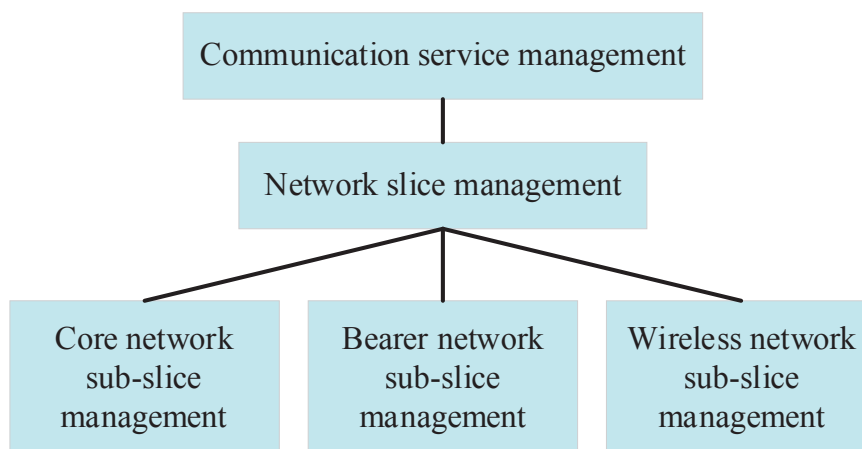


Figure 2 5G end-to-end slice lifecycle management architecture diagram

##### 4.2 SUPPLY CHAIN BUSINESS 5G NETWORK SLICING

The supply chain management process consists of four main areas, namely production and sales process, financial management, personnel management, and information sharing and exchange. Based on these four aspects, a four-layer 5G slicing architecture is used to deploy a "personalized around the individual" supply chain service model under 5G fog computing. 5G slicing provides an "on-demand" application model. It provides an "on-demand" application model for supply chain networks, where each supply chain can adjust its own hierarchy and network structure

according to its own needs.

### **4.3 SUPPLY CHAIN MANAGEMENT INFORMATION SYSTEM**

Supply chain management information system includes 5G network, PTZ, 5G cell phone, web server and software system. 5G network is the operating environment of supply chain information system and the medium of information transmission between cell phone and PTZ. 5G cell phone communicates with the server that manages information through 5G network. At the manager side, the hardware requirement is 5G cell phone, the software is APP software, and at the information system side, it is the computer software inside the information system.

### **5. CONCLUSION**

Under the 5G platform, new supply chain management models and increasing requirements for supply chain management will open up new frontiers for the development of supply chain management in the new era as new technological conditions change. 5G ultra-high-speed mobile network deployment will change the tools and means of supply chain management, as traditional supply chain management is usually done through desktop computer operations to achieve management activities. Under 5G ultra-high-speed mobile network conditions, managers can use 5G cell phones for "palm of your hand" supply chain management, no longer limited to desktop computers. The 5G ultra-high-speed capability and ultra-high-definition shooting capability of smartphones will make supply chain management more convenient, which is not only a new supply chain management tool and means, but also a new supply chain management method.

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# STUDY ON THE SYNERGISTIC MECHANISM OF FOUR CHAINS OF CHINESE ECO-INDUSTRY AND THEIR PERFORMANCE FROM THE PERSPECTIVE OF SOLID WASTE RECYCLING

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## ABSTRACT

Based on the data of 31 eco-industrial demonstration parks in China from 2005 to 2020, a system dynamics model was constructed to explore the synergistic mechanism and performance study of industrial chain, innovation chain, service chain and capital chain in the development of eco-industry in China. The simulation results of the model, taking Tianjin Ziya Economic and Technological Development Zone as an example, show that adopting measures to optimize the industrial chain, increase innovation investment, improve service capacity and increase capital investment has a significant positive impact on increasing per capita industrial value added and solid waste disposal and utilization capacity. In turn, it has significant economic and social benefits by increasing public awareness of eco-industry and winning public satisfaction with the environment.

## KEYWORDS

eco-industry in China; circular economy; solid waste disposal and utilization; industrial chain, innovation chain, service chain and capital chain synergy; synergy mechanism; performance study

## 1. INTRODUCTION

The development of industry and service industry has promoted economic development and made the material life of residents increasingly abundant, and the consequent increase in industrial waste and domestic waste has exceeded the carrying capacity and dissipation capacity of nature, and the human living environment is under unprecedented threat, requiring human measures to reduce the pressure of environmental dissipation of waste [1-2]. At the same time, the rapid development of

industry has accelerated the consumption of various non-renewable resources, the human living environment is deteriorating, and economic development is facing the double pressure of resources and environment [3-4].

Under such circumstances, the development of circular economy and the search for ways to reuse and recycle waste are effective measures to solve the two major problems of resource shortage and environmental pollution, and are of strategic importance to the establishment of a "two-type" society. In the circular economy, the process of converting waste into resources and products constitutes the waste recycling industry chain, and technological innovation and management innovation around waste utilization constitutes the waste recycling innovation chain [5]. The service chain around the waste recycling constitutes the waste recycling service chain, and the government and enterprises form the waste recycling capital chain around the recycling activities. The industrial chain, innovation chain, service chain and capital chain influence each other, and only with the synergy of these four chains can China's intravenous industry develop with high quality in this complex system [6-7].

Most of the existing studies only focus on the supporting role of one or two factors for the development of circular economy, but seldom incorporate these four chains into one framework to explore their synergy and their impact and mechanism of action on the development of circular economy. To this end, this study uses a system dynamics approach to explore the synergy of industrial, innovation, service and capital chains and their impact and mechanism of action on the development of circular economy.

## **2. THEORETICAL BASIS**

### **2.1 THE RELATIONSHIP BETWEEN RESOURCES, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT**

On the one hand, it ensures that the natural environment (such as the atmosphere, soil and water) on which human beings depend will not continue to be polluted and will be gradually restored through self-healing ability. On the other hand, it ensures that all kinds of renewable and non-renewable resources are not exploited in transition, and that the exploited resources are recycled and fully utilized. Save resources for future generations, leave a good development environment, and ensure the intergenerational sustainability of economic and social development. Therefore, resource recycling and environmental protection are the prerequisites for sustainable economic and social development. Based on the theory of the relationship between resources, environment and sustainable development, the circular economy activities, which collect waste in categories and seek ways to repeat and recycle, not only save a large amount of resources and energy, but also effectively reduce environmental pollution, which is an effective measure to solve the two major problems of resource shortage and environmental pollution.

### **2.2 CIRCULAR ECONOMY SYSTEM BASED ON INTRAVENOUS INDUSTRIAL ACTIVITIES**

Vein industry is to protect environmental safety as the premise, to save resources

and protect the environment as the purpose, the use of advanced technology, the production and consumption process generated waste into reusable resources and products. The industry that realizes the reuse and resourcefulness of all kinds of wastes includes the conversion of wastes into recycled resources, the processing of recycled resources into products, and the process of harmless disposal of final wastes.

Based on this, the activities of the intravenous industry in this study include not only production and service activities specializing in waste collection, transportation, storage, sorting, regenerative transformation, processing and utilization, etc. And waste disposal activities, but also include the arterial industry system within the direct reuse of waste links, and then form a circular economy system based on the activities of the vein industry.

### **2.3 THE ROLE OF INNOVATION, SERVICES AND FUNDING TO SUPPORT ECO-INDUSTRIAL DEVELOPMENT**

Regarding the role of innovation on industrial development, some scholars believe that in the process of China's economic shift to a new normal, the development of an industry needs to shift from factor, investment and export-oriented drive to innovation drive. Both non-R&D innovation and R&D innovation in manufacturing can promote industrial development, but there are regional and industry differences. Regarding the supporting role of services for industrial development, some scholars argue that productive services can change the structure of industrial chain and the level of division of labor, prompting the fission of global value chain into global manufacturing chain and global service chain. Regarding the integration of capital chain and innovation chain, an empirical study on Zhejiang's wisdom and health industry shows that the wisdom and health industry needs the support of industrial funds and more importantly, the guiding role of financial major science and technology special funds investment.

## **3. ECO-INDUSTRIAL FOUR-CHAIN SYNERGY MODEL**

### **3.1 DATA SOURCE**

The preliminary research found that the provinces and cities in the eastern coastal region of China have the largest number of applications for setting up eco-industrial parks, followed by the central region and the western region again. Using random sampling, the paper selected 31 eco-industrial parks, and further collected data on these 31 eco-industrial parks by means of telephone interviews, visits and research, and public information collection. Among them, the public information collection includes news reports on the establishment or construction of the parks released by the governments of the cities where the eco-industrial demonstration parks are located, information on the parks' websites, the parks' annual reports, and the verification and acceptance worksheets of the parks' information publicly released by the Ministry of Environmental Protection. data before 2016 are used for testing, and data after 2016 are used for prediction.

### **3.2 COLLABORATIVE MODEL BUILDING**

(1) Model of the change amount of comprehensive utilization capacity of solid

waste

The comprehensive utilization capacity of solid waste is the maximum capacity of the eco-industrial demonstration park to process and utilize solid waste, which is governed by the scale of assets of the eco-industrial park; the larger the scale of assets, the stronger the comprehensive utilization capacity of solid waste. The scale of assets is the result of gradual accumulation of capital, therefore, the comprehensive utilization capacity of solid waste is also the result of gradual accumulation. The amount of change in solid waste comprehensive utilization capacity is quantitatively equal to the product of the change in assets and the solid waste processing and utilization capacity per unit of assets, which reflects the change in solid waste comprehensive utilization capacity.

#### (2) Eco-industrial asset change volume model

The assets of eco-industrial park may come from seven aspects such as investment and scale of liabilities and other accumulation of the state, collective, legal person, individual and foreign sectors. The algebraic sum of the change values of these seven aspects during the solid waste cycle forms the amount of change of eco-industrial assets. According to the availability of data, this study uses the data of accumulation of state capital, collective capital, corporate capital, individual capital and foreign capital to calculate.

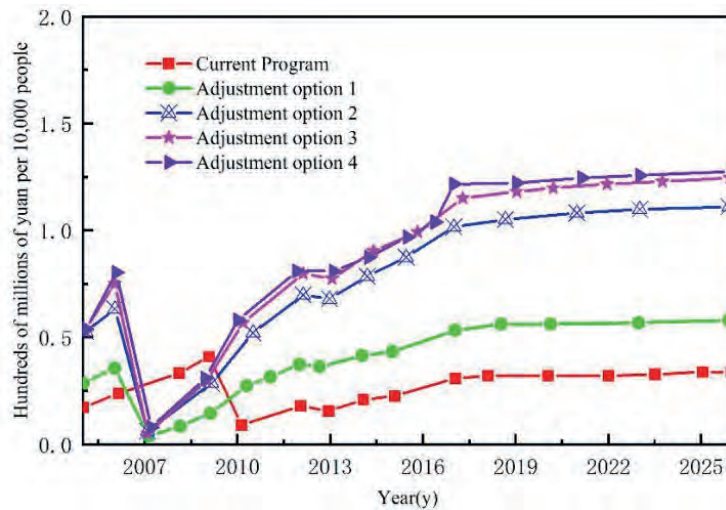
### **4. MODEL SIMULATION ANALYSIS**

This chapter discusses the policy optimization adjustment paths for each of the five different scenarios, using the Tianjin Ziya Eco-Industrial Demonstration Park as an example. The baseline scenario is the current scenario, which is a reference for simulation experiments by extrapolating the system development scenario according to historical data without all parameters being changed. The optimized industrial chain scenario is the adjustment scenario 1, the increased innovation input scenario is the adjustment scenario 2, the increased productive service input scenario is the adjustment scenario 3, and the increased capital input scenario is the adjustment scenario 4. The simulation analysis is conducted for the industrial value added per capita and solid waste disposal capacity, and then the synergistic mechanism and performance of the four chains of Chinese eco-industry from the perspective of solid waste recycling is derived.

#### **4.1 ANALYSIS OF INDUSTRIAL VALUE ADDED PER CAPITA**

Under the established system structure, the model parameters are adjusted to observe possible future scenarios, compared with the traditional method of extrapolating the future predictions based on historical trajectory trends. In this section, the quantitative data analysis of the model is performed for the industrial value added per capita of the park, and the results of the analysis are shown in Figure 1.





**Figure 1** Analysis of industrial added value per capita

In terms of the results of industrial value added per capita, overall the adoption of measures to optimize the industrial chain, increase innovation investment, measures to improve service capacity, and measures to increase capital investment has an increase rate of about 10-20% per year for increasing industrial value added per capita. In local years, between 2006 and 2009, the value added per capita of industry decreased rather than increased after the four options were adopted, because of the rapid development of real estate in China during this period, which generated a large amount of construction solid waste. It was not until the end of 2009 that the government promoted construction waste reuse technology in order to solve the problem of construction waste occupying a large amount of land that construction waste was gradually turned into treasure and generated greater economic benefits, and the simulation results were very much in line with reality.

#### 4.2 SOLID WASTE DISPOSAL AND UTILIZATION CAPACITY ANALYSIS

This section analyzes the data on the solid waste disposal and utilization capacity of the park, and the results of the analysis are shown in Table 1.

**Table 1** Solid waste disposal and utilization capacity analysis

Years	Current Program	Adjustment option 1	Adjustment option 2	Adjustment option 3	Adjustment option 4
2005	98	114	125	131	133
2008	121	137	148	164	169
2011	132	148	159	185	190
2014	148	164	175	201	209
2017	159	175	186	212	215
2020	201	217	228	254	255
2023	264	280	291	317	319
2026	298	314	325	351	354

From the viewpoint of the solid waste disposal and utilization capacity of the park, improving the solid waste disposal and utilization capacity and comprehensive utilization rate can effectively enhance the solid waste disposal and utilization capacity,

which in turn can promote employment, increase public awareness of eco-industry and win public satisfaction with the environment, with significant economic and social benefits. From the predicted results, the solid waste disposal and utilization capacity of the park gradually increases with the increase of years, with an average annual growth of about 15%~20%.

In summary, the construction of the four-chain synergistic model of eco-industry can effectively improve the per capita industrial value added and solid waste disposal and utilization capacity, and then promote the increase of industrial economic benefits.

## 5. CONCLUSION

In order to explore the synergistic mechanism of the four chains of eco-industry in China from the perspective of solid waste recycling, this paper analyzes the synergistic relationship of the four chains of eco-industry, the causal relationship among the variables in the complex system composed of the four chains, and the system characteristics, and constructs a synergistic model of the four chains of eco-industry. Taking Tianjin Ziya Eco-Industrial Demonstration Park as an example, the simulation results show that the model fits well with reality, thus indicating that the synergistic mechanism of the four eco-industrial chains in China can promote each other and enhance economic benefits.

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# INNOVATIVE RESEARCH ON THE INTEGRATION OF THE CONCEPT OF CIVIC EDUCATION INTO CLASSROOM MANAGEMENT IN UNIVERSITIES BASED ON BIG DATA ANALYSIS

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## ABSTRACT

Starting from class management, this paper puts forward the idea of moral education based on the concept of Civic Education and points out the subject and object of moral education work in class management. By explaining the necessity of moral education teachers' participation in class management, it then leads to the innovative thinking of moral education in class management. The integration of moral education into class management requires a good moral education environment, and the innovation of class management is realized by strengthening the construction of moral education work team.

## KEYWORDS

class management; thinking education; moral education work; teachers; innovation; environment

## 1. INTRODUCTION

Moral education is the foundation of education, the soul of education, the leading factor of students' personality development, and the guide, motivation and guarantee of intellectual education and sports development [1-2]. In recent years, Chinese higher education has been developing vigorously. Under the premise of "educating people and moral education first", colleges and universities take the concept of ideological education as the basis, update the concept of moral education in colleges and universities, enrich the content of moral education in colleges and universities, innovate the methods of moral education in colleges and universities, and improve the evaluation mechanism of moral education in colleges and universities, so as to realize the effective management of college classes [3-4].

As the grassroots organization of college students, college class not only has the management role of organizing and regulating college teaching activities and the connection role of teacher-student interaction, but also plays an important role in the moral education of college students [5-6]. College class management is the sum of class norms and spiritual culture that college students in the class cultivate together in their study and life, and it is not only an important part of campus culture, but also a concrete embodiment of campus culture in the class. It can be said that the ideological and moral level, academic talk, values and spiritual outlook of students in each class directly reflect the school philosophy and school style of that school [7-8].

In order to explore the innovative development of integrating the concept of ideological education into classroom management, this paper first analyzes classroom management for moral education integration, and explains the subject and object of moral education work in moral education ideology and classroom management. Then the necessity of moral education teachers' participation in class management is introduced, including the goal of moral education, refining professional ethics and the main innovative college management. Finally, the innovative thinking of moral education in class management is given, which should start from creating a good moral education environment and strengthening the construction of moral education work team.

## **2. MORAL INTEGRATION IN CLASSROOM MANAGEMENT**

In school, class is the main activity place for students. Teachers can use class to get a comprehensive understanding of each student's learning situation, physical and mental development and ideological and moral level, and to understand the internal and external factors that affect students' ideological and moral development. Teachers mainly use the class as a unit to manage students, educate them and nurture them. Reasonable class management helps to achieve the goal of nurturing people.

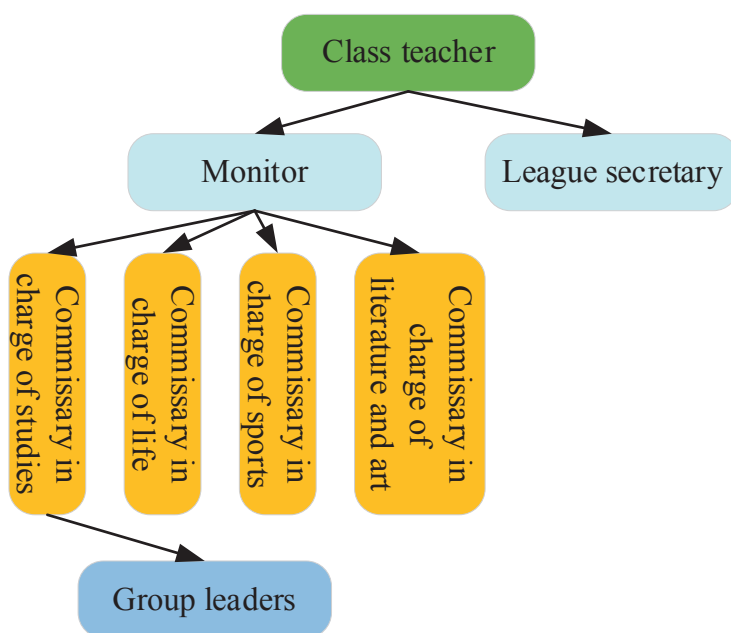
### **2.1 CLASS MANAGEMENT**

Class management is a dynamic process whose fundamental characteristics lie in clear educational goals, efficient and reasonable class management levels, clear and scientific class class rules setting, so that students can correct their learning attitudes and ideological attitudes, clearly work towards their goals, get along harmoniously with their classmates and teachers, and complete their class work efficiently. With the overall development of students as the fundamental purpose, the fundamental goal is to achieve educational goals and help students to get full and comprehensive development.

Teachers tend to rely too much on class rules and discipline and management

authority in the daily class management process, and some of them are also keen on making class rules and discipline, making detailed plans for all aspects of students and setting up reward and punishment mechanisms. However, too many rules make classroom management inefficient or even ineffective, which leads to conflicts and even confrontation between students and teachers. This also shows that moral education should be the first priority in classroom management, and classroom management can be made more reasonable through patient education and positive guidance.

The basic structure of classroom organization and management is shown in Figure 1.



**Figure 1** Basic structure of class organization and management

## 2.2 MORAL EDUCATION IDEAS BASED ON THE CONCEPT OF CIVIC EDUCATION

There are two main schools of thought on the positioning of "moral education," one of which advocates that moral education should be regarded as synonymous with moral education and refers to the education of cultivating students' moral character, while the other advocates the concept of "moral education," which advocates that moral education is an educational activity that transforms the ideological views, political codes, and moral norms of a certain society or class into individual ideological character. The other is the concept of "moral education", which advocates moral education as an educational activity that transforms the ideological views, political codes and moral norms of a certain society or class into individual ideological and moral values.

Moral education can also be called character education, which is also customarily called ideological and moral education. Under the concept of Civic Education, moral education refers to the educator's purposeful, planned and systematic influence on the educated person in terms of ideology, politics and morality in accordance with certain social or class requirements. And through the active cognition, experience and practice of the educated, in order to make them form the moral activities required by a certain society and class, that is, the educator purposely cultivates the moral activities of the educated.

### **2.3 SUBJECTS AND OBJECTS OF MORAL EDUCATION WORK IN CLASSROOM MANAGEMENT**

In the 1980s, the research of subjectivity moral education theory was applied in the process of moral education, which established the subjectivity status of moral education subjects. However, due to various reasons, the subjectivity of moral education object has not been paid attention to, and the moral education work in colleges and universities has been suffering from one-way indoctrination, single educational means and poor effectiveness of moral education. In today's diversified value and complicated situation, it is of great practical significance how to give full play to the enthusiasm and initiative of moral education subjects, solve various problems of moral education and improve the effectiveness of moral education work.

The development of moral education theory is predicated on the development of Marxist philosophy, so the exploration of the subject and object of moral education work and its relationship in college class management. To explore the subject and object and their relationship in Marxist philosophy, Marxist philosophy emphasizes that human being is the subject engaged in practical and cognitive activities, and human purposeful and planned labor practice is the basis of the existence and development of human society.

In the process of moral education work in classroom management, the educator, after mastering the moral norms required by a certain society or class, exerts ideological, political and moral influence on the educated through a purposeful, planned and systematic way. And through the active cognition, experience and practice of the educated, they form the moral norms required by a certain society and class.

### **3. THE NEED FOR MORAL EDUCATION TEACHERS TO PARTICIPATE IN CLASSROOM MANAGEMENT**

In the context of moral education, the participation of moral education teachers in classroom management is a requirement of the times. For students, it helps to guide them to correct values and realize the goal of moral education, for teachers, it helps to

refine their professional ethics and change their teaching philosophy, and for schools, it helps to carry out effective management. For this reason, it is necessary for moral education teachers to participate in classroom management.

### **3.1 HELPING TO ACHIEVE THE GOAL OF CULTIVATING MORAL CHARACTER**

Facing the problems related to the weak sense of social responsibility, unswerving beliefs and ambitions, and distorted values of college students nowadays, moral education teachers should firmly grasp the class as a basic teaching unit, penetrate the concept of moral education through participating in class management, and cultivate excellent future builders and successors of the motherland.

The participation of moral education teachers in classroom management means that they should exert value guidance on students through their own words and actions, just as a small tree grows to remove crooked thorns and make it grow straight and smooth. Among all teachers, moral education teachers embody the most comprehensive quality, many aspects of other teachers do not have, in many quality sort, political requirements should play a traction role, although all courses have the function and responsibility of nurturing people. But in the implementation of the principle of "moral education", the guidance of students to the correct values, moral cultivation, ideological education, etc., moral education classes play an irreplaceable role, the role of moral education teachers is indisputable.

### **3.2 IT IS CONDUCIVE TO REFINING THE PROFESSIONAL ETHICS OF TEACHERS**

Moral education teachers are classroom managers, educators, communicators and communicators. While fulfilling their duties as teachers and leading by example, they should be diligent in reflection, be reflective practitioners, and organize students in a variety of activities to regulate their behavior by planning time wisely, they can effectively and efficiently refine the professional ethics of moral education teachers.

In classroom management, moral education teachers can go into the students, have more contact with them, allow themselves to experience and implement teaching concepts inside and outside the classroom, and constantly change outdated educational concepts. Therefore, participating in classroom management allows moral education teachers to constantly update their teaching philosophy on the classroom as the anchor point, thus enabling teachers to develop their professional skills in leaps and bounds.

### **3.3 FAVORABLE TO THE INNOVATION MANAGEMENT OF UNIVERSITIES**

Teaching and educating people is the soul and backbone of university education work. The participation of moral education teachers in class management can make



ideological and political education integrated into the overall teaching system of the school, so that the goal and task of educating people in the school will no longer be accomplished only by moral education teachers and moral education management departments, but by all school staffs together.

Classes are the main position of teachers' educational management and the basic unit of school organization. The participation of moral education teachers in classroom management helps promote the progress of overall school management, laying a good foundation for school management and making the school a real place for teaching and educating people. Moral education teachers carry out ideological and political education management in their work according to the leadership of the educational goals, and form a complete school education management system together with the existing school moral education management department and all the teaching staff. The educational goals of the school can be achieved through this more scientific management system, from the division of labor in different disciplines and the efforts of different channels, thus promoting the overall management of the school and achieving the cultivation goals of the school.

#### **4. INNOVATIVE THINKING ON STRENGTHENING MORAL EDUCATION IN CLASSROOM MANAGEMENT**

##### **4.1 EFFORTS TO CREATE A GOOD MORAL EDUCATION ENVIRONMENT**

Class management should pay attention to the construction of moral education environment, constantly strengthen the construction of the hard and soft environment of class moral education, improve publicity and education, and establish a good class and academic style. Take advantage of the superior campus environment created by the school, fully exploit the favorable components in the social environment factors and actively use them to create a good class and school spirit and enhance the cohesion of the class.

##### **4.2 STRENGTHENING THE MORAL EDUCATION WORKFORCE**

The classroom teacher team should be strictly managed, and practical regulations should be established for the examination of ideas and political concepts, and the duties and responsibilities of classroom teachers should be clearly defined. We should formulate a special "management method for full-time and part-time class teachers", improve the rating ratio of moral education effect in the process of class management, increase the rating ratio of students to class teachers, and better penetrate into the actual life of students. Use their own personality charm, moral quality and practical actions to influence the students in their class and enhance their trust in the class teacher. Classroom teachers are made aware of the importance of strengthening

communication with students and enhancing their ability to penetrate moral education in the classroom management process.

## 5. CONCLUSION

In order to explore the innovative direction of integrating the concept of ideological education into class management in colleges and universities, this paper takes the concept as the basis, and then elaborates on the idea of infiltrating moral education in class management. The necessity of moral education teachers' participation in class management is analyzed, and it is pointed out that the innovation of moral education integration class management needs to create a good moral education environment. The construction of moral education workforce is strengthened as a way to achieve the innovative development of moral education integration class management.

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# RESEARCH ON THE CONSTRUCTION OF THEORETICAL SYSTEM OF EDUCATIONAL PSYCHOLOGY DISCIPLINE IN UNIVERSITIES IN THE CONTEXT OF INFORMATIONIZATION

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## ABSTRACT

In order to explore the construction of the theoretical system of educational psychology courses in colleges and universities in the context of information technology, this paper analyzes the necessity of the theoretical reform of educational psychology courses in colleges and universities in terms of objectives, teachers, learning psychology and interaction psychology. By constructing a knowledge tree system of educational psychology, giving full play to the leading role of college teachers and creating a psychological soft environment to improve college students' psychological learning motivation, the theoretical system of educational psychology in colleges and universities is realized.

## KEYWORDS

information background; efficient; educational psychology; system construction; tree of knowledge; reform

## 1. INTRODUCTION

In order to thoroughly study and implement the spirit of the National Education Conference and China Education Modernization 2035, fully implement the spirit of the National Conference on Undergraduate Education in the New Era and the fundamental task of establishing moral education, and strictly implement the requirements of "focusing on the foundation and the four returns" [1-2]. Under the background of informationization, colleges and universities should take the concept of "New Liberal Arts" as the leader, focus on teaching innovation and start a learning revolution. It should guide the teachers in colleges and universities to concentrate on teaching and educating people, form the value pursuit and conscious action of teaching excellence,

create the vane of teaching reform in colleges and universities, and promote the "quality revolution" in higher education [3-4].

The necessity of the theoretical reform of the discipline of educational psychology. The discipline of educational psychology mainly studies the basic laws and principles of educational psychology and its application in school practice, focusing on improving students' theoretical level and application ability of educational psychology, which is a course with both theoretical and strong applicability[5-7].

Starting from the necessity of theoretical reform of educational psychology curriculum, this paper analyzes the objectives of efficient educational psychology, including the impact of teachers, college students and teacher-student interaction on psychology curriculum. Then, it discusses the effective path of the reform of efficient educational psychology curriculum, which is to enhance the learning motivation of college students by constructing the tree system of educational psychology knowledge, giving full play to the leading role of efficient teachers, and building a good psychological soft environment.

## **2. THE NEED FOR THEORETICAL REFORM OF EDUCATIONAL PSYCHOLOGY COURSES**

Educational psychology is an important educational content aiming at cultivating a good state of mind among college students, helping them to establish a correct learning concept, effectively cope with various pressures faced in life and study, alleviate their bad emotions, and then improve their adaptability and actively develop themselves. The work of educational psychology in colleges and universities should take the prevention of problems and the promotion of psychological quality as the main teaching objectives, adopt mental health education to cultivate the psychological quality of college students, promote their comprehensive development, and then realize the cultivation of high-quality comprehensive talents.

### **2.1 OBJECTIVES OF EDUCATIONAL PSYCHOLOGY IN HIGHER EDUCATION**

Talent cultivation in colleges and universities is not only professional education, but also ideological education, and college graduates should be high quality talents with qualified politics, advanced ideology, professional proficiency and high moral character, and be comprehensive and excellent builders of socialist country. Therefore, colleges and universities need to pay attention to the character education of college students in talent cultivation, and raise it to the same importance as professional knowledge, or even better status. Throughout the years, the state has continued to pay high attention to the psychological education work in colleges and universities, attaching importance to the role played by teachers in the education of various

disciplines. Educational psychology plays a pivotal role in the process of cultivating comprehensive and integrated quality of college students in colleges and universities, so strengthening the reform of educational psychology courses in colleges and universities is an effective way to improve the mental health of college students.

## **2.2 TEACHERS' EDUCATIONAL PSYCHOLOGY AFFECTS THE EFFECTIVENESS OF TEACHING**

teaching

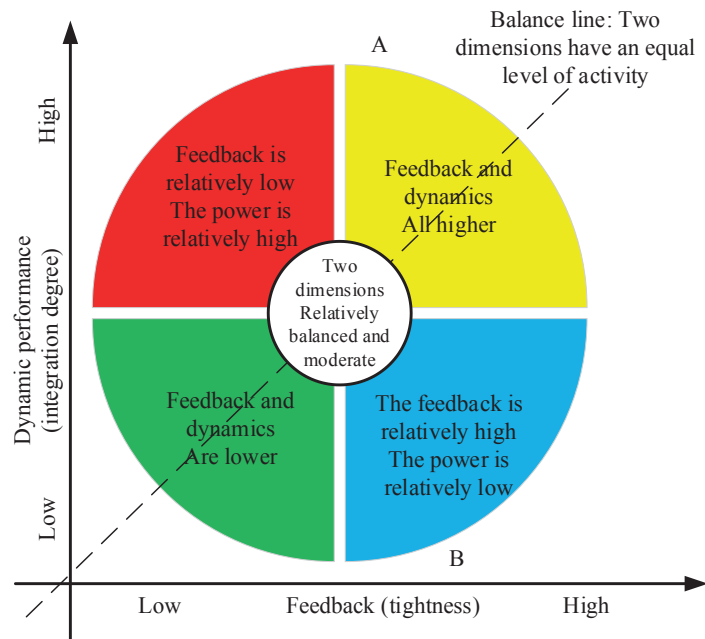
As the main body of psychological education in colleges and universities, teachers' personal characteristics such as their image, morality, learning and character will form the teachers' imprint in the process of interaction with college students and become possible imitation targets for them. Teachers' assessment of their own teaching ability includes feedback on college students' test results and assessment results, in addition to their knowledge of their own educational level. A reputable teacher whose academic standards and personality are recognized by college students will thus have an amplified role model effect. It is easier for college students to accept the ideological culture of teachers and improve their teaching effect by offering some lectures on theories and knowledge related to mental health, which in turn will help college students master the corresponding analysis methods and skills and improve their professional knowledge and psychological knowledge.

## **2.3 COLLEGE STUDENTS' STUDY PSYCHOLOGY AFFECTS LEARNING OUTCOMES**

The university stage is a critical period of psychological development for college students, when their self-awareness has been realized and developed, and their self-cognition and emotional experiences are gradually formed. During this period, the transition from "carefree" family life to independent group life, the discomfort and growth anxiety in the transition process will have certain influence on their psychology and reduce the learning effect.

Through appropriate psychological construction for college students, it can effectively improve their own quality, ability and cognitive ability to the outside world, effectively transform the contradiction between "reality" and "ideal", adjust college students' psychological state of learning, improve learning initiative and optimize learning effect. Optimize the learning effect. Through some appropriate psychological counseling methods, we can improve the psychological quality of college students and promote the sound development of personality.

The basic contents of college students' psychological awareness activities are shown in Figure 1.



**Figure 1** A basic model of mental conscious activity

## 2.4 THE PSYCHOLOGY OF TEACHER-STUDENT INTERACTION AFFECTS THE EFFECTIVENESS OF EDUCATION

Ideas need to be agreed upon and thus be intertwined, so the teacher-student relationship influences teaching and learning activities. The process of communication should be permeated with Marxist educational emotions and strong humanistic concerns, so that the act of teacher-student communication and interaction is effective and achieves the teaching objectives of the educational psychology course.

Psychological communication between teachers and students can effectively solve the problems that arise in learning in order to ensure the learning effect of college students, improve their expression ability and strengthen their self-confidence. Teaching psychology in a harmonious and relaxed teaching atmosphere and environment can better enhance the good psychological state and positive and healthy lifestyle of college students, and deepen the degree of mutual trust, sincere treatment and mutual respect between teachers and students.

## 3. EXPLORING THE PATH OF REFORMING EDUCATIONAL PSYCHOLOGY COURSES IN COLLEGES AND UNIVERSITIES

### 3.1 PLAY THE LEADING ROLE OF UNIVERSITY TEACHERS

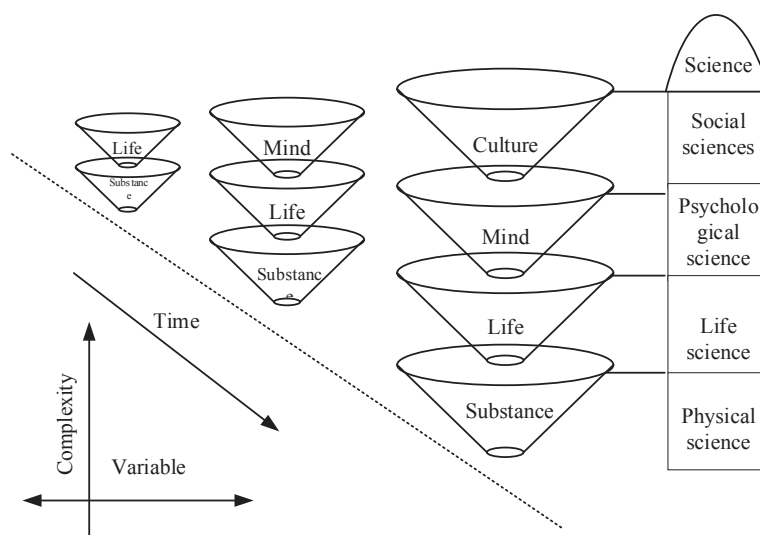
The process of teaching psychology can be seen as a spiritual communication activity that increases the motivation of university students to learn and meet the needs of teachers' lectures. University teachers should be good at applying it discriminately, making full use of its advantages and overcoming its negative effects to continuously

improve their teaching. In the process of impression formation, the first impression is crucial, and this psychological phenomenon is known as the first-cause effect. When teachers first come into contact with college students, their appearance, demeanor and speech will leave a deep first impression on them. The first impression is both the teacher's attitude and an important way of psychological education for college students. In order to make college students accept teachers better and make the teaching of psychology courses more in-depth, teachers must pay attention to the first impression effect of college students.

### 3.2 BUILDING THE TREE OF KNOWLEDGE SYSTEM OF EDUCATIONAL PSYCHOLOGY

By bringing the core ideas of each discipline into a whole and making connections between all disciplines, it is more beneficial to see educational psychology from a holistic perspective.

For students, the Tree of Knowledge system is a new unified theory of knowledge that maps the parts of science in a new way, connecting efficient disciplines and sociological processes, and the parts in between, into a logical whole. Educational psychology in higher education is certainly in this whole, which means that if the whole science is unified, then the psychological sciences must be unified, and perhaps this is a superficial understanding that students and teachers will hopefully gain more insight from. The Tree of Knowledge system structure of educational psychology is shown in Figure 2.



**Figure 2** The tree of knowledge system

### 3.3 BUILDING A PSYCHOLOGICAL SOFT ENVIRONMENT

Starting from the psychology of college students, it is considered that subconsciousness is an effective teaching method of educational psychology. In order

to create a good educational psychology teaching atmosphere in the learning process of college students, we should focus on establishing a good teacher-student interaction with college students and understanding their thoughts, psychology and learning achievements through communication with them. College education should be done to care about college students, not only to pay attention to the shortcomings of excellent college students, but also to be good at finding the advantages of poor students, to achieve the true sense of teaching equality, to achieve a democratic, fair and harmonious teacher-student relationship.

The educational psychology course should establish a correct view of classroom behavior and respect the individual independence of college students in the teaching process. Teachers need to give full play to teachers' initiative in the daily teaching process and create a cheerful classroom atmosphere so that college students can actively participate in classroom learning. By building a psychological soft environment, we can effectively improve the initiative of college students' learning, help mobilize their enthusiasm for learning, realize the transformation from "listening" to "speaking", and deepen the theoretical and practical research results of mental health education.

#### **4. CONCLUSION**

It is the duty of teachers to analyze the mental health status of college students from the perspective of psychology, provide them with appropriate psychological guidance and solve their psychological problems in time. The introduction of educational psychology courses and the tree of knowledge system enables college teachers to achieve "transpersonal thinking" and "congruent guidance" in the process of daily education and teaching, helping college students to establish correct life goals and shape good thinking styles. Through the continuous reform of educational psychology, the research on its application and function will be deepened, providing useful reference for China to cultivate qualified and comprehensive high-quality talents.

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**RESEARCH ON THE IMPROVEMENT OF UNIVERSITY EDUCATION  
MANAGEMENT SYSTEM AND INNOVATION SYSTEM COUNTERMEASURES IN  
THE CONTEXT OF BIG DATA**

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**ABSTRACT**

Exploring the improvement and innovation of college education management (CEM) system below the background of big data is the necessary way to understand modern education management. Starting from proposing the drawbacks of the development of CEM, this paper draws out the inevitable trend of the expansion of CEM from the essence of CEM. Based on this, the innovative strategies of CEM informatization are proposed, i.e., establishing expansion concept, strengthening top-level design, improving system construction and creating education management platform. Multiple directions are taken together to jointly encourage the improvement and novelty of CEM system.

**KEYWORDS**

college education management; innovation; informatization; big data; system construction; management platform

## 1. Introduction

In currently world, big data is penetrating into every aspect of human society, not only varying people's way of intelligent, working and living, altering the production and construction relations of society, but also becoming the "new oil", "new gold mine",

"new resource" and "new engine" of innovation in the future [1-2]. "New resources" and "new engines" of innovation [1-2]. The government must ally with creativities, universities and research establishments, mobilize all people and participate extensively to meet the challenges in the era of "big data", and universities will be the participants and promoters of this big data wave [3-4].

With the promulgation of the National Medium and Long-term Education Reform and Expansion Plan, the status of education informatization has been raised to the level of national strategy, and the reform of higher education informatization has become an inevitable trend [5-6]. Of course, the expansion and existence of colleges and universities not only depend on first-class education, but also on first-class management. Consequently, as a significant care for the action and expansion of colleges and universities, education management must be the "leader" and "main force" of this change [7-8].

To explore the improvement and innovation of CEM system, this paper debates the essence of traditional CEM from the disadvantages of college education expansion, and then draws out the expansion tendency of modern CEM. According to the drawbacks, the corresponding innovation strategies are proposed to comprehend the improvement and innovation of CEM by establishing expansion concept, strengthening top-level design, improving system construction and creating teaching management platform.

## 2. Educational management expansion drawbacks and trends in colleges and universities

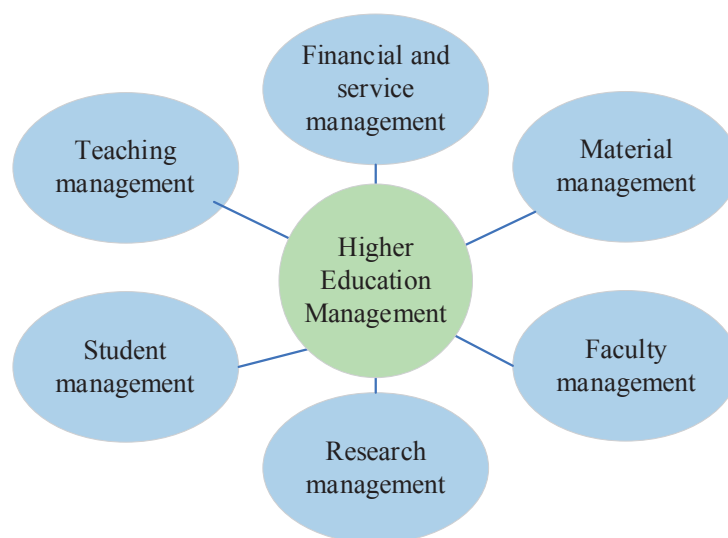
### 2.1 THE ESSENCE OF EDUCATION MANAGEMENT IN HIGHER EDUCATION

The fundamental interest of higher education management is to make students more excellent by educating and nurturing, inculcating and imbuing, cultivating and empowering them with the ability to notice happiness, generate happiness and practice happiness. It could be said that brilliance and gladness are the value of all educational management in colleges and universities.

Colleges and universities are a kind of special social organization that cultivates highly educated talents with coordinated physical and mental expansion. There are three key businesses of colleges and universities; teaching, scientific research and management, and scientific management is essential to attain the goals of teaching and scientific research, and scientific management is even more indispensable to achieve the goals of education.

The eventual good of university education management (UEM) is to expand the

state of all kinds of school fundamentals and their grouping, and to serve together to encourage common universal capacities with ridiculous soul, noble morality, independent thinking, good feelings and prettiness. Educational management of colleges and universities is a significant process and resources to organize the relationship among various elements within colleges and universities and between internal elements and external elements, to reasonably allocate the restricted possessions and make them extra compatible with the environment, so as to better achieve the goals of running schools. The level of CEM and UEM is one of the rudimentary measures of the modernization of education. The level of CEM and UEM directly affects the level and quality of education and teaching in colleges and universities, and the realization of the objectives of running colleges and universities. The basic content of CEM and UEM is shown in Figure 1.



**Figure 1** The basic content of CEM

## 2.2 THE DRAWBACKS OF TRADITIONAL UEM

Peder Drucker, a famous American management scientist, once said, "The roots of management are deeply rooted in culture, society, values, traditions, customs, beliefs, government and institutions." The traditional CEM mode is influenced by Chinese traditional culture hierarchy, obedience culture and western scientific management theory, which presents rigid management in management concept, management system, management content and method. There are many problems in traditional CEM, treating group as a static construction, over-emphasizing management institutionalization, pattern and correction, highlighting inflexible management ignoring elastic management, accenting submission and obedience and ignoring human autonomy, all of which are mismatched with modern management and unfavorable to the expansion of college students and teachers' professional expansion.

## 2.3 TRENDS IN THE EXPANSION OF MODERN UEM

Entering the 21st century, the level, characteristics and mode of CEM and UEM have undergone great changes, and the modernization of CEM and UEM is its inevitable trend. The modernized education management concept of colleges and universities is the pioneer, the modernized education management technical facilities are the foundation, and the modern faculty is the key. Modernization of education management has the following characteristics.

(1) The people-oriented education management modernization advocated by colleges and universities is to take people as the purpose and value of education management. The subject and object of school education management are both people, and its ultimate goal is also for people. It manages the management object through the management subject to finally achieve the purpose of educating, developing and perfecting people.

(2) Informatization is the inevitable trend of CEM and the most basic feature of modernization, which is supported by computer and Internet technologies. Technology provides the possibility to expand the superiority of CEM and solve the problems existing in traditional education management. As a place of knowledge production and concentration, colleges and universities should be the place of utilization of information technology, and the use of modern information technology in the field of CEM has developed an predictable tendency.

(3) More scientific and democratic, more interactive and different. Scientific management is the basis of democracy and equality. In the process of CEM, it is also essential to realize the manifestation of individual differences in education and to do a good job of interactive communication between teachers and students, so as to improve the modernization ability of CEM in decision-making.

## 3. Innovative strategies for informationization of education management in higher education

From ancient empirical management to modern scientific management to modern education management, higher education management has gone through three stages of expansion and has slowly matured. Modern CEM is divided into three progressive levels, namely, information-based education management, big data education management and intelligent education management. And wisdom education management can be said to be the highest level of CEM, with the characteristics of ecology, wisdom and humanism. This chapter focuses on the improvement and innovation strategies of informatization of CEM, so as to realize the innovative

expansion of CEM system.

### **3.1 ESTABLISHING THE CONCEPT OF EDUCATIONAL MANAGEMENT EXPANSION IN THE INFORMATION AGE**

The current information age is no longer the information age that we used to talk about, this new information age has become the age of "cloud", "network" and "number". What is needed in this era is not data and information, nor cloud computing technology or big data technology, but data-based thinking and concept. The expansion of UEM informatization in this era no longer simply relies on the infrastructure of informatization or many information technologies, but depends on the growth of possessions, the application of data and the formation of new thoughts and concepts. Consequently, establishing the concept of open sharing and cross-border collaboration is the premise of transformation of CEM informatization.

### **3.2 STRENGTHENING THE TOP-LEVEL DESIGN OF EDUCATION MANAGEMENT INFORMATION TECHNOLOGY**

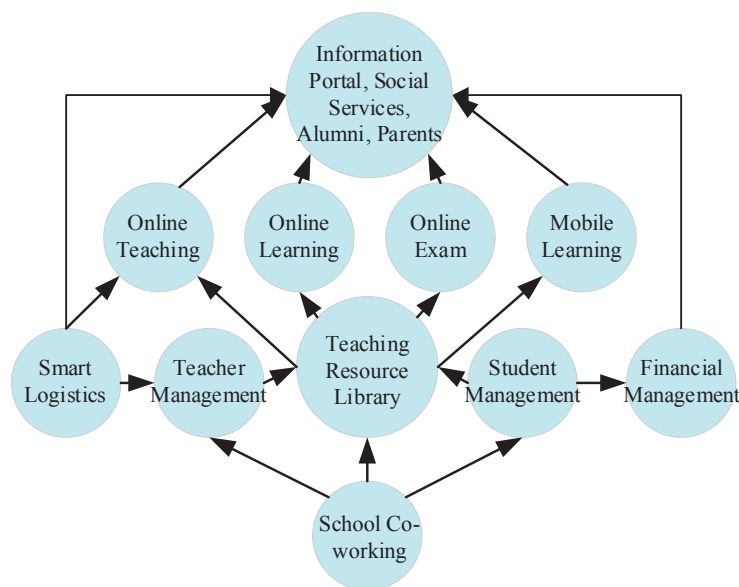
Top-level design is a top-down rational design and planning with the characteristics of long-term, strategic and scientific, which is to think about the structure, function and elements of a work and a task from the overall perspective to reach the project goal quickly and effectively. To develop educational management informatization and realize the transformation of educational management in the new information era, universities need to formulate a perfect informatization expansion mechanism, scientific expansion planning and democratic educational governance model, which has great guiding significance for educational management informatization in all universities.

### **3.3 IMPROVE THE SYSTEM CONSTRUCTION OF EDUCATION MANAGEMENT INFORMATION TECHNOLOGY**

From the early stage of education management informatization construction to the present stage with certain achievements, colleges and universities have invested a lot of energy in the creation of research and expansion of teaching management information system, but the system construction that goes with it is still not perfect, which causes various undesirable phenomena in the operation of information system. The authenticity and validity of the data are damaged, which affects the effective operation of the teaching management information system. For this reason, it is necessary to improve the relevant system in the process of continuing to promote the informationization of education management.

### **3.4 CREATING A DATA SHARING PLATFORM FOR EDUCATION MANAGEMENT INFORMATION**

The data sharing platform of education management informatization is an important part of education management informatization construction. Through a unified access interface, it integrates and applies network technology, storage technology and cloud computing technology to create an independent platform system that enables the transmission, synchronization and sharing of data among independent systems. Its basic structure is shown in Figure 2.



**Figure 2** Education management information data sharing platform

With the data sharing platform, all the basic data of the systems between colleges and universities in the process of operation, including the operation results for the basic data, will be saved in the central repository of the data sharing platform. When this data is to be used again, it only needs to be extracted from the data sharing platform. This ensures the unification and standardization of all kinds of basic data, and also promotes the communication and interaction among universities and accelerates the expansion of education management informatization.

#### 4. Conclusion

The change of times brings the renewal of various information technologies, and in the field of higher education, the scale of most colleges and universities is showing an increasing trend. In such an era of background and challenges, it is especially important to promote both quality and efficiency of education management through efficient education management information construction. Based on this, this paper proposes a new path for the improvement and innovation of education management system in colleges and universities from the aspects of expansion concept, top-level design, system construction and management platform.

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# RESEARCH ON THE FINANCIAL MANAGEMENT SYSTEM OF SMART HOSPITALS IN PUBLIC HEALTH EMERGENCIES FOR BIG DATA PLATFORM

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## ABSTRACT

The frequent occurrence of international public health emergencies in recent years has posed a serious challenge to medical institutions at all levels. This paper develops a corresponding discussion on the emergency financial management approach of smart hospitals under public health emergencies. Firstly, risk prevention and emergency management are effectively integrated, thus forming a model for emergency management of risk in public health emergencies. Then the emergency financial management measures are described. The results show that the average speed of hospital financial management under the big data platform reaches more than 90% in public health emergencies. It can be seen that further clarification of emergency financial management points can play an important role in improving the level of handling of public health emergencies.

## KEYWORDS

Public health event; Smart hospital; Big data platform; Financial management system; Emergency governance model

## 1. INTRODUCTION

A public health emergency is a major infectious disease outbreak, mass unexplained disease, major food and occupational poisoning, and other events that seriously affect public health that occur suddenly and cause or may cause serious damage to the public health of the society [1-2]. It presents characteristics of suddenness, publicness (mass), severity, urgency, and complexity. The new era constantly improves the ability to prevent and resolve major public health risks and does a good job in emergency management of public health emergencies [3-4]. Under public health emergencies, the hospital side should do a good job in emergency financial related management, scientifically match and use hospital emergency materials, fully maintain the stable operation of the hospital, timely assist in handling public health emergencies, and improve the effect of hospital related emergency financial management [5-6].

Currently, academic research on public health emergencies is mainly from a public health and medical perspective. The literature [7] proposes that risk communication is the basis for ensuring public participation in public health emergencies. RC in four epidemiological, socio-political and geo-economic settings were compared and key structural factors that can lead to effective RC in public health emergencies were identified. The literature [8] provides a systematic presentation for the detection of CoVs (novel human infectious coronaviruses) in various environmental matrices, comprehensively covering methods and techniques for sampling, pre-treatment and analysis. The literature [9] proposes that evidence-based

decision making is at the heart of public health. hta (health technology assessment) can address the link between scientific evidence and decision making in public health emergencies and overcome the major challenges faced by public health experts in providing advice to decision makers, and hta can be used as a tool to bring evidence-based actions in public health emergency preparedness and response. What is proposed in the above literature is that research on public health emergencies is more scattered and the interactions between risk prevention and emergency governance are not studied in sufficient depth.

Therefore, this paper, oriented to the big data platform, firstly collates and merges risk prevention and emergency disposal, and constructs a risk emergency governance model for public health emergencies. Then the emergency financial management measures are analyzed, including building a financial organization framework, constructing a budget management platform, improving the level of hospital economic control, and using information management tools. Finally, the timeliness and effectiveness of smart hospitals in risk prevention and emergency disposal in public health emergencies are demonstrated through experiments to improve the governance of public health emergencies.

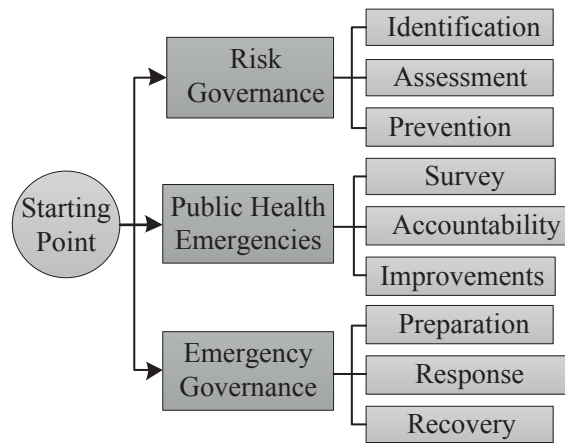
## **2. BIG DATA AND PUBLIC HEALTH EMERGENCY WARNING SYSTEM**

### **2.1 BIG DATA PLATFORM**

Big Data refers to the collection of data that is analyzed and managed on the Internet based on the full use of database software tools. When the data platform provides a viable solution to the problem of lack of effective means to grasp data on the supply and demand of emergency medical resources. On the supply side, the big data platform can carry out dynamic collection of production and deployment data of key emergency medical resources, help manufacturers predict changes in the demand for materials from medical institutions, and realize intelligent on-demand production. On the demand side, the big data platform can realize cross-departmental emergency data sharing and data sharing among relevant departments, health care committees and medical institutions to ensure that relevant departments can obtain real-time and accurate demand data of key materials, especially the docking of core data such as demand, receipt and inventory of epidemic prevention and control materials in hospital information systems and other systems.

### **2.2 RISK AND EMERGENCY MANAGEMENT MODEL FOR PUBLIC HEALTH EMERGENCIES**

Risk in a public health emergency is the possibility of potential harm to human health and safety, as well as the possibility of adverse effects brought about by the occurrence of a public health emergency [10]. For example, in order to reduce or minimize the loss and harm caused by the event in a public health emergency, it is necessary to carry out identification of unknown disease or infection risk sources, infection risk prevention, and infection risk assessment, etc. This series of processes essentially involves the risk management of public health emergencies. Figure 1 shows the risk emergency governance model for public health emergencies.



**Figure 1.** Risk emergency governance model for public health emergencies

The analysis of the governance model in Figure 1 shows that risk management and emergency management are the "two wings" of public health emergencies, on the one hand, to prevent, predict and assess the risks arising from public health emergencies, and on the other hand, to deal with the event itself. The overall goal is to effectively prevent, timely control and eliminate the hazards of public health emergencies, to protect public health and life safety, and to maintain normal social order.

### **3. FINANCIAL MANAGEMENT MEASURES OF INTELLIGENT HOSPITALS UNDER PUBLIC HEALTH EMERGENCIES**

#### **3.1 BUILDING AN ORGANIZATIONAL FRAMEWORK FOR EMERGENCY FINANCIAL MANAGEMENT**

The efficiency and quality of financial management work to meet the standard requirements under the public health emergencies, the hospital should pay more attention to the construction of the emergency organizational framework, which can be started from the following points.

(1) The hospital should determine the size of the emergency finance office for the level of the emergency.

(2) Hospitals should make accurate judgments on the actual implementation of the organizational framework within a limited period of time, and strengthen the connectivity of each link in the framework based on the emergency financial management guidelines to avoid the inability to interface when implementing the financial management process.

(3) Each department within the organizational framework should clarify its own occupation and obligation, and unite the strength of each department to play the coordinating function of the financial management organizational framework.

#### **3.2 BUILDING AN EMERGENCY BUDGET MANAGEMENT PLATFORM**

In order to ensure the effective use of internal funds in the event of a public health emergency and to save budget costs, the hospital's finance department should build a diversified budget management platform based on its own operational characteristics and emergency financial plans. Firstly, it is necessary to grasp the budget management principles, adjust the emergency approval system based on budget approval process and constraint characteristics, and improve the implementation of budget costs by simplifying the approval process. Secondly, the reasonable setting of emergency budget accounts can help improve the standardization and comprehensiveness of the management platform, such as the budget management of basic materials, emergency scientific research and personnel subsidies, and

also pay attention to the construction of medical observation areas and other costs, so as to improve the value of the utilization of budget costs. Finally, in the process of implementing the budget, the hospital should combine the emergency financial planning to improve the budget declaration management system, and flexibly adjust the budget management mode according to the number and distribution of clinical diseases of public health emergencies, so as to realize the scientific management of emergency financial work.

### 3.3 SCIENTIFIC USE OF INFORMATION-BASED FINANCIAL MANAGEMENT TOOLS

Bringing a variety of possibilities to improve the quality of people's work. The integration of information technology into emergency financial management work can not only largely relieve the pressure brought by high-intensity work to financial personnel, but also play an important role in ensuring the accuracy and security of financial data. With the support of the information management system, the finance department can use the computer terminal or mobile terminal to understand the dynamic situation of materials and personnel, and carry out budget cost control and cost accounting according to the timely uploaded information, which not only improves the timeliness of emergency financial management, but also saves a lot of time costs.

## 4. VALIDATION OF FINANCIAL MANAGEMENT SYSTEM OF INTELLIGENT HOSPITAL BASED ON BIG DATA PLATFORM

In this paper, based on the big data platform, a systematic analysis of the financial management system of a smart hospital in a public health emergency was experimented, and the speed of financial management improvement of the built platform is shown in Table 1.

**Table 1.** Speed of financial management in smart hospitals

Whether to use	Total Budget Financial Management	Emergency medical services price control	Performance Evaluation
Using the platform	96%	93%	97%
Not Applicable Platform	81%	78%	80%

Analyzing the results of Table 1 whether to use the built platform or not, it can be seen that the average speed of each system of financial management of the hospital in case of sudden public health time under the big data platform can reach more than 90%. When the platform is not used, the average speed is about 80%, which is a more obvious improvement. In summary, under sudden public health events, hospitals should improve the price management system of emergency medical services, ensure the quality of emergency financial management, and improve the allocation standards in terms of hospital emergency resources. Further enhance the hospital's specific response and solution capabilities to public health emergencies, to ensure that the hospital can operate normally and stably during the disposal of public health emergencies. Through the process transformation of financial operations in the process of smart finance construction, reasonable control of costs to ensure the smooth and healthy economic operation of the hospital.

## 5. CONCLUSION

Big data platform can provide support and guarantee for smart hospital financial management. Based on big data technology, this paper establishes an organizational framework for emergency management in unexpected public time, a budget management platform, and scientific information-based financial management tools to achieve real-time monitoring, analysis, and prediction of financial information and provide a more scientific and accurate basis for financial decision-making. The results of the experimental analysis show that the average speed of each system of hospital financial management under the use of the

built management system is derived to reach more than 90%. When the platform is not used, the average speed is about 80%. It is verified that the proposed system can provide a reference for hospitals to improve their public health emergency response capability.

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# STUDY ON THE ROLE OF PATHOLOGY IMAGE RECOGNITION TECHNOLOGY FOR GYNECOLOGICAL TUMOR DETECTION WITH THE SUPPORT OF SMART EDUCATION TECHNOLOGY

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## ABSTRACT

To improve the detection accuracy of gynecologic tumors. In this paper, the pathology image recognition technique is improved with the support of smart education technology. In the improvement process, the features of gynecological tumor pathology images are extracted in different color spaces and texture spaces to obtain more comprehensive classification and recognition information, and voting is used to make decisions on the detection results. The simulation results show that the detection accuracy of the designed technique in this paper on seven gynecological tumor pathology images is 95.65%. It can be seen that the pathology image recognition technology supported by intelligent education technology can better detect gynecological tumors and has good application prospects.

## KEYWORDS

Smart education technology; Image recognition technology; Texture space; Tumor detection; Classification recognition

## 1. INTRODUCTION

Gynecologic tumors have more tumor types, and their pathological images have small differences under the microscope, which are very easy to judge, so doctors need to rely on experience or repeated observation from multiple angles to make judgments [1-3]. There are many uncertainties in manual analysis and large errors in the diagnosis of different experts, so improving the pathological image recognition technology of gynecologic tumors is an urgent matter to be solved.

In recent years, many experts and scholars have improved the image recognition of tumor pathology. For example, the literature [4] used artificial intelligence techniques to mimic renal pathologists and extract relevant pathological diagnoses from kidney biopsies, improving the reproducibility of renal pathology results for certain parameters and demonstrating their application in renal pathology. The literature [5] used image segmentation techniques for 3D airway reconstruction to reveal detailed tomography of organs, tumors and nerves, parallelized the algorithms for image segmentation and improved the quality of tumor detection in surgical pathology. In summary, the above-mentioned research methods have the problem of complex processes in extracting features and their simple classification of tumors no longer meets the needs of actual physicians during diagnosis.

Based on this, this paper improves the pathological image recognition technique of gynecological tumors with the support of smart education technology. Firstly, the pathological images of gynecological tumors mapped in different color spaces and texture spaces are preprocessed, and the features extracted in each space are concatenated. Secondly, the pathological image features of gynecological tumors are selected, the filtered features are fed into the classifier, and the majority of the results are output as the final recognition results. Finally, the practicality and accuracy of the techniques designed in this paper are verified by the analysis of simulation results.

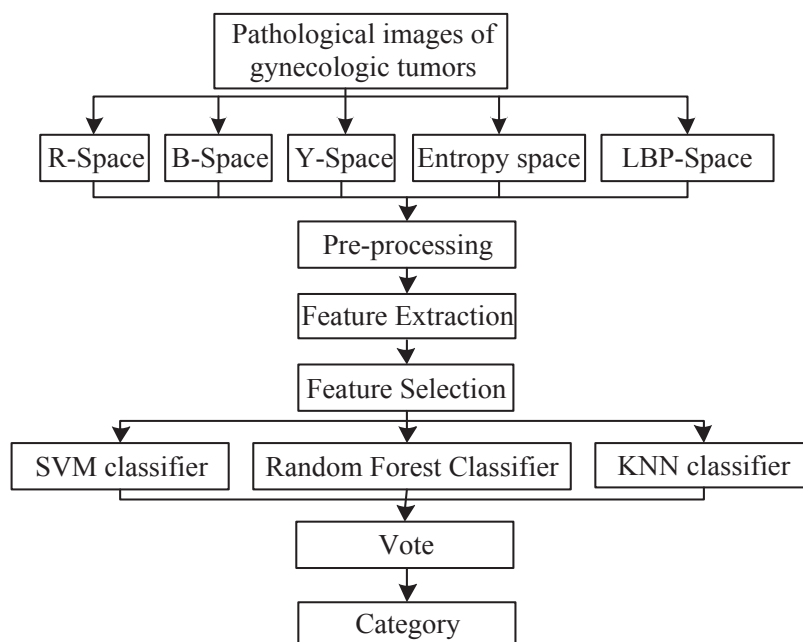
## 2. IMAGE RECOGNITION TECHNOLOGY FOR SMART EDUCATION

### 2.1 SYSTEM ARCHITECTURE OF SMART EDUCATION TECHNOLOGY

Smart education is an intelligent educational information ecosystem created by a new generation of information technologies such as the Internet of Things, cloud computing, big data, and wireless communication, and is an advanced development stage of digital education [6-7]. It aims to enhance the wisdom of the existing digital education system, realize the deep integration of information technology and mainstream education business, and promote the wisdom nurturing and sustainable development of education stakeholders. Smart education is not an isolated system, therefore, the architecture of smart education technology needs to be connected with other smart systems in smart cities through standard interface specifications to share basic data [8-10]. Based on this, this paper improves the pathological image recognition technology with the support of smart education technology to improve its efficiency in detecting gynecological tumors.

### 2.2 SMART PATHOLOGY IMAGE RECOGNITION TECHNOLOGY

Due to the variation of gynecologic tumor tissues in pathological structure, the traditional pathology recognition technology is no longer able to accurately recognize the pathology images. Therefore, in this paper, the pathological image recognition framework of gynecological tumors is improved with the support of smart education technology, and the improved pathological image recognition framework is shown in Figure 1.



**Figure 1.** Gynecologic tumor pathology image recognition framework

As can be seen from Figure 1, with the support of smart education technology, the gynecologic tumor pathology image recognition technology firstly maps the original gynecologic tumor pathology images into different color spaces and texture spaces, which include R-space, B-space and Y-space, and texture spaces include entropy space and LBP space. Next, the gynecologic tumor pathology images after mapping in each space are preprocessed separately, including enhancement with restricted contrast, adaptive histogram and equalization methods. Then the enhanced gynecologic tumor pathology images are feature extracted in five spaces, including texture features based on grayscale covariance matrix, improved LBP features, improved LDP features, and improved HLAC features. The features extracted in each space are then concatenated, feature selection is performed with KPCA, and the filtered features are fed into the classifier. Voting is performed with SVM classifier, random forest classifier and KNN classifier, and the majority result is output as the final recognition result.

### 3. SIMULATION RESULT ANALYSIS OF INTELLIGENT PATHOLOGY IMAGE RECOGNITION TECHNOLOGY

This section presents a simulation analysis of gynecologic tumor pathology image recognition technology supported by smart education technology. The pathological images used in the experiments are gynecological tumor pathological tissue images in marker image file format, and the acquired images contain healthy images, benign tumor pathological images, malignant tumor pathological images, epithelial tumor pathological images, mesenchymal tissue tumor pathological images, naive tissue tumor pathological images and junctional tumor pathological images. The detection results are shown in Table 1.

**Table 1.** Gynecologic tumor pathology image recognition results

Gynecologic tumor pathology image categories	Number of test set data	Detection accuracy
Health Images	80	98.79%
Images of benign tumors	92	94.65%
Malignant tumor images	76	96.38%
Pathological images of epithelial tumors	92	99.34%
Mesenchymal tissue tumors	107	91.36%
Pathological images of naive tissue tumors	59	95.39%
Cross-sectional tumor images	68	96.35%

As can be seen from Table 1, the gynecological tumor pathology image recognition technology supported by intelligent education technology has a high accuracy in the recognition of the above seven pathology images, and the average detection accuracy reached 95.65%, which has a good detection accuracy. The detection accuracy of 80 healthy images reached 98.79%, 92 benign tumor pathology images reached 94.65%, 76 malignant tumor pathology images reached 96.38%, 92 epithelial tumor pathology images reached 99.34%, 107 mesenchymal tissue tumor pathology images reached 91.36%, 95.39% for 59 naive tumor pathology images, and 96.35% for 68 junctional tumor pathology images. It indicates that the pathology image recognition technique designed in this paper has a high accuracy rate and has a good recognition and detection performance for pathology images of gynecological tumors.

### 4. CONCLUSION

In this paper, the pathological image recognition technique for gynecological tumors was improved with the support of smart education technology, and the detection effect of the



technique was verified in the process of practical application. The simulation results show that the detection accuracy of the gynecologic tumor pathology image recognition technology supported by smart education technology is 95.65% on seven gynecologic tumor pathology images, including 94.65% on 92 benign tumor pathology images and 96.38% on 76 malignant tumor pathology images. It is fully proved that the pathology image recognition technique designed in this paper has high accuracy and operability in the detection process of gynecological tumors.

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# DESIGN AND APPLICATION OF A COMPREHENSIVE EVALUATION SYSTEM FOR ONLINE LITERACY OF SCHOOL STUDENTS

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## ABSTRACT

Network literacy is an important part of the comprehensive quality of college students. In this paper, a model of comprehensive evaluation system of network literacy is constructed, and the functions of the system are realized through requirement analysis, design, implementation and testing of the comprehensive network literacy evaluation system of college students, which includes basic information management, comprehensive literacy management, and query statistical module. The experimental results show that after three experiments, the evaluation index scores of experimental group A and group B are above 8 points, and the evaluation is excellent. The system has a catalytic effect on the future cultivation of college students' network quality education.

## KEYWORDS

Network literacy; Comprehensive evaluation system; Evaluation index; Basic information management; Query statistics module

## 1. INTRODUCTION

With the development of science and technology and the progress of network technology in the new era, college students have become an important user group of network users [1-2]. At present, various types of cultural exchanges, intermingling and encounters, facing the redundant ideas and concepts, the college students group is often at a loss, which has put forward higher requirements for the work of college students' network literacy education. Network literacy usually refers to the network quality and moral code that should be possessed in the basic human literacy. It is mainly divided into the knowledge and skills of using network, the dialectical thinking ability of understanding, analyzing and evaluating network information, and the legal and ethical cultivation in network communication [3-4]. Internet literacy education for college students is an educational activity aimed at college students' knowledge and skills of using the Internet, their ability to judge Internet information, and their legal and ethical cultivation in Internet use.

The design of evaluation system a more complex process. The literature [5] proposes to explore the level of web literacy skills of first year undergraduate students of Punjab University, Lahore, Pakistan. Data were collected from 180 from science, social science, arts and humanities. A theoretical model is proposed which may help in designing an efficient and effective web literacy module/subject to help students to improve their skills related to web usage. A comprehensive evaluation system and model for ecological vulnerability of coastal wetlands was constructed and applied in the literature [6]. The results showed that the ecological vulnerability score of the Yellow River Delta wetlands was 0.49, which was

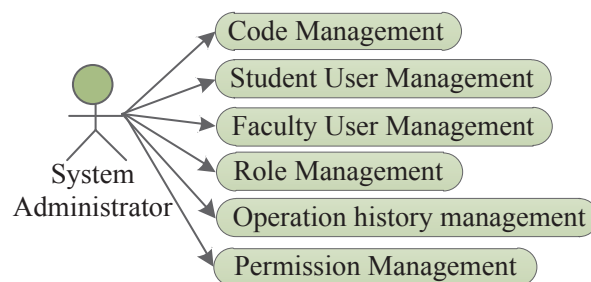
generally at a medium vulnerability level. The effect of "terrestrial influence" gradually decreases with the vulnerability of population and economic agglomeration areas. In the literature [7], a comprehensive evaluation system of customer index data in the power industry was developed for the development of lean marketing strategies. The system evaluates indices from customer data such as renewable energy, carbon emissions, energy efficiency and customer credit. The comprehensive evaluation system proposed in the above literature is difficult to apply to the comprehensive evaluation of online literacy of school students.

Therefore, this paper analyzes the requirements of the comprehensive evaluation system of college students' Internet literacy from the perspective of users, including the analysis of functional requirements and the analysis of performance requirements. In the functional analysis, the system use cases including teachers, users and system administrators are described, and the basic student information management, query and statistics module management, system management and comprehensive literacy management are described respectively, and finally the effectiveness of the system is verified by conducting experiments on student evaluation indexes.

## 2. GENERATION OF ONLINE LITERACY EVALUATION SYSTEM FOR COLLEGE STUDENTS

### 2.1 NETWORK LITERACY COMPREHENSIVE EVALUATION SYSTEM MODEL

The core module of the comprehensive evaluation system of university students' Internet literacy is the system administration, and the user is the system administrator [8-9]. Once the system administrator has successfully entered the system, he/she can operate the management functions as well as maintain the data information. The teacher can change as well as upload student data, and students have the right to view the information and are given the right to change only some of the information. When students provide feedback and other information that does not belong to the individual change authority, they can report to the administrator and collaborate to change it. Figure 1 shows the model of the comprehensive evaluation system of Internet literacy built.



**Figure 1.** Comprehensive evaluation system of network literacy

From the evaluation model in Fig. 1, it can be seen that the role management of the comprehensive evaluation system of college students' network literacy is mainly to restrict the login and use rights of different roles by the administrator, and only the administrator has restricted rights, which achieves the security and consistency of the system to a certain extent. When the administrator manages the role information, the role name is determined first to ensure the certainty of the role authority, and after the role name is input, the system immediately detects the singularity of the role name, and if the user name is repeated, it is reset to avoid the duplication and uniqueness of the role name.

### 2.2 BASIC STUDENT INFORMATION MANAGEMENT

The basic student information management mainly focuses on examining and testing the

basic quality of students, including the functions of adding, modifying and deleting information. The basic information management authority for students includes administrators and teachers. When the teacher enters the user name and password, the system automatically verifies the correctness of the user name and password, and then the system can be accessed after success. Students can change and view their basic personal information, add evaluation information for everyone, and have the final authority to disclose or not disclose personal information. Personal information mainly includes, personal school semester grades, contact phone number, home address, education experience, etc., to a certain extent to maintain the reliability of data.

### **2.3 COMPREHENSIVE NETWORK LITERACY MANAGEMENT**

The comprehensive web literacy management as an evaluation indicator analyzes the breakdown of the student's project, and this module is operated by different users, implementing different functions and with different operational rights [10]. Each function of the comprehensive network literacy management is maintained by the administrator as well as statistics. The summaries and details of network literacy are entered and uploaded by the administrators to ensure the authenticity and security of the data. The data information is maintained in two ways: Excel and front-end input. The former is done by uploading data to the system backend, which is verified by the system and saved in the data list by forming business data according to the preset regulations. In the latter, the data information is entered by the manager in the background and then saved in the system, thus realizing the comprehensive management of college students' network literacy.

## **3. CONSTRUCTING A COMPREHENSIVE EVALUATION SYSTEM FOR ONLINE LITERACY OF SCHOOL STUDENTS**

### **3.1 ESTABLISHMENT OF EVALUATION INDEX SYSTEM**

The total score of university students' online integrity file includes the sum of the scores of the five dimensions evaluated, such as academic integrity, online integrity, economic integrity, life integrity and work integrity. Among them, an evaluation cycle can be set for one academic year, and the score of each dimension is the sum of the basic score, plus score and minus score, and its basic score can be set at 60 points. On the premise that students get the basic score, they are given additional points for the corresponding dimension of trustworthiness, that is, they are given certain positive points, and vice versa, that is, they are given certain negative points as minus points. The educational authorities should improve the national college students' online integrity database, record the online integrity file scores of all college students in time, and form a complete system that can be queried, so that it can be connected with the school registration network for the convenience of colleges and universities, and even the whole society, and use it as a basis to measure the online integrity of college students.

### **3.2 IMPORTANT BASIS FOR EVALUATING MERIT TO JOIN THE PARTY**

College students' online integrity file scores can also be used as an important basis for students to apply for student loans and grants. In the graduation season, the school can also recommend talents to employers. In addition, colleges and universities should include in their school rules and regulations the punishment regulations for network integrity violations, introduce specific punishment policies, increase inspection and assessment, and punish college students for network moral failures or violations, so as to play the role of "supervision, education and rectification".

### **3.3 CARRY OUT NETWORK ETHICS REVIEW**

At the level of colleges and universities, the relevant departments supervise and audit the

work of online ethics education for college students. The competent educational departments should regularly carry out online ethics review activities, give commendations and rewards to colleges and universities that abide by professional ethics, criticize and punish behaviors that violate the law and social morality online, and take the high level of online ethics education work of each college and university as an important evaluation criterion for the assessment and evaluation of its ideological and political education work level.

#### 4. ANALYSIS OF THE APPLICATION OF COMPREHENSIVE EVALUATION SYSTEM OF NETWORK LITERACY

In this paper, a comprehensive evaluation system model of network literacy is constructed, an evaluation index system is established, and an experimental analysis of the network literacy of school students is conducted. First of all, experimental group A and experimental group B are set up, and in the evaluation subject, if there are more than 8 in the evaluation of the three levels of indicators for a student, the evaluation result is excellent. 6-7 or more is the evaluation result of needing efforts, and 5 is qualified. A total of 3 experiments were conducted, and the evaluation results are shown in Table 1.

**Table 1.** Evaluation index of comprehensive literacy of college students

Experimental group	First experiment	Second experiment	The third experiment
A	5	7	9
B	5	8	10

Analyzing the evaluation results in Table 1, the scores of both experimental group A and group B were 5 in the first experiment, group B had been evaluated as excellent in the second experiment, and both groups were excellent in the third result. The psychological characteristics and behavioral patterns that college students have themselves make their living habits, learning methods, and online behavior different. Therefore, for this special group, we should make full use of the network platform and establish educational websites adapted and matched to each individual to achieve the goal of strengthening college students' network literacy education, helping them to establish correct outlook on life and values, and continuously improving their network literacy and ability.

#### 5. CONCLUSION

In this paper, we conducted an in-depth study on establishing college students' online integrity files, constructing a mechanism for rewarding and punishing college students' online morality, and forming a mechanism for supervising and evaluating online literacy education, and constructed a system for evaluating college students' online literacy. The experiments were conducted through the comprehensive evaluation system, and both experimental groups scored more than 8 excellent points after three experiments. In summary, the system plays an important role in the statistics and the integration of the data information of college students' comprehensive Internet literacy, which improves the efficiency of data processing while reducing the labor cost and simplifying the processing process. The system is stable.

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# RESEARCH ON TEACHING SUPERVISION MODEL AND EVALUATION INDEX SYSTEM OF HIGHER EDUCATION INSTITUTIONS UNDER THE BACKGROUND OF INFORMATIONIZATION

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## ABSTRACT

In the context of information technology, in order to improve the quality of teaching in institutions such as et al., this paper constructs an index system by constructing a supervision model and using Delphi method research as a basis for decision making. Using big data technology and cloud computing technology and other processing, the teaching supervision model is diagnosed, and the final evaluation index system is given weights. The results showed that the weighted index B3 "teaching content" (0.364) and B7 "teaching effect" (0.891) had significantly higher teaching content and effect. Thus, it can be seen that the model of teaching supervision in higher education institutions can promote the continuous improvement of teaching effectiveness and provide reference for the development of teaching innovation in higher education institutions.

## KEYWORDS

Teaching supervision model; Delphi method; Evaluation index system; Big data technology; Cloud computing

## 1. INTRODUCTION

With the continuous development of modern science and technology level, the comprehensive strength of the country has been increasing, in which teaching knowledge and thinking play a very big role and gradually become the key indicators reflecting the scientific and cultural literacy of the nation [1-2]. Teaching courses in higher education institutions not only play the role of auxiliary courses, but also are the cornerstones of many professional courses, which are directly related to the effectiveness of students' professional knowledge learning and their future career planning [3-4]. It is the noblest and most difficult mission of higher education to link the advanced information technology with the teaching in higher education institutions, to promote the innovation of teaching system reform in higher education institutions, and to cultivate more excellent talents for the country [5-6].

At the same time, many new teaching modes relying on the Internet are generated, which bring new opportunities for teaching reform in higher education institutions and promote the smooth implementation of teaching reform. The literature [7] analyzed the feasibility of task-driven teaching method applied to the teaching of AI course according to the teaching objectives of AI course and the characteristics and steps of task-driven teaching method. For the instructional design of the intelligence stage, the inevitability of the paradigm shift of instructional design in the context of AI is firstly described in terms of the opportunities brought by AI to education and teaching, the problems of the original information-based instructional

design and the many challenges faced. The literature [8] shows that mobile learning is a new learning method that uses wireless communication networks to access educational information, educational resources and educational services. Mobile learning can integrate mobile technology into the learning process, and teachers can push learning content to mobile platforms through the Internet, and the learning format will be more free. Thus, the integration of modern information technology and curriculum is not only the innovation of teaching mode, but also the direction of future development of teaching. To sum up, modern teaching methods as well as ways to achieve poor teaching effect, not essentially change the traditional teaching methods, not to mention the good solution to the problems existing in traditional teaching.

Based on this, this paper designs a model of teaching supervision model in higher education institutions in the context of information technology. Firstly, the supervision model model is constructed, and big data technology and cloud computing technology are used to introduce facts and empirical evidence into management decision making, and secondly, accessible evidence, practices and data are collected to diagnose the teaching supervision model and determine the evaluation index system. Finally, the experimental analysis proves that the model can effectively optimize the teaching supervision evaluation system and improve the development of higher education institutions.

## **2. TEACHING SUPERVISION MODEL OF HIGHER EDUCATION INSTITUTIONS**

### **2.1 BUILDING A MODEL OF TEACHING SUPERVISION**

Professional teaching model construction is the basis and prerequisite for implementing diagnosis and improvement work, so higher education institutions should invest more in information technology and equipment, and use information platforms to collect and organize relevant information in the teaching process to get more reliable diagnosis results [9-10]. A large amount of data information has been generated in the long-term supervised teaching process, which should be processed by using big data technology and cloud computing technology to improve the efficiency of information acquisition and integration, and at the same time to develop the depth of the content, which is conducive to finding the deeper influencing factors of teaching quality and more targeted when formulating strategies to improve supervised teaching. Following the basic principle of "self-diagnosis as the main focus and external diagnosis as a supplement", we strengthen teachers' awareness of self-diagnosis and make improvements according to their own teaching conditions. We will speed up the construction of smart courses and cloud classrooms, optimize the process of information collection and sharing, and implement the diagnostic work with the concept of refinement.

### **2.2 STRENGTHEN THE TEACHING TEAM**

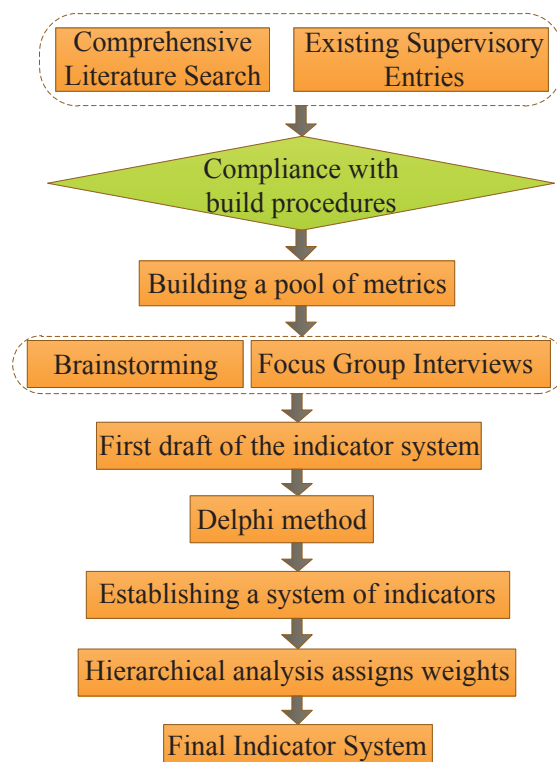
The construction of teaching team is conducive to improving the overall efficiency of practice and creating talent guarantee for the improvement of teaching quality. The traditional teaching methods are reformed and optimized, so that information-based teaching in practice presents the characteristics of normalization, and timely diagnosis is made for the data in teaching in order to obtain more reasonable diagnosis results and clarify the goals and directions of improvement [11]. Taking blended teaching as an opportunity to analyze online teaching on the basis of obtaining offline teaching information, the teaching supervision mode is diagnosed from different perspectives. Higher education institutions should improve communication with experts in related fields, hire experts to provide guidance within the school, improve the overall level of teaching team construction, and present a stronger vitality in their work. Highlight the subjectivity of students in teaching, consider their experiences and



feelings in learning, and create a humanized teaching model.

### 2.3 CLEAR TEACHING EVALUATION INDEX SYSTEM

Through systematic and multiple research methods, we analyze and study the teaching supervision model by combining current modern university development concepts and advanced experiences at home and abroad, and explore the teaching supervision model in higher education institutions by considering the inherent needs and characteristics of higher education institutions, so as to provide a model and reference for the setting, management and operation of teaching supervision in higher education institutions in the future. Introduce facts and empirical evidence into management decision making by collecting available evidence, practices and data, analyzing them on this basis, and then combining them with the experience of managers and the characteristics of their fields, industries and units as a basis for decision making. Combining the existing indicators collected from the practical application of teaching supervision for the evaluation of various aspects of teaching, a comprehensive analysis is conducted on this basis, and a Delphi method study is used as a basis for decision making to construct an indicator system to provide an objective and quantitative evaluation basis for the future development of teaching supervision in higher education institutions. The evaluation index system of teaching supervision in higher education institutions is shown in Figure 1.



**Figure 1.** Supervisory evaluation index system

As can be seen from Figure 1, the teaching supervision evaluation index system is constructed to provide a model and standard for self-evaluation, self-restraint and self-improvement of education and teaching subjects. Through comprehensive literature search and existing supervisory entries, the index pool becomes the index pool by conforming to the construction procedure, brainstorming and focus group interviews become the first draft of the index system, using the Delphi method to establish the index system, and the final index system after giving weights. Through the hierarchical structure the expert evaluation is transformed into a number of factors, and the degree of importance is compared two by two, thus transforming the difficult to quantify qualitative evaluation into quantitative evaluation,

and then calculating the weight coefficient of each indicator according to the results of the comparison. This teaching supervision evaluation index system provides a unique perspective to evaluate and diagnose the state of school operation, provides accurate and effective evidence reference for the management decision-making level of higher education institutions, and provides a reliable basis for making education and teaching management decisions, which can then be targeted to improve work and enhance management effectiveness.

### 3. EXPERIMENTAL ANALYSIS OF EVALUATION INDEX SYSTEM

This paper uses the Delphi method to evaluate the indicator system to analyze the supervisory model of higher education institutions. The Delphi method of collecting experts' feedback includes investigating experts' evaluation of the importance of indicators and experts' opinions and suggestions on the indicator system as a whole. Several rounds of letters were sent to the experts to solicit their opinions by anonymous means, while the decision-making team summarized and organized the opinions of experts in each round, and then sent them to each expert again as reference materials, analyzing and judging them while putting forward new opinions and suggestions, and so on until the experts' opinions converged and the final conclusion was reached. The experts who participated in the Delphi survey in this study were all from a university in Beijing, and a total of 20 letters were sent to explain the survey. The analysis of teaching index weights is shown in Table 1.

**Table 1.** Analysis of Index Weight

First-level Indicators	Secondary Indicators	Relative Weight	Sort
A1. Teaching Preparation	B1 Teaching Design Scheme	0.600	1
	B2 Information Teaching Resources	0.400	2
A2. Teaching Implementation	B3 Teaching Content	0.362	1
	B4 Teaching Organization	0.384	2
	B5 Teaching Evaluation	0.284	3
A3. Teaching Effect	B7 Target Achievement	0.891	1
	B6 Classroom Atmosphere	0.238	2

As can be seen from Table 1, the relative weights of the secondary indicators under the primary indicator "teaching preparation" are B1 teaching design plan (0.536) and B2 informatization teaching resources (0.464) in descending order; under the primary indicator "teaching implementation", the relative weights of the secondary indicators are B3 teaching content (0.364), B4 teaching organization (0.345) and B5 teaching evaluation (0.364) in descending order. In the dimension of primary index "teaching implementation", the relative weights of each secondary index are B3 teaching content (0.364), B4 teaching organization (0.345) and B5 teaching evaluation (0.291) in descending order. Under the primary indicator "teaching effectiveness", the relative weights of the secondary indicators are B7 goal achievement (0.891) and B6 classroom atmosphere (0.238) in descending order. It indicates that the teaching in colleges and universities should improve the professional evaluation mechanism, take professional evaluation as the grasp, and guide teachers to focus on technical skills training and application technology services.

### 4. CONCLUSION

In this paper, a model of teaching supervision model in higher education institutions is constructed in the context of information technology. In the process, the index system is constructed using Delphi method research as the basis for decision making, and the practical application effect of the model is proved through experimental analysis. The results showed

that the weight index B3 "teaching content" (0.364) and B7 "teaching effect" (0.891) were very effective in terms of teaching content and effect. It shows that the model of teaching supervision in higher education institutions can help the professional development of teachers and the improvement of teaching quality in higher education institutions.

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# RESEARCH ON THE INNOVATIVE DEVELOPMENT OF MANCHU FOLK DANCE PROP SINGLE DRUM BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

Based on big data technology, this paper constructs an innovation platform of Manchu folk dance props single drum. Data collection and screening techniques are used to manage and classify resource data, find potential data information through data mining, and organize multi-faceted information to build a database on this basis. The simulation results show that the prediction accuracy of the innovation platform constructed in this paper reaches 92%, the search frequency of single drum keywords is 0.81, and the click rate is 96%. It can be seen that the innovation platform constructed in this paper expands the coverage and influence of the single drum culture of Manchu folk dance props, and lays the foundation for its innovation and development.

## KEYWORDS

Big data technology; Data collection; Data mining; single drum innovation platform; Prediction accuracy

## 1. INTRODUCTION

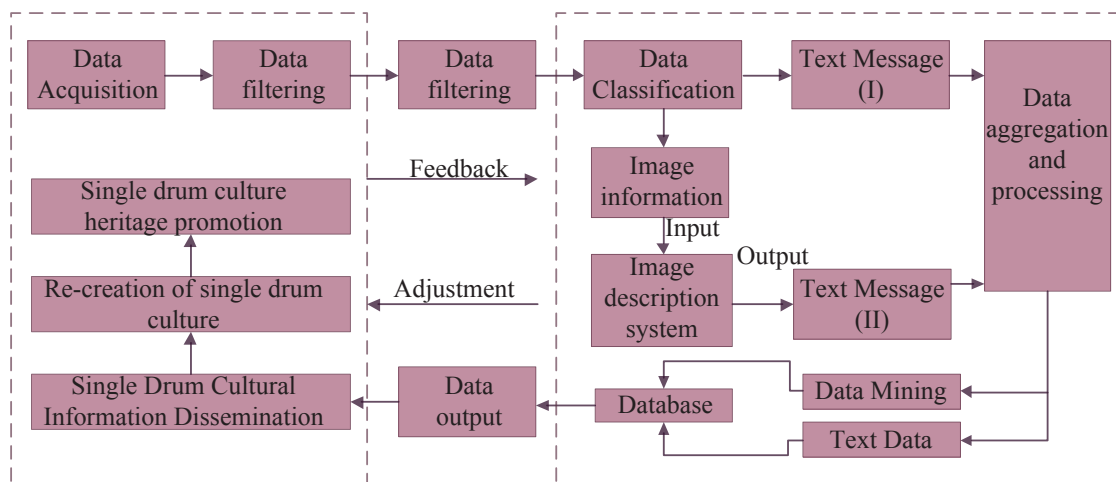
The survival of traditional culture has changed with the revolution of the times brought about by media technology, and with the continuous development of economy and society, people's production and life style have become more diversified. The single drum dance has formed the present-day Manchu single drum dance through the long-term collision and integration of Manchu and Chinese cultures [1-2]. In the era of big data, the change of concept and the progress of social productivity, the self-entertainment of mono-drum dance has been increasing and turned into a popular and highly performative folk art for the masses [3-5].

Manchu folk dance prop single drum has a rich and colorful culture and has a long history of development. If the single drum culture wants to innovate again, it has to find a breakthrough from the form and content. In the literature [6], by innovating the culture of folk dance props through multimedia information technology, anyone can accurately grasp the connotation of the culture of Manchu folk dance props monodrum, and thus be more resourceful in choosing unique dance movements in different dance rehearsals and performance scenarios. The literature [7] uses language and writing to record and document the Manchu folk dance props single drum, fusing and sorting the relevant information for reference and learning with those who come later. The method in the above literature is more conservative difficult to break through, and does not better promote the innovation and development of Manchu folk dance props single drum.

Based on this. In this paper, an innovation platform of Manchu folk dance prop single drum is constructed based on the background of big data. In the process of construction, data collection and mining are realized through big data technology, and the obtained information is classified and organized. And the practical effect of the platform is proved by the simulation practice results. It is shown that it makes the culture of Manchu folk dance prop single drum more visualized and accelerates the dissemination and innovation of single drum culture.

## 2. CONSTRUCTION OF MANCHU FOLK DANCE PROPS SINGLE DRUM INNOVATION PLATFORM

In China, the dance culture of ethnic minorities is colorful and has a long historical development. In this process, the culture, skills and the inheritance and development of their traditional culture are indirectly shown [8-10]. Among them, single drum music is rooted in the soil of the Manchu ethnic folk, it is the most direct, natural and realistic reflection of the spiritual activities and aesthetic interests of the Manchu people at that time. Nowadays, in the context of big data, it can meet the user to obtain, store, retrieve, share, analyze and visualize quickly and accurately, creating a new quantitative research system and method for single drum culture. In this paper, through the understanding and development of Manchu folk dance props single drum, the innovation platform of Manchu folk dance props single drum as shown in Figure 1 is constructed by using big data technology.



**Figure 1.** Structure of single drum innovation platform

As can be seen from Figure 1, data acquisition is the first and the most critical step of information processing. The collected data types include image data and video data, which is the process of obtaining data through network search and other means for Manchu folk dance prop single drum culture. Then the collected information is screened and sorted by data screening, and the collected image information and video information are classified and processed so that data with the same attributes or characteristics are grouped together. After data screening, the data processing will be more specific and operational, and the results thus obtained will be more targeted and systematic.

Data mining can find important information that is implicit, previously unknown, and potentially valuable from a large amount of data. It is mainly through machine learning or mathematical algorithms to reveal the connections and trends between data, to obtain deep knowledge, and to organize multi-faceted information to build a database on this basis. Data mining can provide accurate and perfect information resources of Manchu folk dance prop monodrum culture, truly present the cultural information that can be easily ignored and missed, effectively protect and inherit monodrum culture, and provide the possibility to control the

development trend of Manchu folk dance prop monodrum and make prediction and decision efficiently.

Big Data is a network technology, not a communication medium. It does not change the medium that carries information, but the capacity that carries information, thus accelerating the speed of processing information. The value of big data technology is that through rapid processing and analysis and extraction technology, data is continuously mined and reorganized to form new valuable information. By introducing big data technology into the research of the innovation and development of Manchu folk dance props single drum, the resources of folk dance props single drum culture are mined through big data technology, and the traditional single drum performance is continuously innovated based on the new aesthetic concept. It can be seen that in the era of big data, better use of data systems will folk art will Manchu folk dance props single drum culture protection and storage, will make outstanding contributions to the inheritance of folk art.

### 3. ANALYSIS OF THE SIMULATION RESULTS OF THE INNOVATION PLATFORM

In this paper, based on big data technology, an innovation platform of single drum, a Manchu folk dance prop, is constructed. In order to verify the effectiveness of the platform, we test its application effect in practical application. And compare and analyze with the traditional platform, the specific information is shown in Table 1.

**Table 1.** Comparison information

	Technical Support	Click-through rate	Keyword frequency	Prediction accuracy
Traditional web platforms	Traditional systems	36%	0.24	29%
Innovation platform	Big Data Technology	96%	0.81	92%

As can be seen from Table 1, the traditional platform click rate is only 36%, and in the keyword search, the frequency of single drum keywords appear only 0.24, and the prediction accuracy rate only reached 29%. Saying that the traditional network platform lacks professional technical operation, the problem of Manchu folk dance props single drum innovation development still has not been fundamentally and comprehensively solved. And the innovation platform built based on big data technology has a prediction accuracy rate of 92%, which can accurately predict users' preferences and provide them with data on the single drum dance they are interested in. And the keyword search frequency is 0.81, and the click rate is 96%. This effectively proves that the platform can precisely target users and place them, bringing the single drum culture precisely to the eyes of users who are interested in it. It further enhances the charm of single drum, a Manchu folk dance prop, and provides a more convenient adaptation path for the future inheritance and innovative development of this type of culture.

### 4. CONCLUSION

This paper constructs a single drum innovation platform based on big data technology for Manchu folk dance props with the innovation development of single drum as the research goal, and verifies the effectiveness of the platform in practical application. Compared with the traditional platform, the prediction accuracy and click rate of the single drum innovation platform based on big data technology reached 92% and 96% respectively, and the keyword search frequency was 0.81. This shows that the single drum innovation platform built in this paper can provide more possibilities for the innovation development of single drum culture and promote the inheritance and propagation of single drum culture.

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# RESEARCH ON INNOVATIVE EDUCATION MODE OF IDEOLOGICAL AND POLITICAL WORK IN UNIVERSITIES BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

To expand the level of ideological and political education (IPE) in colleges and universities and develop a novel path of IPE work. This paper collects and analyzes data through big data technology (BDT), digs and researches to determine the thought dynamics and social behavior of college students, quantifies and analyzes the characteristics of college students' groups, and designs a model of innovative education model for ideological and political work (IPW) in colleges and universities. The consequences demonstrate that in the cross analysis of the degree of integration of IPW in colleges and universities, 74.95% of the total number of undergraduates are "very good", and the proportion of "better" in all colleges and universities is as high as about 70%. Thus, it can be seen that the innovative education model of IPW in colleges and universities based on BDT can improve the accuracy and effectiveness of talent cultivation work and generate a novel situation of IPE work in colleges and universities.

## KEYWORDS

College ideology and politics; Innovative education model; BDT; Quantitative analysis; Cross analysis

## 1. INTRODUCTION

As an emerging technology, big data is entering human vision at an unprecedented speed and scale, increasingly subverting and reshaping people's thought patterns, cognitive styles, behavioral paradigms and social patterns [1-2]. Colleges and universities are the key positions for value shaping, belief generation, professional learning and ability cultivation of college students, and the traditional rough working mode and the diversified expansion needs of college students have become the main contradiction facing the current IPW [3-4]. In the era of big data, the massive information resources, real-time collection of data, accurate portrait of individuals and intelligent pushing of information provide an opportunity for the IPW of colleges and universities to improve from simple and rough to lean [5-6].

Human society has arrived the stage of "big intelligence and cloud", and big data, as the core element, provides a powerful driving force for college ideologists to analyze students' personalized characteristics, provide targeted educational contents, implement scientific decision making and enhance antecedent management. The literature [7] is based on digital information technology, which overturns the traditional forms of media. In the IPW of



universities, how to play the role of novel media and meet the challenges brought by the expansion of novel media has become the focus of ideological and political educators. Literature [8] shows that the traditional teaching method can no longer see the learning requests of students at this stage, and the amalgamation of IPE work and Internet platform is conducive to the online education platform to break through the traditional teaching method, so as to stretch occupied show to the role of IPE of college students. To sum up, IPE in colleges and universities cannot use BDT to open up a novel path of IPE work when dealing with the challenges of the times.

Therefore, this paper uses BDT to build a model of innovative education model for IPW in colleges and universities. Firstly, it collects and analyzes the data resources of each individual college student, and mines, researches and judges and foresees the college students, social behaviors as well as learning behaviors through prediction function. Secondly, it coordinates and cooperates with the internal and external education bodies. Lastly, it is demonstrated through experiments that the model can break the bottleneck of traditional IPE and improve the effect of IPE in colleges and universities.

## **2. INNOVATIVE USE OF IPW FOR NURTURING PEOPLE IN COLLEGES AND UNIVERSITIES**

### **2.1 BDT INTEGRATES IDEOLOGICAL AND POLITICAL RESOURCES**

Many universities have initially established relatively perfect education information business systems and accumulated a large amount of IPE resource data with certain value. Due to the constraints of the departmental connection mechanism, resource integration and other objective factors, these data resources cannot be used reasonably. With the advent of the era of big data, it is possible to collect and analyze the "comprehensive data" of each individual college student through BDT. Using all the data resources, we can realize the measurable study of college students by first-hand information from family upbringing, study and education, living and consumption status and interpersonal social activities, so as to explore and sort out the characteristics of college students' group and promote the smooth expansion of IPE work in colleges and universities [9-10].

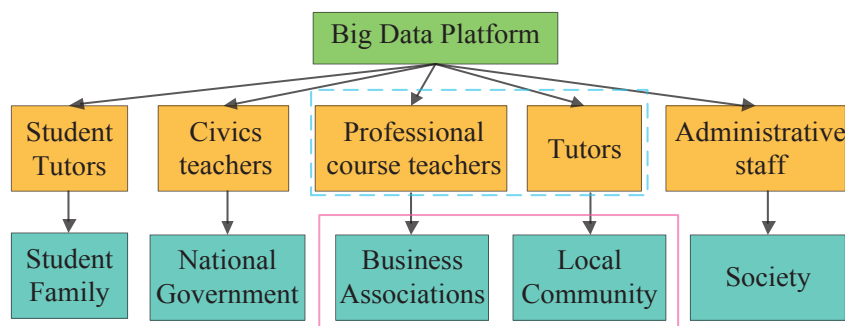
### **2.2 BDT ENHANCES IPW PREDICTION**

The core value of big data is "prediction", and the IPE workers in colleges and universities can make use of the prediction function of big data to excavate, study and judge the ideological dynamics, social behavior and learning behavior of college students, so that the ideological problems of college students can be "early found, early followed up and early diagnosed", and then the early warning mechanism of IPE of college students can be established in time, so as to truly achieve "ideological prevention" instead of "treatment" [11]. In this way, the early warning mechanism of IPE of college students can be established in time, so as to truly achieve "ideological prevention" instead of "treatment" [11]. For example, the IPE workers in colleges and universities can understand the latest ideological and emotional dynamics of college students according to their WeChat, friends circle dynamics and QQ comments, and if they find various irrational behaviors of college students, they should intervene early to channel and guide them, so as to contain various dangerous events in the bud.

### **2.3 ESTABLISHING THE MODEL OF IDEOLOGICAL AND POLITICAL INNOVATION EDUCATION MODEL IN UNIVERSITIES**

In the background of big data era, modern information technology has given birth to a large number of information exchange models and data integration models, which have

comprehensively broken the situation of single-armed and separate efforts of university education subjects [12]. It also collects data and information related to teaching and education and management services of each nurturing body in a coordinated manner, gradually realizes the synergistic linkage between the nurturing body within the university and the nurturing body outside the university, and gradually forms a precise synergistic pattern with multiple participation and interaction of family, school, enterprise, government, community and society. The innovative nurturing model of IPW in colleges and universities is exposed in Figure 1.



**Figure 1.** Innovative parenting model

From Fig. 1, it can be seen that the multiple nurturing subjects in the IPW of colleges and universities, as a social relationship network, are interdependent and inseparable, and together constitute an organic and unified collaborative system. The model breaks the gaps and barriers between the multiple subjects, promotes the precise synergy of all the work and brings into play the combined effect of each nurturing subject. The IPW system of colleges and universities is a "total nurturing" work system formed by different departments and various nurturing subjects, which has the typical characteristics of close connection, mutual influence and collaboration. "It is a strategic support for IPW-ers to promote their respective duties and responsibilities as well as to work with one heart and one mind, and it is also an significant means to encourage the all-round and personalized expansion of college students.

### 3. INNOVATIVE EDUCATION EXPERIMENT ANALYSIS

As a scientific thinking activity, the sense of precision is a reflection of objective things realistically under the guidance of basic Marxist methods, and it is also a product of combining the emerging technology represented by big data with the IPW of colleges and universities. The independent variable of the study is clearly the modern frontier information technology with big data as the core, and the dependent variable is the degree of precision of IPW in colleges and universities. This paper analyzes the working result of the innovative education model of IPW in colleges and universities through the sense of precision. The mathematical statistics and analysis of the questionnaire data of colleges and universities are carried out, and the analysis results of the incorporation degree of BDT and IPW of colleges and universities are exposed in Table 1.

**Table 1.** Analysis results of ideological and political integration

	Very nice	Quite good	Same as	Just so	Very bad	Total
Junior college education	85	98	40	35	28	286
Undergraduate course	536	735	284	84	42	1681
Postgraduate	230	492	286	46	15	1069
Other	11	8	3	3	2	27
Total	862	1333	613	168	87	3063

As can be seen from Table 1, the cross-analysis between the education level of survey

respondents and the degree of integration of BDT in the IPW of colleges and universities shows that a total of 154 of the specialist students said very good and relatively good, accounting for 64.44% of the total number of students. A total of 1128 undergraduates said very good and relatively good, accounting for 74.95% of the entire number. An entire of 721 graduate students, or 69.59% of the total, said very good and relatively good. It can be seen that there are some differences in the degree of integration between BDT and IPW of colleges and universities in different levels of schools, and the precision awareness of undergraduate schools is obviously better than that of specialized higher vocational institutions. However, in general, the proportion of "very good" and "better" is as high as 70%, and more and more colleges and universities have tasted the "sweetness" of big data in the change of IPW precision. "The incorporation of the two has become an irreversible trend of the times, reflecting the awareness that the innovative model of IPE in colleges and universities can improve the precision of IPW.

#### **4. CONCLUSION**

Based on BDT, this paper actively explores the innovative education model of IPW in colleges and universities.

In the process of exploration, a model of innovative education model of IPW in colleges and universities is designed, and the feasibility of the model is verified through the analysis of experimental results. The results show that 74.95% of the total number of undergraduates are "very good" in the degree of integration of IPW in colleges and universities, and the proportion of "better" in all colleges and universities is already as high as about 70%.

It shows that the model of innovative education model of IPW in colleges and universities based on BDT gives full play to the positive effect of BDT and can promote the IPE work to a novel level.

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# THE DEVELOPMENT, DILEMMA AND COUNTERMEASURES OF UNIVERSITY ENGLISH TEACHING UNDER THE INFLUENCE OF "INTERNET+"

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## ABSTRACT

Under the influence of "Internet+", this paper breaks through the limitation of time and space and builds a model of university English teaching. By increasing the access of teaching subjects to resources and creating a multi-dimensional interactive English teaching environment, and by providing specific language observation, input and learning training, students can develop and enhance their independent learning ability. The paper also aims to develop and enhance students' independent learning ability through specific language observation, input and learning training. The results show that the weighted average contact degree of the English teaching response analysis is 0.679, and the overall evaluation score of teaching quality of the "excellent" teachers is  $>0.79$ . Thus, it is clear that "Internet+" can enhance the effectiveness of college English teaching and improve classroom teaching. The effectiveness of classroom teaching can be enhanced and the quality of classroom teaching can be improved.

## KEYWORDS

College English teaching; Internet+; Interactive teaching; Weighted average connectedness; Comprehensive evaluation score

## 1. INTRODUCTION

With the development and innovation of information technology, human society is gradually developing in the direction of informatization and technology. Internet technology plays an important role in promoting and supporting the evolution of the education model, providing direction and motivation for the reform and innovation of the education model, especially having a significant impact on college English teaching [1-3]. The traditional foreign language teaching mode can no longer serve students better, so reforming the traditional foreign language teaching mode, applying information technology to college English classroom, and increasing the fun and vividness of English classroom are the inevitable trends of teaching reform in major universities [4-5].

The "Internet +" is the new industry of innovative Internet development, the evolution of the Internet form driven by the innovation of knowledge society and the new form of economic and social development it has spawned. "Internet +" is a further practical result of Internet thinking, which drives the evolution of economic forms continuously, thus driving the vitality of social and economic entities and providing a broad network platform for reform, innovation and development. The literature [6] explores the reform of university English teaching mode, teaching ideas and methods. The theory of multiple intelligences provides strong theoretical

support for the reform of college English teaching. The new model can improve students' comprehensive language application ability through teaching methods using various modern technological tools. The literature [7] found lecturers' views on formative assessment of English through online classroom tests and identified the baptism of formative assessment of students through online classroom tests in English teaching. The perceptions of English instructors were appropriate to the positive feedback obtained in formative assessment by providing feedback to students through online classroom. In summary, there are still problems in English language teaching, gaps in the level of English language teaching, lack of proficiency in "Internet+" technology, and fixed mode teaching.

Based on this, this paper designs a college English teaching model under the influence of "Internet+". Firstly, the English knowledge and teaching channels are updated, and the students' main position is emphasized. Secondly, we conduct specific language observation, input and learning training, and follow the principles of motivation and structure. Finally, the model is experimentally demonstrated to optimize the strategies of college English teaching and improve the teaching efficiency of modern college English classroom.

## **2. COLLEGE ENGLISH TEACHING MODE UNDER THE INFLUENCE OF "INTERNET+"**

### **2.1 TEACHING AND LEARNING DEVELOPMENT OF COLLEGE ENGLISH**

The "Internet+" has brought great changes to human production and life, and it has gradually penetrated into college English teaching, influencing the methods and thinking concepts of college English teaching, acting on teachers' classroom teaching methods, knowledge updating and teaching channels, and prompting the development trend of diversification and flattening of college English classrooms [8]. With the support of information technology, university English teaching has also broken through the limitation of time and space, and the era of educational knowledge sharing has come, and the knowledge base of high-quality educational resources has increased the way for teaching subjects to obtain resources and further improved the effectiveness of talent cultivation. The reform of university English teaching in the context of "Internet+" is bound to enhance the leading role of teachers, emphasize the main position of students, promote the effective interaction between the two, and promote the ecological benign operation of the whole university English teaching.

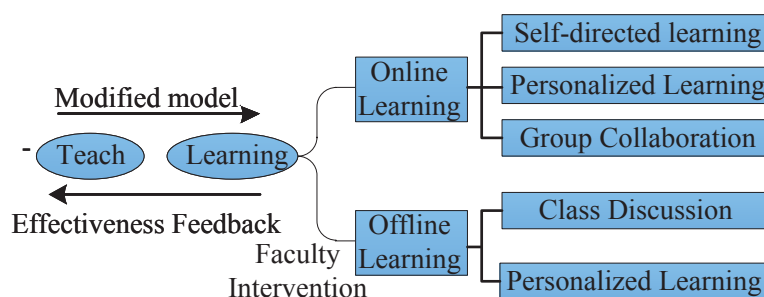
### **2.2 TEACHING DEVELOPMENT COORDINATION FUNCTION IMBALANCE DILEMMA**

In the university English ecological teaching classroom based on Internet information technology, originally teachers and students should be the main subjects of ecological teaching at the same time, but at the present stage, many university English teaching has the following problems, which lead to the imbalance of the coordination function between ecological subjects [9-10]. Firstly, the quantity and quality of students trained by university English teachers can hardly meet the needs of the market based on the continuous expansion of universities and colleges. Second, the implementation of the graded teaching mode of university English in the context of "Internet+" has achieved certain teaching results, but it has also affected the original ecological pattern of classroom teaching. The influx of a large number of information devices in the Internet information era has led to a decrease in communication and interaction between teachers and students and an increase in students' interaction with computers and information devices. All these series of problems have led to an imbalance between ecological subjects, i.e., teachers and students. On the one hand, teachers keep applying modern information technology to innovate teaching methods and continuously develop and enhance students' independent learning ability. On the other hand, students believe that their purpose is to learn English rather than to focus on information

technology, thus leading to a poor curriculum atmosphere and an imbalance between ecological subjects.

### 2.3 COLLEGE ENGLISH TEACHING MODEL CONSTRUCTION

The application of Internet technology can help students meet these needs more comprehensively by providing specific language observation, input and learning training. Specifically, building a college English teaching model in which the college English teaching classroom is the process of interaction and influence between the teacher, the teaching environment, and the students, creating a multidimensional interactive English teaching environment can provide support for both teachers and students. Specifically, the construction of a multidimensional and interactive classroom includes: before the class, the English classroom should be equipped with complete multimedia teaching equipment and corresponding teaching materials, and the natural physical environment should be prepared in advance. In the course, it is necessary to build a harmonious external classroom environment and form an equal and harmonious teacher-student relationship, while the multidimensional interactive ecological classroom is essentially centered on interaction. Thus, teachers can use a variety of Internet information technology tools to add more interactive links between teachers and students in the preliminary design of the college English lesson plan. The university English teaching model is shown in Figure 1.



**Figure 1.** College English teaching model

As can be seen from Figure 1, this paper constructs a three-dimensional teaching model for college English teaching supported by cognitive learning theory and constructivist theory, and explores its application in daily teaching through examples. The teaching model is used to create a display space for each student under limited conditions and to receive timely feedback. The teaching should follow the principles of motivation i.e. inquisitive drive, competent drive, and reciprocal drive, the principle of structure i.e. knowledge is composed of actions, images, and symbols, the principle of procedure i.e. the process of knowledge acquisition, and the principle of reinforcement i.e. the timeliness of evaluation feedback.

### 3. ANALYSIS OF THE RESULTS OF ENGLISH TEACHING COUNTERMEASURES

In order to verify the effectiveness of the college English teaching model constructed in this paper, the research text of this paper was a total of 347 college students enrolled in a university in Shanghai, and 12 English teachers in the university were evaluated by means of a questionnaire. The results of the response analysis are shown in Table 1.

**Table 1. Results of Countermeasure Analysis**

Connectivity	A	B+	B-	C+	C-
Excellent	0.429	0.003	0.384	0.005	0.357
Good	0.684	0.254	0.341	0.003	0.002
Differ from	0.285	0.454	0.004	0.516	0.003
Score	0.876	0.489	0.804	0.782	0.835

As shown in Table 1, the evaluation results of the response analysis show that the characteristic values of the four levels of variables are consistently close to the average value of the grade Good, and among the weighted average association of the four evaluation levels Excellent, Good, Medium and Poor, the association of the Good level is the largest at 0.679. The overall evaluation score of the teacher who was rated as "excellent" was >0.79, and the evaluation result was "medium"; the overall evaluation scores of the other nine teachers were all between 0.89 and 0.8, and the evaluation result was The other nine teachers' overall evaluation scores were between 0.89 and 0.8, and their teaching evaluation results were "good". This indicates that the quality of English teachers' teaching tends to be good, and the teachers' teaching ability and overall quality have improved.

#### 4. CONCLUSION

In this paper, we study the development, dilemmas and countermeasures of college English teaching under the influence of "Internet+". In this study, a university English teaching model was designed, and the experimental analysis of countermeasures proved the effectiveness of the model. The results show that the weighted average contact degree of English teaching countermeasures analysis is 0.679, and the overall evaluation score of teaching quality of teachers who are rated as "excellent" is >0.79. This indicates that under the influence of "Internet+", university English teaching has the effect of jointly promoting the reconstruction of university English teaching. This shows that under the influence of "Internet+", university English teaching has the role of jointly promoting the optimization and reconstruction of university English teaching, which highlights the value of university English teaching activities.

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# THE LOGIC, PRACTICE AND OPTIMIZATION STRATEGIES OF SOCIAL ORGANIZATIONS' PARTICIPATION IN EDUCATIONAL GOVERNANCE IN THE INTERNET ERA FORMED IN THE TRANSITION PERIOD OF SOCIAL DEVELOPMENT

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## ABSTRACT

To optimize the practical perception of social organizations' participation in educational governance. This paper proposes the logic, practice approach and optimization strategy of social organizations' educational governance in the period of social development transition. By reconstructing the focus of social organizations' participation in educational governance, it makes substantial changes in the connotation and extension of educational governance. By optimizing the educational governance practices and strategies of social organizations, the cognition of social organizations' participation in educational governance is reshaped and the effectiveness of educational governance is increased. The simulation results show that the efficiency of education out of poverty in region A is increased by 33.74%. This shows that the educational governance practices and optimization strategies of social organizations are conducive to the construction of a new educational governance pattern.

## KEYWORDS

Social organizations; Optimization strategies; Educational governance; Educational poverty alleviation; Governance effectiveness

## 1. INTRODUCTION

Social organizations are various forms of organizations or networks spontaneously established by citizens of all social strata in the process of social transformation, which have certain social public attributes [1-3]. With their unique nature and functions, social organizations have played an active role in participating in national decision making, local innovation, and educational governance reform [4-5].

For example, the literature [6] studied the characteristics of social organizations and their ability to manage public safety emergencies in schools from a public safety perspective, making social organizations systematic in their participation in the governance of public safety in schools. The literature [7] conceptualized the organizational projects and financing strategies of social organizations through quantitative and qualitative studies in order to increase the dependence of decision beneficiaries and reduce the complexity of management. The aforementioned literature only explores the content and paths of social organizations' participation in educational governance and does not address the renewal of their educational governance mechanisms in the transition period.

Based on this, this paper proposes the logic, practice approach, and optimization strategies of educational governance for social organizations in the transition period of social development. By reconstructing the focus of educational governance and optimizing the practical approaches and strategies of governance, it enables social organizations to respond spontaneously to the objects of educational governance.

## 2. PARTICIPATORY MECHANISMS OF EDUCATIONAL GOVERNANCE

Social organizations, as a special social force, are an important force in the contemporary Chinese educational governance system [8]. In the context of the Internet era, social organizations have been given a new educational meaning, which not only constitutes an important element in the construction of a high-quality education system, but also an important cut-off point for dealing with several issues such as the new relationship between church and state and improving governance capacity.

### 2.1 EDUCATION GOVERNANCE LOGIC

Educational governance gives rationality and legitimacy to social organizations in terms of ethics and procedures, allowing social forces to participate in the process of educational governance in order to complement and optimize governmental educational functions [9]. In the period of social development transition, the construct of social organizations' participation in educational governance has experienced a shift in focus. On the governance-focused construct, the form of governance in education shifted from general governance to educational governance. In the construction of education as the center of gravity, there is a shift from governance about education to governance based on education. From this point on, the participation of social organizations in educational governance began to rise to the level of national discourse, and its connotation and extension began to undergo substantial changes.

### 2.2 EDUCATIONAL GOVERNANCE PRACTICE APPROACH

The participation of social organizations in educational governance is manifested in multiple dimensions or levels, and in terms of participation content, it includes participation in macro educational decision-making, participation in local educational innovation, and participation in school governance. The specific governance contents are shown in Table 1.

**Table 1.**Content of education governance of social organizations

Levels	Nature	Content	Mode
Macro	Professional Organizations	Expert consultation and construction	Indirect Participation
		Involvement in educational strategy decisions	
Central View	Public benefit organizations	Advisory Board	Direct, indirect participation
	For-profit organizations	Advisory Board	
Microscopic	Professional organizations	Participation in the school	Direct participation
		Educational Relief	
		Participation in school governance	

As can be seen from Table 1, social organizations provide more social resources for schools when they participate in school operation during the transition period of social development by funding the construction of schools or donating funds for school operation. When participating in the process of school governance, they provide diversified resources for school development through management and supervision and making school development plans. When participating in social relief and educational compensation, they

provide personalized services for educational governance through financial support and other actions. In addition, social organizations have played a good complementary role in helping to fight poverty in education.

## **2.3 OPTIMIZATION STRATEGIES FOR EDUCATIONAL GOVERNANCE**

### **2.3.1 PROMOTE THE CONSTRUCTION OF SOCIAL ORGANIZATIONS**

In the context of the Internet era, social organizations' participation in education governance firstly requires the establishment of an efficient and smooth internal governance structure and the efficient division of powers and responsibilities between various departments. Secondly, it is necessary to establish a true and transparent information disclosure system, enhance the professionalism of social organizations, and participate in education governance reform with a professional perspective and professional methods.

### **2.3.2 INNOVATIVE SOCIAL ORGANIZATION SYSTEM**

Establishing a modern management system for social organizations requires comprehensively promoting a unified registration system for social organizations, changing the previous dual management system under the separate responsibility of different government departments, making a more scientific and reasonable classification of social organizations, and carrying out effective supervision according to the classification. Encourage and support social public media to supervise social organizations and establish a sound third-party evaluation mechanism for social organizations.

## **3. ANALYSIS OF THE PRACTICE RESULTS OF EDUCATIONAL GOVERNANCE**

In this paper, the practical approach of social organization participation in educational governance was applied to the actual governance process. The social organization R was selected for the experiment and made to carry out educational governance in area G for a period of 12 months. The level of education after governance is shown in Table 2. As shown in Table 2, after social organization R conducted education governance for 3 months, the amount of education relief and compensation in area G increased from 32,500 yuan to 209,500 yuan, and the efficiency of education out of poverty increased from 53.67% to 87.41%, which improved the efficiency of poverty relief by 33.74%. And the number of out-of-school education and training in G area has also increased from 2 times per quarter to 16 times per quarter, promoting the overall development level of students. 35 sessions of youth red education, law promotion, mental health and self-care education were carried out in 2022, covering more than 1,800 youths in the district. 2022 service activities for accompanying children, serving a total of more than 1,000 accompanying children. The joint Guandu District Office of the Undisciplined has written 36 social investigation reports after being entrusted by the case-handling authorities, carried out conditional non-prosecution for 46 minors in conflict with the law, and issued 28 psychological assessment and psychological counseling reports. This shows that the social organization R has made good progress in the education of poverty relief in G area after participating in education governance.

**Table 2** Effectiveness of educational governance in R organizations

	Before treatment	After treatment
Educational Relief and Compensation	32500	209500
Expert consultation and advice	23	204
Number of off-campus training	2	16
Education out of poverty efficiency	53.67%	87.41%
Number of educational and practical activities	11	35
Covering the range of youth in the district	26.7%	70%
Number of people served by service activities for children moving with them	268	1000
Number of social investigation reports related to minors written after commissioning by case authorities	7	36

#### 4. CONCLUSION

Standing in the context of the Internet era, this paper analyzes the logic of social organizations' participation in social governance in the transition period, and innovates the practice and strategy of educational governance. And its role in educational governance is verified in practice. After the participation of social organizations in education governance, the efficiency of education out of poverty in area A increased from 53.67% to 87.41%, and the number of out-of-school education training increased from 2 to 16 per quarter. It shows that social organizations have an innovative role in the practice of education governance and can promote the reform and development of education governance system.

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# RESEARCH ON THE CONSTRUCTION AND APPLICATION OF COMPUTER NETWORK SECURITY EVALUATION MODEL BASED ON IMPROVED CIRCULAR ALGORITHM

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## ABSTRACT

With the continuous promotion of information technology construction, computer network security evaluation has become the focus of attention in the industry. This paper introduces the establishment strategy of computer network security evaluation system, analyzes the advantages of the application of the improved cyclic algorithm in computer network security evaluation, and describes the specific strategy of the algorithm applied to the computer security network evaluation model system. The results show that the security level of the computer network security evaluation model is B, and the average error between the expected output and the actual output is less than 3.7%. Therefore, by constructing the computer network security evaluation model, it can effectively guarantee the operational security of computer networks and reduce information security problems.

## KEYWORDS

Network security evaluation; Improved round robin algorithm; Security level; Actual output; Average error

## 1. INTRODUCTION

With the widespread use of computer networks, network security has become an important frontier research topic that is urgent and needs to be addressed in the development of network technology [1-2]. Due to the development of the Internet and the progress of related science and technology, there are more and more hazards for computer network security, such as the continuous emergence of various viruses, or the emergence of other network attacks [3-4]. These are great threats to network security. At the same time, because these attacks have a very complex connection, the traditional security assessment methods have been unable to effectively assess, and the accuracy of their final evaluation results is very low [5-6]. Therefore, in today's very complex and changing network environment, an excellent network security evaluation system must be built immediately, while on top of it, the analysis and prediction of future network security problems must be completed [7].

Network security evaluation is actually a nonlinear approximation and pattern recognition problem. The literature [8] briefly analyzed the security risk of ship communication network brought by cloud computing. Based on the analysis of the relationship between the traditional ship communication information security risk assessment method and the nine elements, the security risk assessment model of ship communication network based on cloud computing is proposed. The model has some similarity with the traditional ship communication information security risk assessment method, and can well predict the information security of ship

communication network in cloud computing service. The literature [9] points out that 5G networks have been enabling the creation of various new services and applications, which require a new cyber security architecture. By examining the similarities between immune systems and cybersecurity systems, some guidelines for the design of cybersecurity architectures are extracted. The literature [10] physical layer attacks threaten the services transmitted through optical networks. To detect the attacks, an investigation of spectral signature analysis and identification is proposed. The cornerstones of network security presented in the above literature are more fragile and the grid structure is not secure enough to exploit the security flaws for network attacks.

Therefore, this paper calculates the advantages of computer network security evaluation by constructing a computer network security model and using an improved circular algorithm. Based on this algorithm can effectively guarantee the operational security of computer networks and reduce information security problems. At the same time, the construction and application of computer network security evaluation model is analyzed in conjunction with the connotation of computer network information security, aiming to promote the safe and stable operation of computer networks. The security level of computer network security evaluation and the actual output are verified through experiments, which provides a feasible higher security evaluation path for network security.

## 2. COMPUTER NETWORK SECURITY MODEL BASED ON CIRCULAR IMPROVEMENT ALGORITHM

### 2.1 IMPROVED LOOP ALGORITHM

This paper proposes the construction of a computer network security evaluation model based on a circular improvement algorithm, and the improvement method is divided into the following steps:

- (1) Feature word priming.
- (2) Feature word screening.
- (3) Spatial vector: composition of feature word spatial vector.

The specific content of network security evaluation is mainly for the five aspects of network topology topic, network structure elements, overall network synthesis, network reinforcement scheme and network posture.

### 2.2 COMPUTER NETWORK SECURITY EVALUATION MODEL

The computer network security evaluation model itself has dynamic and multi-level characteristics, and after repeated modifications, the corresponding functional model contains four parts: protection, detection, response, and recovery, mainly using the corresponding backup recovery mechanism, the system can recover from the failure as quickly as possible and reduce the loss. The constructed network security evaluation model is shown in Figure 1.

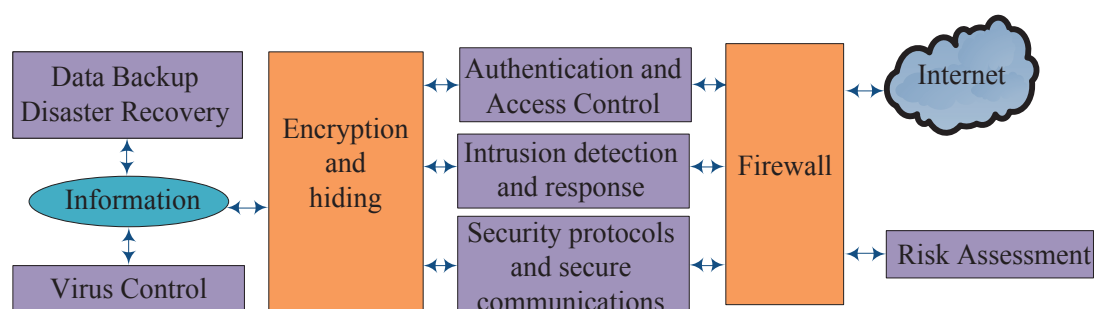


Figure 1. Computer network security model

As can be seen from Figure 1, in the process of information transmission in computer networks, the firewall will first filter the communication rules, and then within the system, a variety of security protection technologies, such as authentication and access control, intrusion detection and response, security protocols and secure communication, are used to control the behavior of network users. In the underlying information protection, emphasis should be placed on the encryption of information, transforming the original plaintext information into ciphertext information that cannot be directly identified, and also backing up some important information to ensure that it can be recovered after the information is damaged. At all levels of information application, corresponding antivirus software should be set up to do a good job of virus prevention and control.

### **3. COMPUTER NETWORK SECURITY EVALUATION MODEL DESIGN ANALYSIS**

#### **3.1 SAFETY EVALUATION INDEX SELECTION AND SYSTEM**

Reasonable security evaluation index is the key to build computer network security evaluation model, and the complexity of computing network should be fully considered when selecting the model, so that the evaluation index can have as much coverage as possible, and the level of influencing factors should be analyzed according to the characteristics of different security factors, and then each risk factor should be evaluated to finally come up with a scientific and reliable evaluation system.

The independence of the evaluation system is mainly reflected in the selection process, which should not only avoid repeated selection to reduce the representativeness of the sample, but also reduce the degree of correlation between various different indicators as much as possible, so as to accurately reflect the network security situation and improve the overall adaptability of the target.

#### **3.2 CRITERIA FOR THE ESTABLISHMENT OF COMPUTER NETWORK SECURITY EVALUATION SYSTEM**

From the perspective of the establishment and standardization of computer network security evaluation system, including quantitative evaluation and qualitative evaluation of two different indicators, according to the different rules and range of values also need to be standardized to better adapt to different evaluation standard system. For quantitative indicators, in the evaluation process, we should pay attention to the actual environment of the network system based on which the values are taken, not only not to carry out one-size-fits-all treatment according to certain standard rules, but also not to be overly independent and specific, and to standardize the treatment through different measurement units, so as to achieve the goal of controlling the range of values, which is the way to improve the efficiency of evaluation. For qualitative indicators, we invite professional technical consultants to score and strengthen the evaluation and supervision of the network system, so as to achieve internal comparison of quantitative indicators, which also contributes to the better standardization of qualitative indicators.

#### **3.3 COLLECTION OF RUBRICS FOR COMPUTER NETWORK SECURITY EVALUATION SYSTEM**

The characteristics of network security evaluation determine the selection and generalization principles of evaluation indexes. In the process of establishing the evaluation result rubric, it can be divided into four different sets of safe, relatively safe, as well as insecure and extremely insecure, according to certain evaluation criteria and descriptions to make the evaluation result clear at a glance, so as to further enhance the construction effect of the network security evaluation model.



#### 4. MODEL PERFORMANCE ANALYSIS

Combined with the characteristics of network security evaluation, this paper divides the computer network security level into four levels: A, B, C and D, which correspond to very high security, high security, average security and low security respectively. Combined with 12 groups of typical single indicators of network security (input value), 17 network security indicators of specific scores, we can find the comprehensive evaluation of security scores (output item). Routing control technology, network security education, and digital signature technology. The individual evaluation indexes are shown in Table 1.

**Table 1.** Individual evaluation indicators

	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>	<b>C6</b>	<b>C7</b>	<b>C8</b>
1	1	0.9	0.93	0.94	0.84	0.91	0.91	0.94
3	0.74	0.71	0.77	0.68	0.7	0.7	0.71	0.82
5	0.95	0.91	0.85	0.81	0.71	0.88	0.85	0.87
7	0.7	0.71	0.69	0.61	0.61	0.81	0.79	0.69
9	0.85	0.93	0.87	0.85	0.61	0.88	0.82	0.57
11	0.63	0.59	0.63	0.5	0.6	0.72	0.53	0.62
12	0.62	0.51	0.42	0.5	0.61	0.59	0.61	0.41

As can be seen from Table 1, an improved round-robin algorithm is used for the comprehensive evaluation of computer network security. The hidden nodes of the whole computer network security evaluation model are 5, based on the hidden nodes for evaluation, the parameters of, are set to 0.1, after 1000 times of training, the expected output and the actual output of the computer network security model are 0.844, 0.866, the average error is 2.84, the average evaluation value is 8.67, the security level is B. Because the expected output and the average error between the expected output and the actual output is less than 3.7%, so it can be determined that the computer network security evaluation model is valid and reliable, and can better meet the needs of comprehensive evaluation of computer network security.

#### 5. CONCLUSION

This paper focuses on the important applications in the field of computer security evaluation. Based on the improved recurrent algorithm, the nonlinear relationship between computer network security evaluation indexes is sorted out, and the computer network is further optimized to accelerate its convergence speed, so that the number of input neuron nodes becomes larger, thus increasing the accuracy of the computer network security evaluation model. The experimental results show that the security level of the computer network security evaluation model is B, and the average error between the desired output and the actual output is less than 3.7%. In summary, the improved recurrent algorithm applied to computer network security evaluation results are more realistic and create the corresponding conditions for the smooth development of computer security management.

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# RESEARCH ON THE MANAGEMENT AND PREDICTION OF ONLINE EDUCATION AND TEACHING OF COLLEGE STUDENTS FROM THE PERSPECTIVE OF BIG DATA ANALYSIS

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## ABSTRACT

To enhance the online education teaching management of college students in universities. Based on the perspective of big data analysis, this paper firstly scans the online education database in the process of platform construction to derive multiple problem-prone parts of online education teaching management, which is regarded as a frequent itemset. Secondly, we iterate on the frequent itemset to derive the main factors that eventually affect online education teaching management. Finally, the online education teaching management platform is constructed based on the obtained factors. To verify the effect of the constructed platform, a set of simulation results designed shows that before and after the use of the online education teaching management platform, students' rating of the richness of online education teaching resources increases from 70 to 95, which is an increase of 25 points. It can be seen that relying on big data analysis technology can improve the online education teaching management level of college students.

## KEYWORDS

Association rule analysis; Educational database; Frequent item set; Online education; Instructional management

## 1. INTRODUCTION

Under the impact of the new wave of informationization, the innovation of college student education and management has been imminent. In the traditional college management mode, teachers' guidance plays a decisive role in college students' education management, but with the development of big data technology, online education has replaced part of offline education [1]. Traditional college teaching and management has even been resisted by students, who

have higher expectations for college teaching and management methods. Therefore, in today's big data era, the advantages of big data technology should be fully applied to the education and management of college students [2].

The literature [3] designed a teacher teaching management system based on the analysis of the basic functional and non-functional requirements of the system, using object-oriented development methods, Asenet, MVC, SQL Server 2015 and other big data development technologies. The literature [4] developed a teaching management system using big data technology based on the idea of hierarchical design. The system contains two underlying modules of network communication and message pushing, and five functional modules of experiment arrangement, work management, interactive question answering, user management and settings. Using this system, teachers, students and administrators can access and manage teaching resources at any time, and educate and interact online through the interactive question-answer module. Although the method proposed in the above literature can effectively improve teaching management, its flexibility as well as convenience and other properties can no longer meet the requirements of the current booming online education.

Based on this, this paper constructs an online education teaching management platform for college students based on the perspective of big data analysis. Firstly, the online education data of college students are extracted and integrated into a database. Secondly, the database is scanned using association rule analysis to get a frequent item set of online education management problems. Secondly, the frequent itemset is continuously scanned and iterated to get the main factors affecting online education management and build the online education management platform. Finally, the effect of the platform built in this paper on the online education teaching management of college students is analyzed through simulation experiments.

## **2. ONLINE EDUCATION MANAGEMENT OF COLLEGE STUDENTS UNDER BIG DATA ANALYSIS**

### **2.1 THE RELATIONSHIP BETWEEN BIG DATA ANALYSIS AND ONLINE EDUCATION MANAGEMENT**

The management of students' online education mainly relies on each node in Internet teaching, through which the integration and transmission of teaching resources and data are completed. If you want to manage the online education of college students, you should make full use of the advantages of information sharing platform, deeply optimize the information content related to big data, and conduct efficient data collection, classification, analysis, storage and application by the unified platform for the information from schools, families, students and various nodes in online teaching, so that effective information can be delivered to all parts of teaching and improve the management while optimizing The efficiency of supervision within the enterprise.

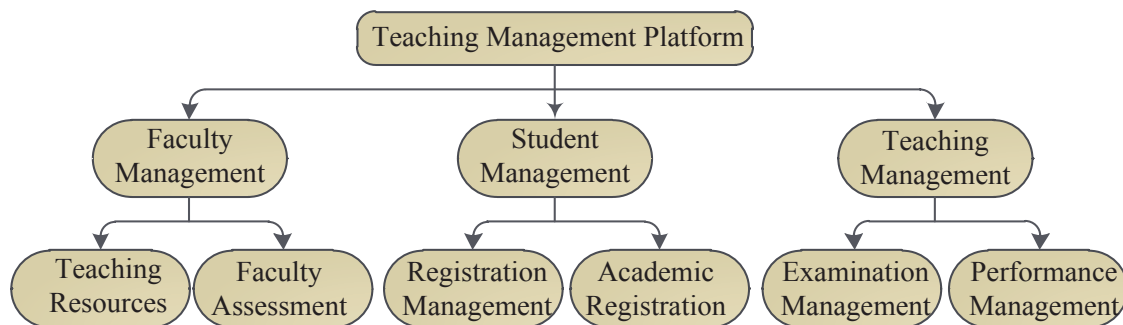
### **2.2 ANALYSIS OF ASSOCIATION RULES**

Unlike traditional teaching, online education generates a large amount of data. To achieve better teaching effect, we need to analyze these data, which requires the use of big data analysis technology. Big data analysis refers to the analysis of large amounts of data, which can be divided into four categories: association rule analysis, classification analysis, regression analysis, and cluster analysis according to the form of input and output [5-7]. These analytical models and their combinations are widely used in teaching scenarios as well as in analytical tasks in other industries, such as teaching resource optimization, teaching effectiveness prediction, and enterprise customer analysis [8-9].

Accordingly, this paper uses association rule analysis to mine the association relationships that exist between different teachers and students in the online education database, so as to obtain general rules for teachers and students to conduct online education, and use these rules to guide teachers to conduct reasonable teaching management. The data of online education is extracted into a new database, and the dataset is firstly scanned once to get multiple frequently occurring problems in online education teaching management, which is regarded as a frequent item set. Then the candidate set is obtained from the frequent itemset layer by layer by iteration, and the frequent itemset is filtered from the candidate set by using the nature of frequent itemset until no new frequent itemset is generated.

### 2.3 ONLINE EDUCATION MANAGEMENT PLATFORM BASED ON BIG DATA ANALYSIS

After analyzing the online education data using big data analysis technology, the main factors that ultimately affect the teaching management of online education can be derived. Accordingly, this paper develops the design of online education teaching management platform for college students from three aspects, which are teacher management, student management and teaching management. The online education teaching management platform based on big data analysis is shown in Figure 1.



**Figure 1.** Management platform based on big data analysis

As can be seen in Figure 1, teaching resources and teacher assessment are the main components of instructional management. To elaborate, teacher resources include information resources and physical resources. Information resources are mainly teachers who organize teaching tasks according to the number of students as well as teaching contents, update necessary online teaching resources according to specific situations, including information such as PPT lectures, videos, quizzes and syllabi, and store information on remote servers using videos and other means. The preparation of physical resources is to arrange the teaching environment for the implementation of the course according to the number of seats in classrooms and computer rooms, multimedia situation and machine environment. The teaching management stage is mainly for teachers to "teach" and students to "learn". Students can view teaching resources, upload assignments, and communicate with teachers and classmates online, while teachers can provide personalized guidance to students and realize remote and distributed collaborative learning for joint improvement. In addition, the platform realizes the evaluation of students, including examination management and grade management. Teachers maintain exam information through the system, including test papers, exam time, exam location, and invigilators, etc. The test database is stored on a remote server for management, avoiding problems such as the traditional test paper management which is not easily accessible and easily lost. The system adopts the random function Random in Java to realize the automatic generation of examination seats, which solves the complexity and tediousness of traditional examination arrangement work and reduces the burden of teaching staff. The system realizes online grade entry for teachers and provides flexible grade query

and statistics, so that teaching staff can make grade query and statistical analysis according to course information and student information, and realize timely feedback of grade information.

### 3. ONLINE EDUCATION TEACHING MANAGEMENT PLATFORM EFFECT PREDICTION ANALYSIS

To verify the effectiveness of the online education management platform, 50 students and 50 teachers are randomly selected to rate the online education teaching management-related indicators of a school out of 100 points in this paper. Considering the lengthy teaching process, this paper predicts the scores of the same online education teaching management-related indicators through the online education classroom performance of teachers and students. The scoring results are shown in Table 1.

**Table 1.** Changes in ratings before and after platform use

Evaluation Indicators	Faculty and student ratings before platform use		Faculty and student rating predictions after platform use	
	Student Grading	Teacher Ratings	Student Grading	Teacher Ratings
Richness of teaching resources	70	73	95	97
Reasonable arrangement of machine room	69	65	90	93
Quickness of remote guidance	60	60	93	90
Timeliness of assignment feedback	67	65	94	91
Ease of access to results	73	79	98	98

As can be seen from Table 1, before the use of online education teaching management platform, students' rating of richness of online education teaching resources was 70. And after the use of online education teaching management platform, the predicted students' rating of richness of online education teaching resources is 95 points based on students' performance, which is 25 points higher than before. After the application of online education teaching management platform, this paper predicts that the ratings of students and teachers on the reasonableness of computer room arrangement are 90 and 93 respectively, which are 21 and 28 points higher than before. From the ratings, teachers were able to provide timely feedback on students' assignments before and after the use of the online education teaching management platform. Before the use of the online education teaching management platform, the students' rating of the timeliness of feedback on assignments was only 67. After the use of the platform, students rated the timeliness of homework feedback as 94, which was 27 points higher than before. After the use of the online education and teaching management platform, this paper predicts that both students' and teachers' scores on the convenience of querying grades will be 98, which is 25 and 21 points higher than before the use of the online education and teaching management platform, respectively. Thus, it can be seen that the online education teaching management platform constructed based on big data analysis for college students has improved the teaching management from multiple dimensions.

### 4. CONCLUSION

In this paper, an online education teaching management platform for college students was constructed under the perspective of big data analysis, and the effects of the constructed platform were verified and analyzed in practical applications. The relevant results show that before and after the use of the online education teaching management platform based on big data analysis, the students' rating of the timeliness of teachers' feedback on assignments increased from 67 to 94, an increase of 27 points. The changes in the ratings of students and teachers show that the online education teaching management platform based on big data analysis for college students can improve the online education teaching management.

## FUNDING

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# THE INTERSECTION OF TRADITIONAL CHINESE COSTUME ELEMENTS AND MODERN FASHION DESIGN IN THE CONTEXT OF BIG DATA

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## ABSTRACT

In order to improve the competitive advantage of Chinese garment industry in the international arena. This paper actively explores the intersection of Chinese traditional costume elements and modern clothing design, and designs a big data-based clothing intersection design method. A differentiated fusion algorithm is used to inform the characteristic data of clothing elements. The fuzzy attribute set of fabric management data is utilized to meet the needs of the wearer. The simulation results show that the overall design experience of designers is improved by more than 1.14 points, and the average experience rating of users in product performance is 9.19 points. This shows that big data technology can meet the experiential needs of modern clothing interfacing design and enhance the artistic image of clothing.

## KEYWORDS

Big data; Differentiated fusion; Feature data; Apparel design; Fuzzy attribute set

## 1. INTRODUCTION

Costume culture is one of the important components of traditional Chinese civilization, with a wide variety and unique styles, and plays a crucial role in modern fashion design [1-2]. Nowadays, more and more scholars propose for fashion designers to look to traditional arts to draw inspiration from them for fashion design. For example, literature [3] used data mining and Internet of Things technology to build an intelligent ethnic clothing design system and constructed an intelligent clothing design system based on the idea of human-computer interaction to meet customer needs. The literature [4] demonstrates the way in which discourse symbols are integrated with the material design of clothes, enriching the concept of materiality understanding in clothing culture design. Although the aforementioned materials integrate traditional art into the process of modern clothing design, they ignore the role of dress elements in informing modern clothing design. Therefore, this paper designs a big data-based clothing intermingling design method to explore the application of traditional costume elements in modern clothing design. Using big data technology, the way of intermingling traditional Chinese costume elements with modern costume design is analyzed in three aspects: reasonable matching of costume elements, flexible selection of patterns and colors, and rigorous selection of costume fabrics.



## **2. BIG DATA-BASED CLOTHING INTERGRATION DESIGN**

In the context of big data, the intermingling of traditional costume elements with modern fashion trends can play a significant role in effectively promoting the development of China's apparel industry [5-6].

### **2.1 BASIC CHARACTERISTICS OF TRADITIONAL COSTUME ELEMENTS**

In terms of the styling characteristics of traditional Chinese clothing, it tends to be cut in a straight line, making the structure of the clothing flat and fitting to the features of the human body [7]. Such clothing design products are smooth and simple in shape, comfortable and easy to wear. In traditional Chinese costume culture, the design of patterns is very elaborate, and the rich patterns are not only embellishments and decorations for the costumes, but more importantly, they contain some kind of moral meaning. For example, the design of magpie on plum and so on implies people's aspiration and pursuit of a better life. In today's society, although modern design concepts are constantly updated and developed, the patterns of these traditional costumes still contain profound connotations.

### **2.2 APPLICATION OF TRADITIONAL ELEMENTS IN MODERN CLOTHING DESIGN**

#### **2.2.1 RATIONAL MATCHING OF CLOTHING ELEMENTS**

Traditional Chinese dress culture is very particular about the selection and matching of points, lines, surfaces, bodies and their various factors, and the matching and combination of different factors produce different effects. Therefore, in the process of modern clothing design, differentiated fusion algorithms can be used, combined with the optimal deployment of IoT nodes, to inform the characteristic data of different clothing elements [8-9]. In order to achieve the topological design of the functional and stylistic characteristics of the apparel, harmony and unity from the whole to the local can be achieved.

#### **2.2.2 FLEXIBLE SELECTION OF PATTERNS AND COLORS**

Based on big data, the intermingled design of clothing should fully consider the real needs of the wearer, and while using patterns such as flower clusters and dragon patterns in traditional clothing culture, modern clothing design techniques are cleverly used to make appropriate data processing of traditional patterns. In terms of color matching, modern clothing designers can use the method of logo bit discrimination to calculate the sample fusion coefficient of the wearer's color matching needs, taking into account the popular design needs [10].

#### **2.2.3 RIGOROUS SELECTION OF CLOTHING FABRICS**

In big data-based apparel intermingling design, modern apparel designers can get the statistical distribution attribute values of fabric scheduling through the fuzzy attribute set and similarity feature distribution set of apparel fabric management data. In this way, the fabric can be selected reasonably according to the needs of the wearer and create a tasteful garment with comfortable fabric.

## **3. SIMULATION RESULT ANALYSIS OF CLOTHING INTERGRATION DESIGN**

In this paper, a big data-based clothing intergration design method is designed by combining the differentiated fusion algorithm and the logo bit discrimination method to integrate the traditional Chinese clothing elements with modern clothing design in the context of big data. In order to verify the feasibility of the design method, this section analyzes the practical application effect of the big data-based clothing intergration design method from the perspective of two experiences of designers and wearers.

### 3.1 DESIGN EXPERIENCE COMPARISON RESULTS

In order to get a comprehensive understanding of the designers' design experience in using the big data-based apparel intersection design method, this paper uses five designers A-E as the experimental samples and five designers F-J as the control samples, making them incorporate geometric pattern elements into their modern apparel design products. The comparison results of the design experience of the ten designers are shown in Table 1.

**Table 1.** Comparison of designers' apparel design experience

	A-E	F-J
User Needs Analysis	3.14	4.89
Apparel fabric design	2.98	4.12
Understanding the level of convenience of patterns	3.07	4.67
Color Matching	3.56	4.98

As can be seen from Table 1, after using big data-based apparel intergration design method, the designer's design experience in user requirement analysis improved by 1.75 points, in apparel fabric design experience improved by 1.14 points, and in pattern and color matching design experience improved by 1.6 points and 1.42 points, respectively. It can be seen that the use of big data to intermingle traditional clothing elements and modern clothing can improve the overall design experience and design efficiency of designers.

### 3.2 ANALYSIS OF USER EXPERIENCE RESULTS

The apparel design products of the five designers in the previous section F-J were put on sale, and after all of them were sold, a return analysis was conducted on the purchasing users, and the results of the collated user experience ratings are shown in Table 2.

**Table 2.** Apparel product user experience results

	Product Performance	Appearance
F-designed apparel products	8.92	9.34
G-designed apparel products	9.15	9.71
H-designed apparel products	9.36	9.65
I-designed apparel products	9.75	9.12
J-designed apparel products	8.79	8.87

As can be seen from Table 2, all five users gave high ratings to the design products that fused traditional costume elements with modern clothing. The average user experience rating in terms of product performance is 9.19, and the average user experience rating in terms of clothing appearance is 9.34. This indicates that the use of big data-based clothing fusion design products has ensured the quality of clothing design to a greater extent, and provided a practical path reference for clothing products that fuse traditional clothing elements with modern clothing design.

## 4. CONCLUSION

Standing in the context of big data, this paper actively explores the fusion design of Chinese traditional costume elements and modern clothing, designs a big data-based clothing intermingling design method, and verifies the practicality of the design method through the analysis of simulation results. After using this paper's design method, the designer's design experience in user requirement analysis improved by 1.75 points, and the user's experience rating in product performance was 9.19 points on average. It indicates that the clothing intermingling design method based on big data can achieve better design results

in practical application, which is conducive to promoting the joint development of traditional Chinese clothing elements and modern clothing design.

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# SIMULATION ANALYSIS OF THE OPERATING PERFORMANCE OF THE BATTERY PACK SUSPENSION CONFIGURATION BASED ON VIBRATION CHARACTERISTICS ANALYSIS

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## ABSTRACT

In this paper, based on the dynamics theory of vibration characteristics, the vibration of the automotive battery pack suspension is analyzed by constructing and using the dynamics simulation software ADAMS model. The transfer matrix method is applied to analyze the vibration isolation effect, optimize the force transfer rate of vibration isolation system, and parametrically design the damping coefficient to apply the vibration excitation to the vehicle body and power assembly. The results show that the energy decoupling rate is less than 86%, the average inherent frequency of power assembly is 12.36, and the optimal value of damping is in the range of 0.3~0.5Ns/mm. Thus, it can be seen that the battery pack suspension model based on vibration characteristics analysis accelerates the analysis efficiency, thus improving the working performance of electric vehicles.

## KEYWORDS

Vibration characterization; Dynamics software; ADAMS model; Damping coefficient; Energy decoupling rate

## 1. INTRODUCTION

In recent years, electric vehicles have become an important development direction for the automotive industry and have received widespread attention from the global automotive industry. Electric vehicles not only show great superiority in energy saving and environmental protection, but also have advantages in power performance such as fast torque response and acceleration, which can better meet the requirements of handling stability and response agility [1-3]. However, the power battery, as the most important energy storage element of electric vehicles, has the characteristics of large size and mass. Newly developed new energy power is gradually outlawing coal power, and the problem of environmental pollution from power plants has been greatly alleviated, which makes the indirect pollution problem of electric vehicles effectively improved [4-5].

The concept of vehicle response agility has been constantly mentioned due to the increase in consumer demand for responsiveness while driving. Electric vehicles have a long history of NVH problems, with electromagnetic vibrations and transmission gear mesh excitation causing high frequency vibration noise in the powertrain, which seriously affects the driving and riding comfort of the vehicle. The literature [6] suggests that the transport mode has the potential to replace internal combustion engine vehicles in the near future. Electric vehicles can have a significant impact on the environment, the electrical system and other related sectors. The current power system may face great instability and with proper management and coordination, electric vehicles can turn out to be a major contributor to the successful implementation of the smart grid concept. The literature [7] presents a simple and easily optimized mathematical representation of the energy management strategy of an electric vehicle hybrid energy storage system. The analysis is based on the drive cycle speed and the internal resistance of the battery module. The objective is to minimize the energy consumption. It achieves the best results in low-speed cycles. In summary, conventional energy sources still dominate and cannot improve all aspects of electric vehicle performance to lead the automotive industry.

Based on this, this paper designs a simulation software ADAMS model to analyze the working performance of the automotive battery pack mounts based on vibration characteristic analysis dynamics. Firstly, each dispersed mass isolation system is designed separately, and the force transfer rate of the isolation system is used as the optimization target. Secondly, the output torque fluctuates under the non-sinusoidal distributed air gap magnetic field. Finally, it is experimentally demonstrated that the model can reduce the vibration and noise of electric vehicles, thus improving the NVH performance of electric vehicles.

## **2. VEHICLE VIBRATION CHARACTERISTICS ANALYSIS**

### **2.1 AUTOMOTIVE AGILE DYNAMICS**

Automotive suspension systems are dominated by single-layer vibration isolation systems, but it is difficult to meet the vibration isolation requirements of electric vehicle suspension systems in the high frequency band due to the influence of the elastic vibration of the foundation and the standing wave effect of the vibration isolator [8-9]. In the 1960s, a vibration isolation method of installing dispersed mass blocks in the middle of the vibration isolator was proposed, which not only has excellent vibration isolation capability in the high frequency band, but also can individually design the structure size and shape of each dispersed mass, etc., and is suitable for small and discontinuous installation space. The small intermediate mass vibration isolation system has excellent high frequency vibration isolation performance and practical application value. The transfer matrix method is applied to analyze the vibration isolation effect of small intermediate mass vibration isolation system, and the influence of the size of the intermediate mass on the vibration isolation system is studied. The optimal design of the small intermediate mass isolation system is carried out with the force transfer rate of the isolation system as the optimization target, and it is proposed that the arrangement of the small intermediate mass blocks can be adjusted to improve the vibration isolation capacity of the isolation system in the low frequency band.

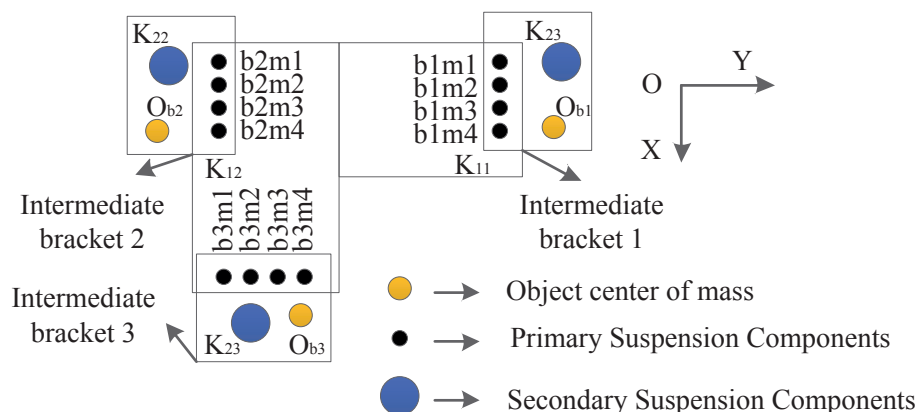
### **2.2 BATTERY PACK SUSPENSION SYSTEM VIBRATION CHARACTERISTICS**

Electric vehicles are subjected to different external excitation of the battery pack suspension system than fuel vehicles due to the electric motor drive rather than the internal combustion engine, where the torque generated by periodic inertial forces causes periodic inertial force excitation of the piston and connecting rod [10]. The inertial forces generated by vehicle acceleration, braking or sharp turns, after the damping coefficient is parameterized,

cause the motor to vibrate due to unbalanced rotor rotation. The centralized motor powertrain suspension system includes a permanent magnet synchronous motor, a gearbox, and a suspension element. The motor output torque fluctuates due to the non-sinusoidal distribution of the air gap magnetic field, fluctuations in the stator gear torque, and deviations in the motor manufacturing and installation processes. The road surface unevenness causes vibration excitation of the powertrain and the vehicle body. After the excitation is attenuated by the tires and suspension system, only the vibration excitation within 0-3.5 Hz can be applied to the vehicle body and the powertrain.

### 2.3 BUILD SIMULATION SOFTWARE BASED ADAMS MODEL

The vehicle powertrain consists of a longitudinally mounted engine, clutch, transmission, etc., with a 3-point suspension support and rear engine rear wheel drive. The two front mounts are located at the lower front side of the engine and the rear mounts are located above the transmission, both with pure rubber mounts [11]. Meanwhile, two sets of drive belts are restrained in front of the EV engine, one set connecting the crankshaft pulley and the air conditioning compressor drive pulley, and the other set connecting the crankshaft pulley and the radiator fan pulley. The base is fastened to the frame, which can be considered as a rigid foundation. A coil spring suspension is attached to the frame to form another vibration subsystem. Connected through the drive belt to become an elastic coupling, the simulation software ADAMS model is constructed to analyze the vibration system of the car battery pack suspension as shown in Figure 1.



**Figure 1.** Vibration Analysis System

As can be seen from Figure 1, the O-XYZ in the simulation software ADAMS model is defined as the global coordinate system of the electric vehicle, with the X direction pointing along the body toward the rear of the vehicle, the Z direction pointing upward vertically to the ground, and the Y direction determined according to the right-hand rule, with the Y direction pointing to the right along the wheel axis. The local coordinate system at the center of mass is oriented in the same way as the global coordinate system of the vehicle. According to the coupling interface, the suspension system can be divided into the vibration source and power assembly subsystem A, the primary elastic element subsystem B, the intermediate support subsystem C, the secondary elastic element subsystem D and the frame support base subsystem E. The force and response velocity vector and transfer matrix model between the input and output ends of each subsystem.

### 3. EXPERIMENTAL ANALYSIS OF BATTERY PACK SUSPENSION WORK PERFORMANCE

In order to can understand the electric vehicle system modal distribution, targeted to avoid resonance between the electric vehicle system or with external excitation, effectively reduce

vibration. The modal analysis of the suspension system model can be done directly in the simulation software ADAMS model, and the modal inherent frequencies and vibration patterns of each order are shown in Table 1.

**Table 1.** Initial Position of the Suspension System

Modal Order	1	2	3	4	5
Inherent Frequency/Hz	5.64	11.09	12.02	14.94	15.66
Vibration Type Dominant Direction	Longitudinal Panning	Lateral Panning	Vertically Flat	Flat Rotation	Transverse Rotation
Decoupling Rate/%	94.75	84.38	56.81	42.84	74.28
Damping Factor Ns/mm	0.32	0.42	0.38	0.46	0.31

As can be seen from Table 1, the first 24 orders of modal frequency decoupling rate is poor, including the first 6 orders of energy decoupling rate, the powertrain transverse (2nd order), vertical (3rd order) translational and translational rocking (4th order), and transverse rocking (5th order) energy decoupling rate in the direction of rotation is less than 86%, the average inherent frequency of the powertrain under rigid base is 12.36, and the optimal value of damping is in the range of 0.3~0.5Ns/ It is shown that the accuracy of the model can be verified by the vibration simulation analysis of the model and the electric vehicle response has agility.

#### 4. CONCLUSION

In this paper, the working performance of electric vehicle battery pack suspension is simulated and analyzed based on vibration characteristic analysis. In the analysis process, the simulation software ADAMS model is designed, and the feasibility of the model is verified by the analysis of experimental results. The results show that the energy decoupling rate is less than 86% in the rotation direction of the electric vehicle, the average inherent frequency of the powertrain under the rigid base is 12.36, and the optimal value of damping is in the range of 0.3~0.5Ns/mm. It shows that the battery pack suspension model based on the vibration characteristic analysis can help improve the robustness and comfort of the electric vehicle and enhance the market competitiveness.

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# RESEARCH ON INNOVATION PATH OPTIMIZATION OF COLLEGE STUDENTS' EDUCATION MANAGEMENT BASED ON IMPROVED VSLAM ALGORITHM

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## ABSTRACT

In order to promote the development process of informationization and intelligence for the education management of college students. This paper constructs an adaptive feature matching framework based on the improved VSLAM algorithm, and builds a working path of education management mechanism with the participation of multiple subjects. The results show that the management work scores are all over 0.5 in the analysis of the innovation ability of college students' education management. It can be seen that the improved VSLAM algorithm can propose the optimization path of education management work in a targeted way and promote the innovation of education management work of college students.

## KEYWORDS

VSLAM algorithm; Adaptive features; Innovation capabilities; Educational management; Multiple subjects

## 1. INTRODUCTION

The education and management of college students is an important part of college

management, and with the progress of society and economy, the education and management of college students in colleges and universities has been promoted [1-2]. In recent years, with the change of the main generation of college students, the challenges and opportunities of college students' education and management coexist [3-5]. The psychological characteristics of college students and their needs are changing constantly. In the new period, the college students put forward higher requirements for college management, so colleges and universities must understand the current situation of college students and adjust the work direction according to the actual needs of college students' education and management [6-7]. Constantly innovate and develop new models in order to meet the demand for college students' education and management in the new era.

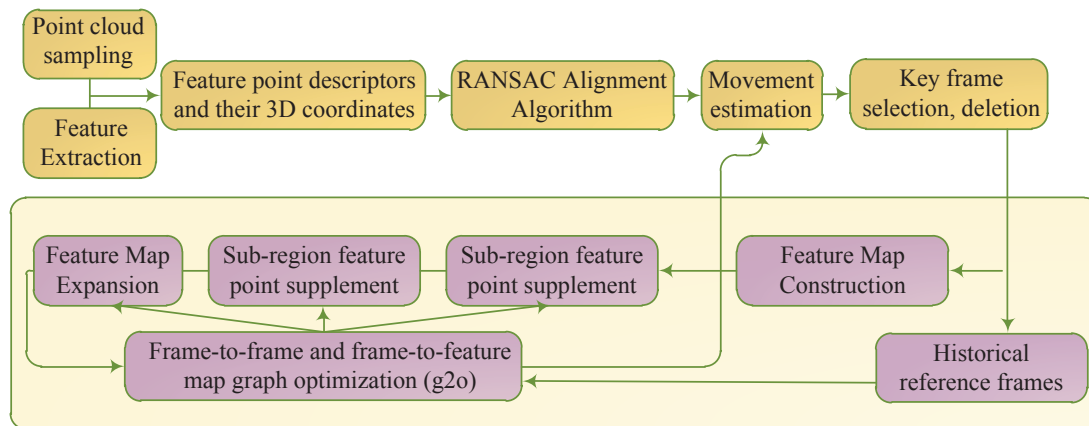
The management of university education is an important task for universities. The main purpose of the study in the literature [8] is to help the scholarly community to distinguish those educational methods that try to maintain "unsustainable" and to identify the problems of lecturer-student interaction in the process of large-scale transition to distance education and to find solutions to these problems. In the literature [9], an expert system based on belief rules was developed in order to analyze in depth the educational management costs of R&D talent development, and the first educational management cost prediction was achieved through incremental data and parametric learning. The literature [10] suggests that the growth of competitiveness of domestic organizations and enterprises depends to a large extent on the education sector. For the development of the domestic education system, educational management research is of particular importance and it should ensure the development of domestic educational management theory, which has long been under the influence of Western management theory. The educational management work presented in the above literature lacks the sense of independent innovation, and the management model is too traditional and too poor in innovation.

Therefore, this paper constructs a VSLAM algorithm framework to analyze the innovation path optimization of college students' education and management work. Under the new situation, the education and management work of college students should be based on their psychological characteristics and establish a student-oriented education and management concept. The education management mode should recognize the situation, establish the education management of multiple subjects, actively explore and study the education management mode in the new period, and vigorously promote the development and innovation of education management in colleges and universities. Finally, the experiment proves that combining innovative education concept with college education management can not only help to promote the reform of higher education, but also clarify the direction and goal of talent cultivation and deliver excellent talents to the society.

## **2. IMPROVING VSLAM ALGORITHM APPLIED TO COLLEGE STUDENTS' EDUCATION MANAGEMENT**

### **2.1 IMPROVED VSLAM ALGORITHM FRAMEWORK**

VSLAM algorithm is an algorithm proposed through the inspiration of human eye visual system, and this paper carries out the innovation path optimization of college students' education management work through VSLAM algorithm. The framework of the constructed VSLAM algorithm is shown in Figure 1.



**Figure 1.** VSLAM algorithm framework

As can be seen from Figure 1, adaptive features are added to the framework of VSLAM to align each frame with the adaptive scale features, which improves the estimation accuracy while reducing the computational effort. In this paper, VSLAM information technology is used to realize the innovation and optimization of the educational management of college students and the improvement of the educational work of colleges and universities by using Internet thinking.

## 2.2 PRINCIPLES AND BASIC IDEAS

As a group with the most active thoughts, college students' personality, independent consciousness and independent character can develop faster and more fully in an open society than other social groups due to their own characteristics. In the face of the new situation, the following principles should be grasped in order to guide the development of college students' personality, independent consciousness and independent character to the benign side for the progress of college students and the whole society: student-oriented principle, openness and innovation principle, guidance and restraint principle.

Student education and management workers in colleges and universities should constantly explore and research to find the best solutions to problems. These include: establishing the concept of student-oriented education and management, and actively playing the main role of students. Optimize the student education and management system and establish a scientific and effective working mechanism. Strengthen students' self-management and enhance students' ability of self-education and management.

## 3. OPTIMIZATION OF THE INNOVATION PATH OF EDUCATION AND MANAGEMENT OF UNIVERSITY STUDENTS IN THE PERIOD

### 3.1 IMPLEMENT THE CONCEPT OF HUMANE EDUCATION AND MANAGEMENT

According to the new situation and new requirements, we innovate the concept of education and management of college students, adopt humanized management, and give more care and love to college students. The concept of humanization requires that in the process of management, it is not only necessary to abide by the rules and regulations and promote the standardization and institutionalization of education and management, but also pay attention to the humanistic care for students. In order to help students properly solve the difficulties encountered in study and life, relieve psychological pressure, so that college students can better integrate into learning activities. In the specific work, we should not only care about students' study, but also care about their psychological health and help them properly solve the difficulties they encounter in their life. Make students feel humanistic care, enhance their sense of belonging and identity, make them consciously abide by the rules and

regulations, and promote the efficiency of college students' education and management.

### **3.2 ESTABLISH THE EDUCATION MANAGEMENT MECHANISM WITH THE PARTICIPATION OF MULTIPLE SUBJECTS**

At present, one counselor is usually responsible for the education and management of one grade or several classes. However, the results achieved by some counselors are not very satisfactory, which restricts the efficiency of work and the overall development of students. To make up for this deficiency, the counselor team can be subdivided into study, life, thought and career counselors, each of whom is responsible for the corresponding work.

### **3.3 BUILD AN INFORMATION-BASED EDUCATION MANAGEMENT SERVICE PLATFORM**

Establishing a perfect database to grasp the basic information of students in detail and understand their basic situation is conducive to improving the relevance and effectiveness of work. Focus on the convenient features of microblogs, weibo and the Internet to facilitate communication and interaction with college students, to understand the dynamics of students' thoughts and the difficulties they encounter in life and study, and to help them answer their doubts in a timely manner. Reasonable use of computers and the Internet to publish educational management materials, including video clips, slides, text materials, etc., so that college students can access and study these materials, and then inspire and guide students, and promote the effectiveness of college students' educational management work.

## **4. EDUCATION MANAGEMENT INNOVATION PATH ANALYSIS**

This paper builds a framework based on the VSLAM algorithm and applies it to the innovation of college students' education management. The experimental analysis of university students is divided into "excellent, good and poor" and projected into the interval of [0,1] with the values of "1, 0.75, 0.5, 0.25, 0". At the same time, different assessment targets were averaged to find the values. The experimental results are shown in Table 1.

**Table 1.** Results of innovation in educational management

	<b>Management Innovation</b>	<b>Management Capability</b>	<b>Management Method</b>	<b>Management Effectiveness</b>	<b>Number of samples included</b>
Excellent	0.77	0.78	0.75	0.80	16
Good	0.6	0.58	0.55	0.55	32
Rather poor	0.3	0.3	0.29	0.29	5

As can be seen from Table 1, all of the above experimental analyses have scored more than 0.5 for innovation in college students' educational management, which is a moderate to high level. Among the four different attribute values, management innovation has the largest value, which indicates that management innovation has a strong role in the educational management of college students. The management method score is the lowest among all the scores, which indicates that the management method, to a certain extent, needs to be further adjusted with the counselors needed. In a word, college student education and management is a kind of art education integrating ideology, policy, knowledge and practice, as well as a comprehensive education and management promoting students' all-round development in moral, intellectual and physical aspects. Under the new situation, the education and management of students in colleges and universities should be changed from passive to active, establish the concept of student-oriented education and management, regard students as both management objects and management subjects, give full play to democracy in management, mobilize the enthusiasm of college students and strengthen self-management.

## **5. CONCLUSION**

To promote the smooth educational management work of college students. Based on the improvement of VSLAM algorithm and the basic principles and ideas of education management, this paper proposes the innovation paths of implementing the concept of humanized education management work, establishing the education management mechanism with the participation of multiple themes and constructing the information-based education management service platform to promote the smooth education management work of college students and improve the effect of college students' education management and the quality of talent cultivation. The experimental results show that the scores of innovation ability of college students' education management are all over 0.5, which are in the middle to upper level. Therefore, the proposed algorithm can effectively improve the education management work of college students.

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# NEW IDEAS OF MENTAL HEALTH EDUCATION FOR COLLEGE STUDENTS IN THE CONTEXT OF BIG DATA

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## ABSTRACT

The purpose of exploring new ideas of mental health education work for college students in the background of big data is to cultivate excellent college students who are more in line with the development of society. This paper starts from positive psychology, takes the principle of its application in the mental health education work of college students as the starting point, and then analyzes the application strategy of positive psychology in the mental health education work of college students. Through the analysis, it can be concluded that the use of positive psychology can effectively help college students' mental health education and can become a new research direction for college mental health education work.

## KEYWORDS

big data; college; college students; mental health education; positive psychology; application strategy

## 1. INTRODUCTION

It is very important to promote each student to have a healthy body and mind and a positive personality [1-2]. Currently, most universities in China adopt the traditional psychology education model based on problem awareness [3-4]. Positive psychology, on the other hand, changes the perspective based on the original teaching and plays a heuristic role in the promotion of mental health of college students [5-6].

College students hope to get good evaluation from the society, realize themselves and achieve themselves, and they also look forward to a bright future and desire happiness as well as joy [7]. Therefore, how to guide the positive psychological development of college students has become a focus of attention.

This paper analyzes the application principles of positive psychology in college

mental health education from the connotation and kernel of positive psychology, and then gives its application strategies. It is hoped that the strategy will provide new research ideas for the mental health education work of college students, and then tap the positive potential of most ordinary students and play the role of psychological education in terms of fundamental prevention.

## 2. POSITIVE PSYCHOLOGY

### 2.1 THE MEANING OF POSITIVE PSYCHOLOGY

Positive psychology believes that although psychological problems in themselves do not add strength and excellence to human beings, the presence of problems also provides an opportunity for human beings to show their excellent qualities and potential abilities. Anyone has a need for self-actualization, and this need stimulates their latent positive strengths. Positive psychology helps people find their inner resources and use them to the fullest, so that they can realize their potential, have higher quality of life, better quality of life and a happy life. Experiments have shown that more than 95% of human neurons are unused, and that there is unlimited potential in this untapped area. When viewed from the perspective of positive psychology, every individual has excellent qualities. Positive psychology supplemented with excellent qualities of college students is shown in Figure 1.

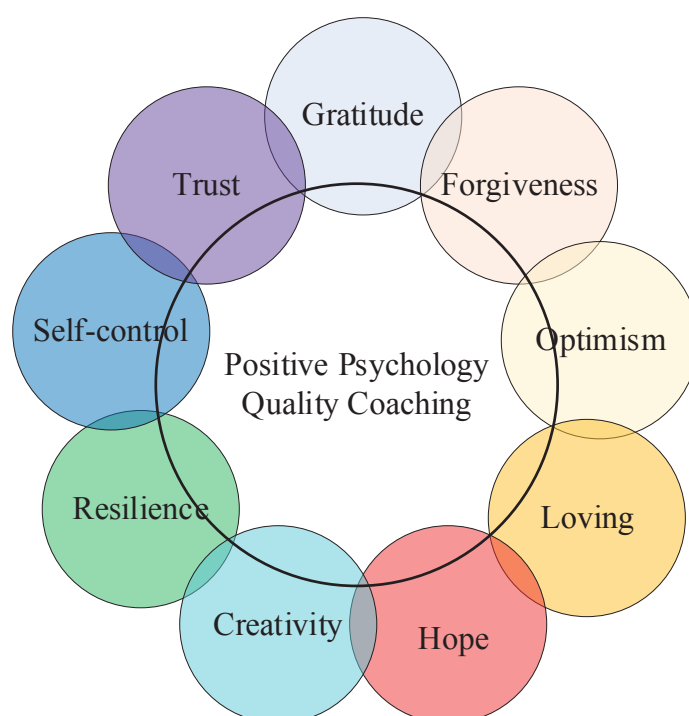


Figure 1 Excellent quality

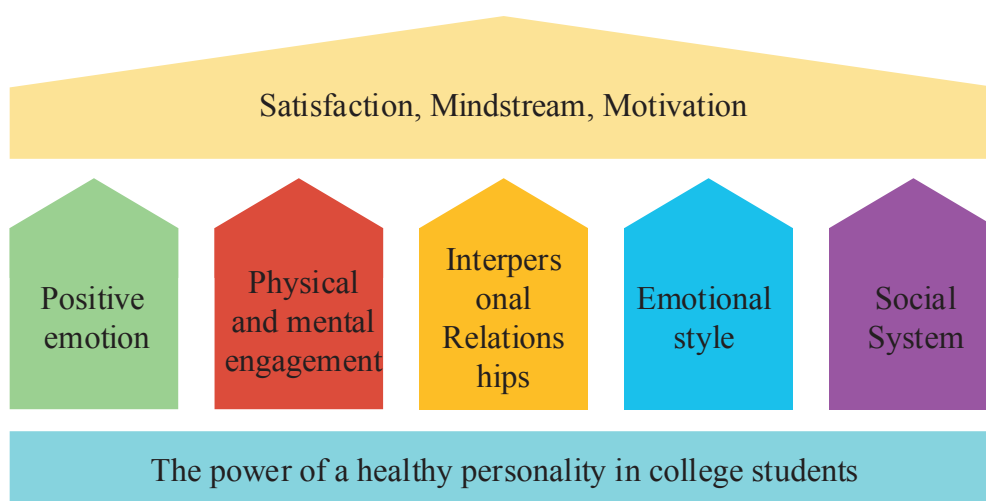
### 2.2 THE KERNEL OF POSITIVE PSYCHOLOGY

Positive psychology explores the positive strengths of human beings from three

perspectives. The individual perspective focuses on the positive qualities that contain personality traits such as intellectual dignity. The subjective perspective looks at three perspectives: past present and future. For the past, we should study the sense of accomplishment and satisfaction, etc.; for the present, we should study happiness and joy, etc.; for the future, we should study a series of positive and good experiences such as confidence and hope. The collective perspective, in general, explores the positive social system including macro level, meso level and micro level.

Positive psychology has the main purpose of counseling college students to achieve positive personality, positive emotions and harmonious integration into positive social systems, through the development of individual personality, the sharing of subjective well-being and generalized social systems in order to achieve mental health education for college students.

The counseling path of positive psychology for college students to achieve mental health is shown in Figure 2.



**Figure 2** Coaching Pathways

### **3. PRINCIPLES OF POSITIVE PSYCHOLOGY APPLIED TO MENTAL HEALTH EDUCATION**

#### **3.1 PRINCIPLE OF SUBJECTIVITY**

The principle of subjectivity refers to the fact that the mental health education of college students under the perspective of positive psychology takes students as the main body, takes students as the center and starting point, and the selection of teaching contents and the use of teaching methods should fully respect the law of physical and mental development and the growth needs of college students, so that the initiative of college students can be given full play. If there is no subjective experience of college students, the educational activities will become a kind of forced behavior and lose the meaning of education. College students' self-awareness and



independence are increasing, and the implementation of the principle of subjectivity is an inherent need for the development of positive psychological qualities of college students.

### **3.2 MOTIVATIONAL PRINCIPLE**

Needs are the prerequisite and basis for an individual to make a behavior, and a certain need of a college student stimulates a certain motivation, which determines the corresponding behavior. Marx pointed out, "Everything that people strive for is related to their interests." If the mental health education of college students can meet the reasonable needs of the education target, it can gain the recognition of college students and avoid losing the foothold of education due to empty reasoning. Educators should adhere to the principle of motivation, mobilize the internal psychological mechanism of college students by satisfying their reasonable needs, and stimulate their motivation, emotion and potential to play.

### **3.3 EXPERIENTIAL PRINCIPLE**

The principle of experiential means that educators should insist on promoting the development of college students through practical activities. Practical activities are an important way to develop and improve one's abilities. College students can express themselves, know themselves and realize their potential and value in the activities. Educators should insist on combining theoretical education and practical training, and put the principle of experience into all aspects of education and teaching. Through practical exercise and situation creation, college students can gain insight through experience, accelerate the comprehension of theoretical knowledge and consciously educate themselves.

### **3.4 PRINCIPLE OF INFECTIVITY**

The principle of infectiousness refers to the purpose of education by influencing, sensitizing and inculcating the emotions of college students through certain environment or objects without their consciousness. Infection includes various forms such as emotional infection and image infection. Emotional infection is to create a certain atmosphere to influence the emotions of the educated, so that they can choose and accept the educational content. For example, creating a warm family atmosphere, carrying out recreational activities, visiting the school history museum, etc. influence on the educated. The image infection is the use of concrete, objective objects to influence the educated.

## **4. THE APPLICATION STRATEGY OF POSITIVE PSYCHOLOGY IN THE MENTAL HEALTH EDUCATION OF COLLEGE STUDENTS**

### **4.1 STRENGTHEN FACULTY CONSTRUCTION AND ENHANCE TEAM LEVEL**

The construction of faculty has an important influence on the quality of psychological counseling and education work in colleges and universities, but mental health education started late in Chinese colleges and universities, and the construction of faculty cannot meet the actual demand in terms of quantity and quality. Strengthening the construction of teachers and improving the overall quality of the teaching team are the keys to solve the real problems.

The competent departments of colleges and universities should study and formulate teacher training programs for colleges and universities, establish teacher training bases, and give policy and financial support. Clarify the training contents and assessment methods, standardize the induction qualification, unify requirements and management, and carry out training on mental health education topics at least once a year for in-service counselors, class teachers and instructors to improve the level of teachers in all aspects.

### **4.2 STRENGTHEN PRACTICAL TEACHING TO ENHANCE POSITIVE EMOTIONAL EXPERIENCE OF STUDENT COLLEGE STUDENTS**

What really determines human intelligence is emotions and feelings, and practice is an effective way to gain emotional experiences and develop abilities. Practical activities can make college students consolidate and deepen their theoretical learning and expand their knowledge field, which is the bridge and link connecting college and society, theory and practice, classroom and extracurricular.

Colleges and universities should firmly establish the idea of cultivating people through practice, encourage and organize college students to carry out social practice which is closely integrated with professional learning, provide college students with practice bases through school-enterprise cooperation, etc., and combine theoretical teaching with contextualized practical exercise. The university should give full play to the personalities and strengths of college students, accelerate their comprehension of knowledge and systematic thinking, and cultivate their independent ability, exploration consciousness, creative talent and practical spirit.

### **4.3 STRENGTHENING CAMPUS CONSTRUCTION AND CREATING A HARMONIOUS NURTURING ENVIRONMENT**

According to positive psychology, "people do not develop themselves exactly according to their genetic factors, but their personality develops mainly through the interaction between the individual and the social environment, where the internal and

external factors interact with each other."

The cultivation of psychological quality is difficult to achieve the ideal effect only by the transmission of knowledge and education, it needs a cultural atmosphere of inculcation, infection. With its beautiful and clean physical environment and pleasant humanistic environment, the campus culture moistens the soul and cultivates the spirit, relieves the fatigue generated by study and work, transforms the inner world of college students, and promotes the establishment of ideal beliefs of college students.

The construction of campus physical environment should always be designed and developed around the formation of college students' personality. Improve the infrastructure construction, actively carry out school greening work, and build elegant humanistic landscape to provide good support for teaching practice and after-school leisure.

## **5. CONCLUSION**

As the future pillars of the country, whether college students have a positive psychology or not is directly related to the development of the country. Therefore, we should give enough attention to the mental health education of college students. In this paper, in order to explore new ideas of college students' mental health education work under the background of big data, the principles and strategies are analyzed with positive psychology as the main means. By applying the strategies, we hope to provide a new research direction for the development of college students' mental health education work, so that colleges and universities can cultivate excellent college students who are more in line with the development of society.

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# ANALYSIS OF PHYSICAL EDUCATION TEACHING EVALUATION SYSTEM AND DESIGN OF INTELLIGENT EVALUATION SYSTEM

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## ABSTRACT

In this paper, the intelligent evaluation system of physical education is constructed through the modular programming of intelligent technology development. In the evaluation process, relevant parameters as well as evaluation indexes are set. Secondly, the data module is used for unified and centralized management, and finally, the analysis results are displayed in the form of data through the result analysis module. The simulation results show that the intelligent evaluation system has 99.56% and 99.25% confidence in the evaluation indexes, and the error rate is only 1.03% and 2.4%, respectively. Thus, the intelligent evaluation system of physical education built in this paper becomes an important platform for improving teaching quality and strengthening teaching management.

## KEYWORDS

Physical education; Intelligent technology; Evaluation system; Data module; Confidence level

## 1. INTRODUCTION

Nowadays, the concept that teaching quality is the lifeline of schools has become the general knowledge of schools of all levels and types, and the quality of classroom teaching, as the main channel to implement the teaching intention, directly determines the quality of teaching [1-2]. Evaluation of physical education teaching is an important part of physical education teaching, which is the evaluation of the quality of physical education teaching and the feedback of the effect of physical education teaching, and it has positive significance and important role in improving the quality of physical education teaching [3-5].

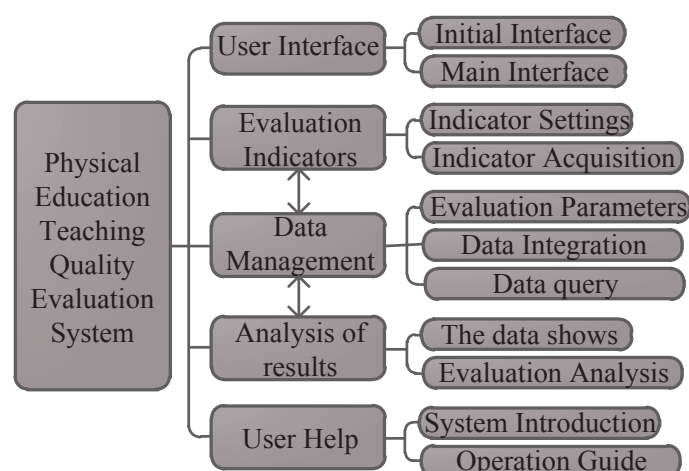
The evaluation of physical education has long been limited to a qualitative description, and the evaluation results are often influenced by the subjective consciousness of the evaluator, thus affecting its authenticity and objectivity. How to evaluate physical education quantitatively is an important factor to improve the quality of teaching. The literature [6] introduced a fuzzy evaluation algorithm in the system. In the data processing, all collected teaching evaluation data were classified by unsupervised learning in advance. The literature [7] used hierarchical analysis to determine the weights of evaluation indexes. The evaluation system in the above literature lacks authenticity and objectivity, and there are redundancy, fusion and superposition of evaluation data.

Based on this, this paper designs an intelligent evaluation system for physical education based on intelligent technology. In the design process, modular programming idea is adopted, and the main body of the evaluation system includes 5 functional modules. In the evaluation process, relevant parameters and indexes are established and selected, based on which, the evaluation results are organized in data unification and then displayed through digital

methods. And the practicality of the intelligent evaluation system is confirmed by simulation practice.

## 2. BUILD AN INTELLIGENT EVALUATION SYSTEM FOR PHYSICAL EDUCATION

The modern education technology characterized by informationization and intelligence to promote the reform of physical education in colleges and universities is both an inevitable trend of deepening the application of modern education technology and a necessary way to meet the development of the times and realize the leapfrog development of physical education [8-10]. Therefore, it is an important task of physical education to establish a scientific physical education teaching quality evaluation system. In this paper, intelligent technology is used to build an intelligent evaluation system for physical education, and the system structure is shown in Figure 1.



**Figure 1.** Structure of intelligent evaluation system

As shown in Figure 1, this teaching quality evaluation system adopts modular programming ideas in the development process and uses intelligent technology to make the whole system highly readable, intelligent and flexible. The evaluation system mainly includes 5 functional modules user interface module, evaluation index module, data management module, result analysis module and user help module.

The system login interface is a human-computer dialogue interface, which is operated by the user with the mouse or keyboard to achieve the function of human-computer dialogue.

It enables the selection of relevant parameters and the capture of evaluation indicators in the evaluation process. The system also ensures that different teachers and different courses can be evaluated under the same evaluation index and evaluation mode, so as to achieve the principle of fair and just evaluation.

It is a unified and centralized management of the data from the teaching evaluation results entered on different computers distributed in the campus network. It mainly includes the services of collecting evaluation parameters, data inheritance and querying related evaluation data or evaluation objects, which is the main function module of classroom teaching quality evaluation system.

According to the evaluation parameters set by users, the evaluation results are displayed as data using curves or figures. It can also do horizontal or vertical comparison of teaching quality of different courses or different teachers, and realize analysis of evaluation results.

In order to facilitate the user's operation, the system also sets up a help item file and provides an online help module.

### 3. ANALYSIS OF THE PRACTICAL RESULTS OF THE EVALUATION SYSTEM

In order to verify the effectiveness of the intelligent evaluation system of physical education constructed in this paper, a school was randomly selected as the experimental object in this paper, and the physical education data of the school was obtained through multiple channels, and a comprehensive evaluation of the quality of physical education in the school was conducted. The same operation is then performed using the traditional evaluation system, and the comparison information is shown in Table 1.

**Table 1.** Comparison information

Evaluation indicators	Intelligent Evaluation System		Traditional evaluation systems	
	Confidence%	Error rate%	Confidence%	Error rate%
Teaching content	99.56	1.03	50.13	22.68
Teaching methods	99.25	2.4	62.17	29.31
Orientation	99.62	2.45	51.93	31.69
Teaching Objectives	99.73	2.71	66.18	27.86

As can be seen from Table 1, in the two evaluation indexes of teaching content and teaching method, the confidence level of the traditional evaluation system is only 50.13% and 62.17 respectively, and the error rate reaches 22.68% and 29.31. The low confidence level indicates that the evaluation of the traditional evaluation system is too homogeneous and narrow, which makes it difficult to evaluate the physical education teaching satisfactorily. In contrast, the intelligent evaluation system constructed in this paper has 99.56% and 99.25% confidence in these two evaluation indexes, and the error rate is only 1.03% and 2.4%, respectively. This proves that the intelligent evaluation system further improves the quality of teaching evaluation and has good guidance and reference significance.

### 4. CONCLUSION

In this paper, an intelligent evaluation system of physical education based on intelligent technology is constructed from the perspective of physical education evaluation, and the application effect of the system is verified in practical activities. Compared with the traditional evaluation system, the intelligent evaluation system has only 1.03% and 2.4% error rate in the evaluation index, and the confidence level is as high as 99.56% and 99.25%, respectively. It shows that the intelligent evaluation system designed in this paper is beneficial to the reform and development of physical education teaching, and provides effective data and support for teaching quality evaluation.

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# RESEARCH ON THE OPTIMIZATION METHOD OF MULTI-RESPONSE PARAMETER MATHEMATICAL MODELING BASED ON MATRIX MODEL

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## ABSTRACT

The study of multi-response parameter optimization problems is of great significance for complex industrial systems. In this paper, a two-dimensional matrix optimization model is developed through the work decomposition structure and cost decomposition structure. The mathematical modeling differential equations for multi-response parameter optimization are derived using perturbation suppression and ambiguity resolution, and are evaluated in terms of both optimization time and the fit of optimization results. The method in this paper saves 2.13 s of time cost compared to the MEA-based SVM parameter optimization and 4.02 s compared to the fish swarm algorithm. The stability of the multi-response parametric mathematical model designed in this paper is high and can effectively meet the needs of nonlinear control models.

## KEYWORDS

multi-response parameters; two-dimensional matrix model; mathematical modeling; parameter optimization

## 1. INTRODUCTION

Process parameter optimization design, as the first barrier to control the quality of products, has a decisive impact on the quality of product production [1-2]. As industrial manufacturing becomes increasingly intelligent, more and more noise factors appear in the production process, which seriously affect the product quality. In the face of

numerous noise disturbances, the initiative of designing a large number of noise factor tests to obtain robust parameters may greatly increase production costs, which is contrary to the principle of manufacturing economy [3-4]. In addition, when the number of noise factors increases exponentially, the orthogonal test table has to be increased, which will eventually lead to overflow of test data into the orthogonal table and make it difficult to perform parameter design [5].

To address these challenges, the literature [6] simplifies the system mainly by means of dimensionality reduction. For systems that are not easily subjected to dimensionality reduction, the literature [7] uses the integrated satisfaction method to deal with the integrated quality index to represent the overall optimization degree of multiple responses. The Box-Behnken response surface method and the gray relational analysis optimization method were proposed in the literature [8] to optimize the EDM process parameters. However, all of the above methods eventually require weight setting in order to simplify the complex system. In this paper, a two-dimensional matrix model is used to optimize the state eigenvolume of the multi-parameter response mathematical modeling for perturbation suppression.

## **2. OPTIMIZATION METHOD BASED ON TWO-DIMENSIONAL MATRIX MODEL**

### **2.1 TWO-DIMENSIONAL MATRIX MODEL**

#### **2.1.1 WORK BREAKDOWN STRUCTURE**

The Work Breakdown Structure, or WBS for short, is a powerful analytical tool whose concept was first widely used in large scale project management in the 1970s. Through WBS, a project is organized hierarchically and systematically broken down into smaller and manageable units, with each decreasing level representing an increasingly detailed definition of all project components, with the phases interconnected, starting at the beginning of the project and decomposing one by one, with the subsystems interacting to form a unified and integrated management, which is oriented to the project deliverables by breaking down the overall project work into smaller sub-unit modules for easy project management and control of individual work unit modules, and thus defines the entire scope of work of the project.

#### **2.1.2 COST BREAKDOWN STRUCTURE**

Cost Breakdown Structure, or CBS for short, establishes a sharp tool for integrating this mapping model with relevant cost categories and functional breakdowns throughout the project life cycle. The decomposition of the appropriate cost structure system plays a crucial role in project LCC, which can visualize the analysis, occurrence and interrelationship of project costs, so that project tracking management can be

implemented in a targeted manner, and the CBS can collect, analyze and output cost reports for any project that generates costs.

### 2.1.3 TWO-DIMENSIONAL MATRIX

Two-dimensional matrix model is a means of whole life cycle cost analysis, which combines work breakdown structure and cost breakdown structure in a mathematical mapping model. It analyzes the LCC occurrence of a project from functional, elemental dimensions and multi-dimensional threads in the form of a matrix, and then derives the total cost of a phase, a sub-project or the whole LCC of a project vertically or horizontally through simple mathematical modeling operations. It can monitor, analyze and dynamically manage the whole life cycle cost of the project, and grasp the cost situation of the whole process of the project in time, so that the whole process cost data information of the project can be summarized in different hierarchical structures, and the project cost can be predicted, analyzed and controlled in different organizational levels, which can effectively solve the problem of separating each phase of the whole life cycle.

## 2.2 MULTI-RESPONSE PARAMETRIC MATHEMATICAL MODELING

### 2.2.1 MULTI-RESPONSE PARAMETRIC MATHEMATICAL MODELING DIFFERENTIAL EQUATIONS

In this paper, we use the method of perturbation suppression and fuzzy degree resolution to obtain the differential equations of multi-response parameter mathematical modeling, satisfying its function  $x = [x_1, \dots, x_p] \in R^p$ . The distribution interval of the bounded characteristic solution of the multi-response parameter mathematical model is obtained under the multimodal constrained fluctuation perturbation satisfying the fuzzy degree function  $y: R^p \rightarrow R$ . The stability generalized equation of the multi-response parameter mathematical modeling differential equation is given by:

$$y(x) = \exp \left\{ - \sum_{k=1}^p \omega_k (x_k - x'_k)^2 \right\} \quad (1)$$

Where  $\omega$  is a column vector of unknown spatial correlation coefficients to represent as the input  $x$  is separated from  $x'$ . In the linear programming region of the differential equation for multi-response parameter mathematical modeling, let  $x^*$  be a vector of spatial marginal values in the set of eigen-solutions of the differential equation for multi-response parameter mathematical modeling. In the stochastic eigensolution distribution region, the singular decomposition operator of the multi-

response parameter fitting eigenequation is obtained as  $g_k$ . Under the singular perturbation constraint, the stable eigensolution of the multi-response parameter fitting is obtained as  $(g_0, g_1)$ . Under the smooth periodic solution constraint, the steady-state model of the multi-response parameter fitting state eigenequation is obtained as:

$$\phi(x) = \frac{1}{(2\pi\tau^2)^{n/2}} |g_k|^{1/2} \exp\left\{-\frac{1}{2\tau^2}(d-x\beta)^T\right\} \quad (2)$$

Where  $\beta$  denotes the state term of the pairwise Cauchy-Hadamard type,  $d$  denotes the uncertain state parameter of the multi-response parameter fitting state, and  $\tau$  denotes the edge vector of the smooth periodic solution of the nonlinear system. Using the least-squares fitting control method, the supercritical fluctuation integral term is obtained as:

$$f(x) = \int_{-\infty}^{\min(\gamma)} (\min(Y) - y(x)) \phi\left(\frac{y(x) - \lambda}{d_1(x) - d_2(x)}\right) dx \quad (3)$$

Where  $\lambda$  is the boundary stability convergence characteristic solution,  $d_1(x)$  and  $d_2(x)$  are the fuzziness generalization parameters of the multi-response parameter fitted state equation, respectively, and define the boundary equation term  $d(x)$ . Under the critical condition, the finite function of the multi-response parameter fitted state equation is obtained as follows:

$$Y = \Pi\left(\min\{d(x_k)\} | x_k \in y(x)\right)^\omega n \quad (4)$$

In the sparse bounded distribution set of the differential equations for the mathematical modeling of the multi-response parameters, the smooth periodic stable solution of the system is obtained denoted by  $\Delta d(x)$ . In the singular space  $IR^3$ , the differential equation for the multi-response parameters fitting the state parameters is obtained as:

$$u(x) = \frac{\partial\phi(x)\partial y(x)}{\partial x^2} - \frac{\lambda}{2} \ln(2\pi) \quad (5)$$

Based on the above analysis, the multi-response parameter mathematical modeling differential equations are constructed, and the multi-response parameter mathematical modeling and parameter seeking control are realized under the critical conditions.

## 2.2.2 MULTI-RESPONSE PARAMETRIC MATHEMATICAL MODELING

In a complex industrial production process,  $k$  observations of influencing factors are used as control variables, denoted as  $X_1, X_2, \dots, X_k$ , and  $m$  observations of quality fluctuations are used as response variables, denoted as  $Y_1, Y_2, \dots, Y_m$ . A total of  $n$  sets of experiments are designed in the experimental process, denoted as  $1, 2, \dots, n$ . The model of the multi-response parameter optimization problem is shown in Table 1.

**Table 1** Multi-response parametric optimization problem model

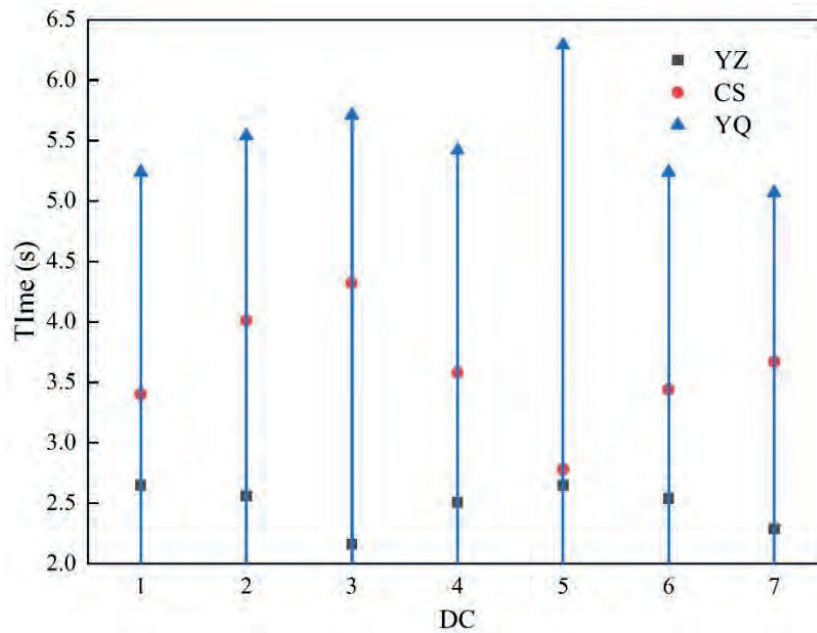
Control Variables			Response Variables		
$X_1$	.....	$X_k$	$Y_1$	.....	$Y_m$
$x_{11}$	.....	$x_{1k}$	$y_{11}$	.....	$y_{1m}$
.....	.....	.....	.....	.....	.....
$x_{n1}$	.....	$x_{nk}$	$y_{n1}$	.....	$y_{nm}$

## 3. OPTIMIZATION ANALYSIS BASED ON TWO-DIMENSIONAL MATRIX MODEL

### 3.1 PARAMETER OPTIMIZATION TIME ANALYSIS

In order to verify the overall effectiveness of the multi-response parameter optimization method, the multi-response parameter optimization method needs to be tested. The multi-response parameter optimization method based on matrix model, the SVM parameter optimization method based on MEA, and the classification parameter optimization method based on fish swarm algorithm were tested to compare the classification time of the three different methods. The average classification time for the six iterations was 2.68 s. The average classification time for the six iterations for the MEA-based SVM parameter optimization method was 4.12 s. The average classification time for the six iterations for the fish swarm algorithm-based classification parameter optimization method was 5.63 s. The average classification time for the six iterations for the heterogeneous network big data classification method, the MEA-based SVM parameter optimization method and the fish swarm algorithm-based classification parameter optimization method were compared. The average classification time of the multi-response parameter optimization method, the MEA-based SVM parameter

optimization method, and the fish swarm algorithm-based classification parameter optimization method is less than the above two methods.



**Figure 1** The time used for the classification of the three different methods

### 3.2 OPTIMIZATION RESULTS

The stability analysis of the multi-response parameter mathematical model is carried out by numerical analysis and MATLAB simulation, and the number of iterations of the steady-state control of the multi-response parameter mathematical model is given as 130, and the planning set size of the test sample function is 2200. the above test parameters are set to realize the optimal design of the multi-response parameter mathematical model, and the optimized parameter analysis results of the multi-response parameter mathematical model are obtained. The analysis of the test results shows that the stability of the parametric analysis results of the multi-response parametric mathematical model is good and the test parameters are well fitted.

### 4. CONCLUSION

In this paper, the multi-response parameter mathematical modeling is optimized based on a two-dimensional matrix model, and the results show that it still has a good fit with a short optimization time. Different treatment methods can be adopted for different stages of multi-response parameter optimization design, so that the overall product quality can be improved. The introduction of matrix model can solve the problem that the response weights are difficult to determine directly and expand the application scope of the method. With the adoption of bidirectional projection decision, the resolution of the system simplification results can be improved and the reliability of the parameter design can be further enhanced.

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# THE APPLICATION OF BIG DATA TECHNOLOGY IN THE IDEOLOGICAL AND POLITICAL EDUCATION ENVIRONMENT OF UNIVERSITIES

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## ABSTRACT

Each era has its own development characteristics and teaching forms. In the background of big data era, along with the emergence and application of new technologies, it has changed people's thought patterns and working methods. In the process of ideological and political education in colleges and universities, scientific response to students' complex and jumpy thinking is the basis for teachers to effectively accomplish their teaching goals. However, some teachers are still not provided with more reasonable teaching methods to grasp students' "fickle" thoughts in time, which brings problems and difficulties to their teaching work. Teachers should update their educational philosophy and effectively integrate big data thinking; and continuously enrich their teaching tools and scientifically use big data technology to get out of the dilemma based on the new teaching model.

## KEYWORDS

Big data; Universities; Ideology and politics; Educational environment; Application path

## 1. INTRODUCTION

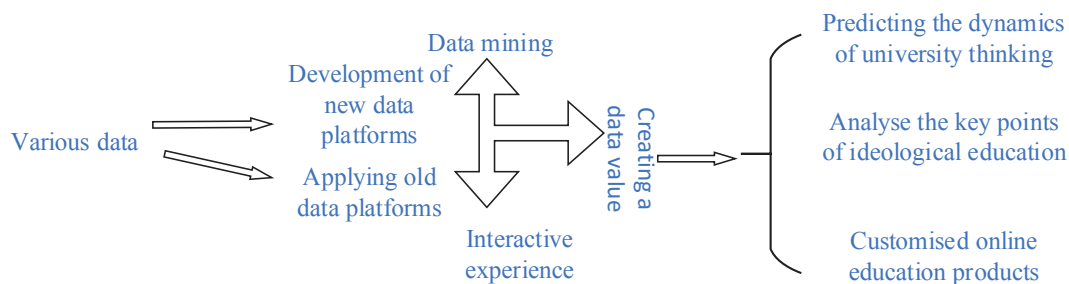
The application of big data technology has set off an information storm that has swept through the entire educational field. It not only brings a certain promotion to the form of teaching, but also, brings a certain influence to the thinking of college students [1-2]. Based on the popularity and use of Internet technology and mobile smart devices, contemporary college students can get richer information through different ways, and their thinking has changed dramatically [3-4]. Teachers use the traditional teaching format to maintain the classroom teaching process, which can no longer meet the learning needs of students [5-6]. In particular, ideology and politics in colleges and universities mainly focus on students' ideological and political dynamics, political awareness and value system, etc. If teachers cannot form a correct understanding of students' physical and mental development and changes, they cannot teach in a more targeted way and thus cannot effectively accomplish their teaching goals [7-8]. In this paper, we intend to discuss the rationality, mechanism and path of combining big data with ideological and political education in colleges and universities in order to promote the effectiveness of ideological and political education in Chinese colleges and universities.

## 2. THE APPLICATION OF BIG DATA IN IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES

Figure 1 shows the mechanism of big data applied to ideological and political education in colleges and universities. Big data has four basic characteristics: large data volume, diverse data, low value density and fast speed. According to the insight of Victor Mayer-Schönberg,



one of the authoritative proposers of big data, the reason why big data is valuable is that big data reveals the correlations between things with rational full-volume data information, and these correlations can observe the development trend of things. People can make effective behavioral choices based on these trends. In fact, it is the users themselves who create the correlations reflected by big data. Previously, it was difficult to obtain these valuable relationships through research among all users because of the difficulty of observation. Behind big data are the habits of thought and behavior of users. These, like personalities, do not change easily, so Big Data makes it easier for people to understand themselves and the people around them.



**Figure 1.** The Mechanics of Big Data Applied to Ideological and Political Education in Universities

## 2.1. DATA ACQUISITION

On data platforms, various different types of data are generated every day. Some of the more famous and large data platforms in China are Baidu, Taobao, Renren and so on. If you want to know the interests of a group or a person, you can easily get all the data through these data platforms. These are ready-made data platforms. There are also new data platforms that individuals and organizations can build to capture data. For example, the WeChat public platform that more organizations are continuously opening recently. To understand the socialist core values identity of college students, for example, first, universities should determine the on-campus data platforms to be collected. For example, students online, BBS, WeChat, socialist core values special website, secondly, integrate into commercial websites such as Baidu posting bar, Tencent microblog, Sina microblog, Renren, Tianya community, Tencent QQ group, etc. Finally, establish data filtering and screening system to obtain structured and unstructured data related to socialist core values in real time.

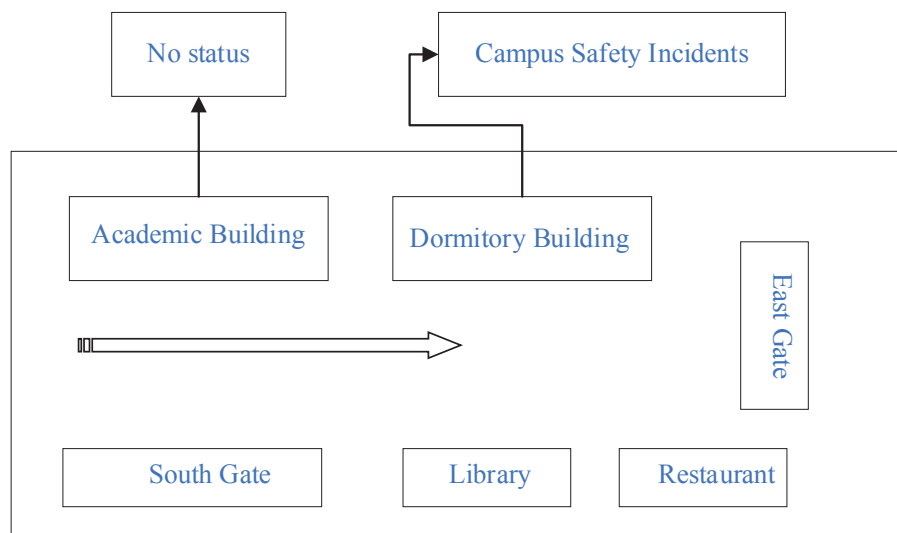
## 2.2. DATA MINING

Data mining involves specific techniques for data analysis. Commonly used techniques are semantic analysis techniques, building data models. The parameters of how to determine correlations and the attributes that define those correlations are the core domain. This requires an interdisciplinary group of data scientists with specialized knowledge and skills or a professional organization. One of the better known current data application platforms is hadoop, through which any individual and organization can mine data according to their needs. Take understanding the daily thought dynamics of students as an example, the relevant departments of universities will collect all kinds of structured and unstructured data through hadhoop platform processing, which can define some attributes, such as search hot words, political life events of concern, active forms, and value deviation. The relevance is determined by the number of clicks, the number of statements, the frequency of occurrence of phrases, and the concentration of data types.

## 2.3. HUMAN-COMPUTER INTERACTIVE EXPERIENCE

Figure 2 shows the dynamics of student thought based on location. Data is lifeless, while

the human experience is real and valuable. Therefore, the value of data is reflected in the interactive experience between people and data. Data will only produce great value when combined with human analysis and judgment, and with various human needs. Currently, wearable devices are entering the market, and wearable devices are a model of human-computer interactive experience. The devices not only produce a lot of data every moment, but the data generated can become the basis for the devices themselves to continue to innovate, and bring perceptual experience to the users. Still taking the example of college students' thought dynamics, avoiding the simple presentation of statistical tables, if we can combine location data for visual presentation of scenes, it will enhance the experience of college management.



**Figure 2.** Location-based student thought dynamics

### **3. INNOVATION OF IDEOLOGICAL AND POLITICAL EDUCATION PATHS IN UNIVERSITIES IN THE ERA OF BIG DATA**

#### **3.1. APPLY BIG DATA TO DEVELOP NEW PRODUCTS OF IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES**

According to the application mechanism of big data, only by combining data mining analysis with the experience of college students can the developed products be attractive. Based on the application of big data for opinion monitoring and analysis, the new products developed should have the characteristics of good experience, interesting, real-time feedback and close to life. The new products developed should respect students' personality characteristics and current needs. The new products should have a rich variety of forms, which can be either online courses, themed games, or offline activity arrangements.

#### **3.2. PAY ATTENTION TO THE NETWORK PRACTICE OF IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES**

College students' values are unstable and subject to the effects of socialization validity and education. College students' behaviors and perceptions are often in a state of inconsistency. The current application of big data focuses on the cognitive aspect of college students' values. As cognition can reflect problems, big data is used to classify students' cognition, compare unreasonable cognition and biased cognition with rational cognition, find out the gaps, and then formulate specific practice programs, and then correct cognitive bias through practical actions, so that cognition and behavior can be matched, and socialist core values can be established and consolidated in practice.

### 3.3. SCIENTIFIC USE OF BIG DATA TECHNOLOGY

In the process of teaching, teachers should continuously enrich their teaching methods based on new teaching ideas so as to carry out ideological and political education activities in a more scientific way. In the background of the big data era, based on the use of the Internet and other technologies, teachers can filter effective information from the huge amount of information and integrate it into their teaching. When teachers provide ideological and political education to students, they mostly use relevant teaching materials to carry out classroom teaching activities, but the content of teaching materials is not updated in real time due to the influence and limitation of various factors. In the current era, teachers can collect more practical knowledge into the teaching content according to the information focus of students, so as to enrich teaching resources and provide favorable conditions for effective classroom teaching. When students are interested in, and even resonate with, the content provided by teachers, they can more actively participate in the learning atmosphere. Only when students have a deep understanding and absorption of the relevant teaching content can they essentially have a positive influence on their thinking and achieve the purpose of ideological and political education.

### 4. CONCLUSION

When carrying out ideological and political teaching work, colleges and universities should be good at using big data, the Internet and other cutting-edge technologies. They should be able to enhance their data sensitivity and observe and feel the changes in students' thoughts with a dynamic mode of thinking, so as to provide more targeted ideological education to students. According to the "people-oriented" teaching concept, we should pay more attention to students, and then solve the actual problems of students' minds.

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**INVESTIGATION AND ANALYSIS OF THE CURRENT SITUATION OF HEALTH  
BUSINESS IN SHAANXI BASED ON THE BACKGROUND OF DATA  
COLLECTION AND RESEARCH ON CONSTRUCTION AND DEVELOPMENT  
STRATEGIES**

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**ABSTRACT**

This paper investigates the current situation of health career in Shaanxi Province in the context of data collection, analyzes the basic data of health and medical service level, and gives the development strategy of health career construction in Shaanxi Province. The development of health undertakings in an integrated manner should be promoted in terms of ideas, mechanisms as well as effectiveness, so as to realize the demonstration construction of 8 types of health cells in Shaanxi Province, weave the warp and weft network of healthy Shaanxi, and improve the level of health literacy of the public.

**KEYWORDS**

data collection; Shaanxi Province; health career; medical services; health literacy level; mechanism

**1. INTRODUCTION**

As the wheel of time continues to move forward, the world's shared concept of sustainable development has brought China and the entire world to a climax. However,

if the skin does not exist, how can the hair be attached? The quality of life of contemporary people and their health are the cornerstones of sustainable human development [1-2]. Health is the cornerstone of overall human development and happiness in life, as well as an important symbol of national prosperity and social civilization progress [3]. Medical and health care has long been one of the important indicators of China's coordinated economic and social development and the overall building of a moderately prosperous society [4].

Medical and health care is a matter of vital interest to the people and has received close attention from the whole society. With the upgrading of economic development and consumption structure, the people's demand for medical and health services and multi-level health services has further increased [5]. In recent years, Shaanxi Province has attached great importance to public health work, and from its own reality, it has boldly explored innovations to achieve new breakthroughs in key areas and critical links. It is committed to strengthening the prevention and control of major diseases in rural areas of the province, health reform and other key work, and strives to solve the outstanding problems that affect the health of the people, such as the difficulty of access to medical care and expensive medical care [6-7]. The scale of medical and health services, service conditions and service levels have been effectively improved and enhanced, and the province's medical and health care has continued, stable and healthy forward development.

This paper analyzes the level of health and medical services in the context of data collection, starting from the data survey of the current situation of health undertakings in Shaanxi Province. Based on the data analysis, it is proposed that the development of health undertakings in Shaanxi Province should start from the demonstration construction of 8 types of health cells, and mainly work on unifying ideas, improving mechanisms as well as enhancing effectiveness, so as to promote the construction of healthy Shaanxi.

## **2. Survey on the current situation of health business in Shaanxi Province**

Medical and health care is related to the quality of health of the people, and the people's vital interests are closely related. To meet the growing medical and health needs of the people, vigorously develop medical and health care, ensure public health security, improve the health quality of the whole nation and the relevant departments, especially the health system in front of the majority of medical and health workers a major historical task. This chapter is based on the "Shaanxi Province Health and Health Care Development Statistics Bulletin 2021", using data collection techniques to investigate the current situation of health care in Shaanxi Province data, through data analysis to provide the basis for the development of health care construction strategies

in Shaanxi Province later.

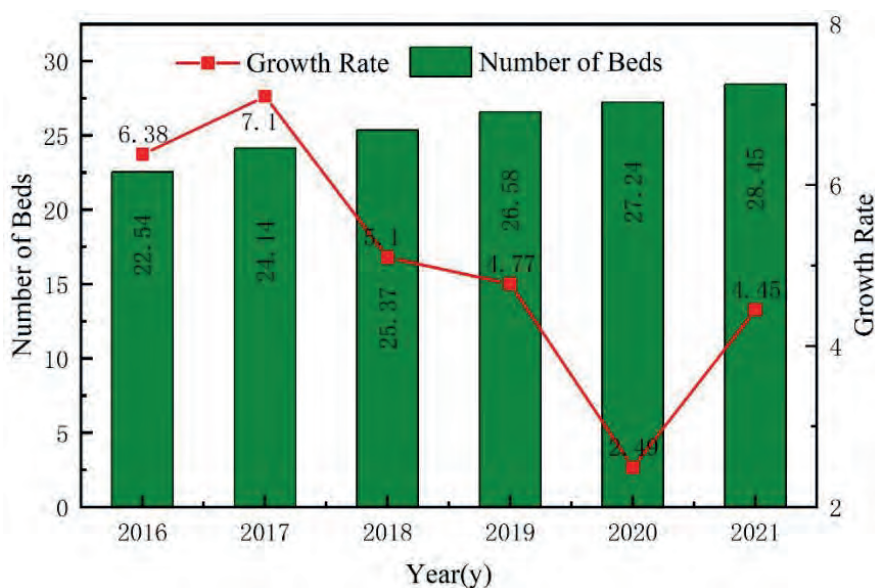
## 2.1 HEALTH AND WELLNESS LEVEL

### (1) Total number of medical and health institutions

At the end of 2021, the total number of medical and health institutions in the province 34,971, down 4 from the previous year. Among them, 1270 hospitals, 33,185 primary health care institutions, 415 professional public health institutions. Compared with the previous year, the hospital increased by 51, primary health care institutions decreased by 14.

### (2) Number of beds

At the end of 2021, there were 284,500 beds in medical and health institutions in the province, including 233,600 beds in hospitals (82.08%), 40,900 beds in primary medical and health institutions (14.38%), and 0.97 million beds in specialized public health institutions (3.39%). The number of beds in medical and health institutions in the province and the growth rate are shown in Figure 1.



**Figure 1** Number of beds and growth rate

### (3) The total number of health personnel

At the end of 2021, the total number of health personnel in the province will be 445,900, an increase of 555 (0.12%) over the previous year. 2021 end health personnel institutional distribution is 286,800 (64.33%) in hospitals, 125,000 (28.04%) in primary health care institutions, and 30,800 (6.91%) in specialized public health institutions. 2021 3.05 practicing (assistant) physicians per 1,000 population, 4.03 registered nurses per 1,000 population. 3.35 general practitioners per 10,000 population, and 7.79 personnel per 10,000 population in professional public health institutions.

## 2.2 MEDICAL SERVICES

### (1) Outpatient and inpatient volume

In 2021, the total number of visits to medical and health institutions in the province will be 187,049,500, an increase of 10,219,100 visits (5.78%) over the previous year. (41.15%), and 671.09 million visits to other medical and health institutions (3.59%). Compared with the previous year, the number of hospital visits increased by 17,097,200 and the number of primary care visits decreased by 5,986,900. 85,343,800 visits were made to public hospitals in 2021 (82.56% of the total hospital visits) and 18,023,300 visits were made to private hospitals (17.44% of the total hospital visits). The specific workload is shown in Table 1.

**Table 1** Province-wide medical service workload

Institution Type	Number of consultations		Number of hospital admissions	
	2020	2021	2020	2021
Total medical and health institutions	17683.04	18704.95	675.68	728.42
Hospital	8627	10336.71	589.55	649.52
Public Hospitals	7140.37	8534.38	466.43	510.95
Private Hospitals	1486.62	1802.33	123.11	138.57
Hospitals in:				
Tertiary hospitals	3804.26	4708.3	233.49	276.34
Level II Hospital	3985.13	4656.44	295.75	305.65
-level hospitals	364.85	450.65	26.73	31.3
Primary Health Care Institutions	8295.84	7697.15	54.33	53.58
Other institutions	760.21	671.09	31.81	25.31
In total: Non-public medical and health institutions	3675.37	4052.24	23.74	139.02

### (2) Workload of hospital physicians

In 2021, the average daily workload of hospital physicians will be 5.8 consultations and 2.3 inpatient bed days, of which: 6.2 consultations and 2.3 inpatient bed days will be the average daily workload of public hospital physicians.

### (3) Hospital bed use

In 2021, the province's hospital bed utilization rate will be 72.41%, including 78.61% in public hospitals. Compared with the previous year, the hospital bed utilization rate increased by 3.74 percentage points (including public hospitals increased by 3.44 percentage points). 2021, the average hospital discharges hospital days was 9.0 days (including public hospitals 8.9 days), compared with the previous year, the average hospital discharges hospital days decreased by 0.1 days (including public hospitals decreased by 0.2 days).



#### (4) Improve medical services

By the end of 2021, 34.14% of public hospitals at the second level and above had carried out consultation appointments, 91.54% had carried out clinical pathway management, 56.49% had carried out telemedicine services, 87.92% had participated in mutual recognition of examination results at the same level, and 93.05% had carried out quality nursing services.

#### (5) Blood security

In 2021, the annual number of blood donations will reach 562,300 and the volume of blood collected will reach 973,100 units, an increase of 9.1% and 10% respectively compared to 2020, with a blood donation rate of 14.2 per 1,000 population.

In addition to health care and medical services, health care in Shaanxi Province also includes primary health services, Chinese medicine services, patients' medical costs, disease control and public health, maternal and child health and healthy aging, food safety and health supervision, and population and family development, etc. Based on the limited space of the article, only health care and medical services are used for the later development of health care construction in Shaanxi Province Provide data.

### **3. HEALTH CONSTRUCTION DEVELOPMENT STRATEGY IN SHAANXI PROVINCE**

Shaanxi Provincial Party Committee and Provincial Government earnestly implement the important discourse of General Secretary Xi Jinping on the construction of health China, implement the new era of health and health work guidelines, raise the construction of health Shaanxi to the province's strategy, adhere to the government-led, departmental coordination, social participation, common construction and sharing, from the extensive, social and overall nature of health impact factors, comprehensively promote the construction of healthy organs, healthy military barracks, healthy communities, healthy villages, healthy schools, healthy hospitals, healthy enterprises, healthy families and other eight types of health cell demonstration, weaving the warp and woof of health Shaanxi, and improve the level of health literacy of the masses.

#### **3.1 PROMOTE SOLIDLY AND WORK ON UNIFYING IDEAS**

From the extensive, social and diverse health influencing factors, scientific planning, graded implementation, the provincial level by the Health Shaanxi Construction Work Committee Office is responsible for the formulation of implementation plans, determine the objectives and tasks, coordinate the relevant units to organize and implement, so that there are annual goals, tasks are led, responsibilities are borne, work is done, quarterly monitoring, year-end inspection.

The city (district) and county refer to the provincial practice to set up a special team, develop a work plan and collaborate to promote. The provincial, municipal and county levels work together in the same direction, mobilizing from the government, departments, communities, families and individuals at five levels, mobilizing the enthusiasm and initiative of all parties, maximizing the overall resources, coordinating and promoting in a coordinated manner.

### **3.2 INTEGRATING DEVELOPMENT AND WORKING ON SOUND MECHANISMS**

Strengthen the industry and departmental collaboration, and consolidate the foundation of health Shaanxi action. Against the 17 contents and 130 indicators of Health Shaanxi Action, further improve the content of tasks related to the demonstration construction of 8 types of health cells. Focus on the health knowledge and healthy habits that the people are most concerned about and most closely connected with, do a good job in the management of chronic disease services, implement comprehensive prevention and control of infectious diseases, cultivate a civilized and healthy, green and environmentally friendly lifestyle, and improve the overall health level.

### **3.3 FOCUS ON IMPROVING THE EFFECTIVENESS**

Take health education and health promotion work platform as the carrier, take health knowledge popularization as the entry point, actively explore new ways to mobilize the masses to participate in health cell demonstration construction under the new situation, guide the masses to actively participate in health cell demonstration construction, transform the people's extensive concern for health into active participation in health behavior activities, and make health cell demonstration construction a conscious action of the whole province.

## **4. CONCLUSION**

This paper investigates the current situation of health undertakings in Shaanxi Province in the context of data collection, and proposes strategies for the development of health construction in Shaanxi Province by analyzing two basic data on health and medical service levels. In the process of promoting the construction of healthy Shaanxi, it is important to focus on unifying ideas, improving mechanisms as well as enhancing effectiveness, so as to promote the development of the health cause in Shaanxi Province, weave the warp and weft of healthy Shaanxi, and improve the level of health literacy of the public.

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# CONSTRUCTION OF CIVIC INFORMATION EDUCATION MODEL FOR UNDERGRADUATES OF LANDSCAPE ARCHITECTURE VOCATIONAL EDUCATION BASED ON SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM

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## ABSTRACT

This paper starts from the specific connotation of Civic Information and Landscape Architecture VET undergraduate, and points out the problems of integrating ideological education in Landscape Architecture VET undergraduate. Under the OBE concept, the path of landscape gardening innovative education mode is given, that is, the improvement and comprehensive development of landscape gardening students' ideological quality is realized through double classroom teaching and double tutor teaching methods.

## KEYWORDS

Civic Information Technology; Landscape Architecture; OBE Concept; Education Model; Dual Tutor; Dual Classroom

## 1. INTRODUCTION

Establishing moral education is the fundamental task of education, and all types of classroom teaching in colleges and universities have different functions of educating people. General Secretary Xi Jinping pointed out in the National Conference on Ideological and Political Work in Colleges and Universities that "classroom teaching should be used as the main channel, and ideological and political theory courses should adhere to strengthening in improvement, enhancing the affinity and relevance of ideological and political education, and meeting the needs and expectations of students' growth and development." In many colleges and universities today, ideological education and professional knowledge have not been well penetrated, and ideological education courses are often taught as independent courses, and classroom teaching is one of the main breakthroughs of ideological education [1-2]. Nowadays, colleges and

universities should highlight the value of "curriculum ideology" from daily classroom education, and explore new ways to break through the problems of combining ideology and politics with professional courses, which is of great significance to the comprehensive training of college students [3-4].

As one of the backbone disciplines of the Habitat and Environment discipline cluster, landscape architecture is inextricably linked to important national construction areas such as rural revitalization, territorial spatial planning, national parks, and urban renewal [5-6]. With global resources, environment, and ecology becoming primary issues, practitioners of landscape architecture play an important role in the protection and development of habitat environment. Therefore, institutions of higher education should further improve the professionalism, skills, and moral cultivation of landscape architecture students and cultivate landscape architecture talents and practitioners with the spirit of craftsmanship [7-8].

In order to explore the construction of the ideological informatization education mode for undergraduates in landscape gardening vocational education, this paper firstly explains the connotation of ideological informatization and landscape gardening vocational education undergraduate. Then it points out the problems of integrating ideological education for undergraduate students in landscape gardening vocational education, that is, the teaching methods, ideological understanding and the relatively backward teacher team. Finally, under the guidance of OBE theory, an effective path for the innovative education model of landscape architecture is proposed, namely, promoting the synergization of the teaching team, strengthening the practicalization of teaching contents and promoting the diversification of teaching methods. Through dual classroom teaching and dual tutor teaching methods to promote the overall improvement of the ideological quality of undergraduate students in landscape architecture vocational education, it also provides a new research direction for landscape architecture talent training.

## **2. THINKING INFORMATION TECHNOLOGY AND LANDSCAPE ARCHITECTURE VOCATIONAL EDUCATION UNDERGRADUATE**

### **2.1 CIVIC INFORMATION BASED ON SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM**

A nonlinear planning problem is a planning problem in which the objective function or constraints contain nonlinear functions. Generally speaking, solving nonlinear planning is much more difficult than solving linear planning problems. Moreover, unlike linear programming, which has a general method called the simplex method, there is no general algorithm for nonlinear programming that is suitable for all kinds of problems, and each method has its own specific scope of application. When the objective function

and constraints have good analytical properties, people like to use the indirect method to analyze and solve the constrained optimization problem. Thinking information technology through the sequence of quadratic programming algorithm for data statistics, statistical analysis results to landscape gardening vocational undergraduate students to improve the quality of thought, and then to achieve the full range of landscape gardening practitioners' quality development.

## **2.2 BACHELOR OF LANDSCAPE ARCHITECTURE VOCATIONAL EDUCATION**

Landscape Architecture is an engineering major with a high degree of integration of humanities, arts and natural sciences, and a strong application type. It is an important carrier of human civilization, with the fundamental mission of harmonizing the relationship between human beings and nature, and the fundamental task of creating an ideal living environment for human beings in harmony with heaven. There are still two skins in the ideological education and professional education of landscape architecture, and professional teachers have vague or wrong perceptions of the curriculum, and the professional curriculum emphasizes the mastery and application of engineering knowledge and technology, pursuing "fine in work" but neglecting "craftsmanship in the heart and quality in action. ". Teachers are not cohesive enough and lack the awareness of using the mainstream socialist ideology to guide students to form correct values. In the landscape architecture program, teachers can tap the ideological elements from the professional teaching to cultivate students' knowledge and skills, values and sense of mission, and guide students to establish correct outlook on life and values, so as to cultivate qualified successors for socialist construction.

## **3. THE PROBLEM OF INTEGRATING IDEOLOGICAL EDUCATION IN UNDERGRADUATE LANDSCAPE ARCHITECTURE EDUCATION**

### **3.1 LACK OF INNOVATION IN TEACHING METHODS**

The traditional teaching method is the teacher's theoretical knowledge transfer method and course design guidance method in the classroom, students are more "listening" to the teacher, their own sense of participation is not strong. The abstract professional knowledge is obscure and difficult to understand, and it is not easy to arouse students' desire to know, and it is difficult to mobilize their learning enthusiasm.

And in the context of today's rapidly developing Internet, information is disseminated more rapidly and people have wider sources of access to data and information, so online teaching is gradually gaining public attention and popularity. How to attract students to learn knowledge efficiently within their own classrooms and at the same time be able to enhance students' cultural self-confidence is a question that teachers in contemporary colleges and universities should think deeply about. Faced with the impact of diversified cultural trends, teachers should understand that traditional

teaching methods can no longer meet the needs of curriculum ideas and teaching practices in the context of the new era, while landscape architecture majors are committed to cultivating innovative and applied professionals, and need more diversified and innovative teaching methods.

### **3.2 STUDENTS HAVE A SHALLOW UNDERSTANDING OF IDEOLOGICAL EDUCATION**

The traditional ideological education is carried out in the ideological and political science class, the content of the lectures are mostly political theory, rarely have the ideological content of Chinese garden culture, so the ideological education lecture effect is also unsatisfactory, and outside the classroom there are few garden culture ideological education-related content, the students' attention to this is minimal. Based on this, it is not easy to enhance the autonomy of students' ideological learning inside and outside the classroom, and students' limited access to garden ideological education and insufficient internal motivation for their own learning lead to a lack of in-depth understanding of the excellent Chinese traditional culture. The understanding of the excellent Chinese classical garden culture is even more superficial, so that the understanding of garden culture-related ideological education is shallow.

### **3.3 BACKWARD FACULTY DEVELOPMENT**

In the practice of educating culturally confident ideas in landscape garden planning and design courses, the teachers' own cultural literacy inevitably affects their teaching level and teaching effectiveness. The process of incorporating ideas in today's curriculum still has many problems in this regard, which also leads to the failure to effectively improve the quality of the curriculum.

On the one hand, teachers' salary levels are not reasonably raised, thus failing to motivate teachers. On the other hand, the quality of the curriculum thought teachers group is mixed, there is a big ability gap between different teachers, and there are fewer teachers with strong integrative skills. The performance of teachers' own cultural literacy infects students at all times, while the neglect of students' moral quality and cultural literacy cultivation leads to the failure to achieve the teaching goal of all-round cultural education.

## **4. THE EFFECTIVE PATH OF LANDSCAPE GARDENING INNOVATIVE EDUCATION MODEL**

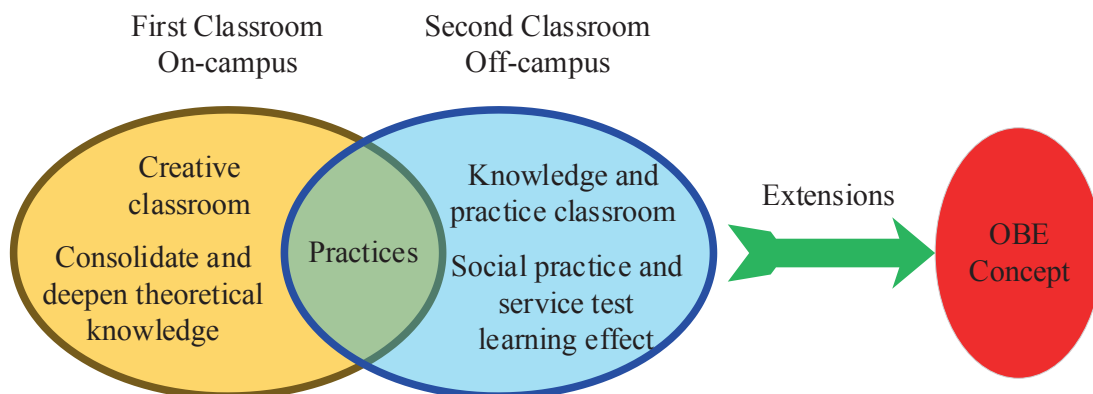
### **4.1 FACULTY SYNERGIZATION**

Build a team of teachers with collaborative education and industry. The teaching team of this course is composed of on-campus instructors with many years of teaching experience and engineering background, off-campus enterprise instructors and alumni,

thus ensuring that the instructors have both solid professional theoretical knowledge and practical experience that closely follows the development needs of the industry. In the course of teaching, the instructors are able to educate students from industry needs, combine their own experiences and social hot issues, and help students understand the current situation and trends of the development of China's modern landscape architecture industry

#### 4.2 REALISTIC TEACHING CONTENT

Through the introduction of actual enterprise projects, we carry out practical content teaching, and emphasize "industry-oriented" and "product+service oriented" in content design to meet the "design and construction integration" requirements. The content design emphasizes "industry-oriented" and "product+service oriented" to meet the requirements of industry development and service satisfaction of project products. From the OBE education concept, the teaching content is designed in the reverse direction, and the traditional mode of "teaching-learning" is shifted to the independent learning mode of "learning-teaching" as shown in Figure 1, so as to cultivate students' innovation and entrepreneurial ability and social service ability. The course is designed to develop students' innovative and entrepreneurial skills and social service abilities. The ideological elements of the course are explored and the spirit of craftsmanship is internalized in the course projects.



**Figure 1** Instructional design for dual classroom linkage

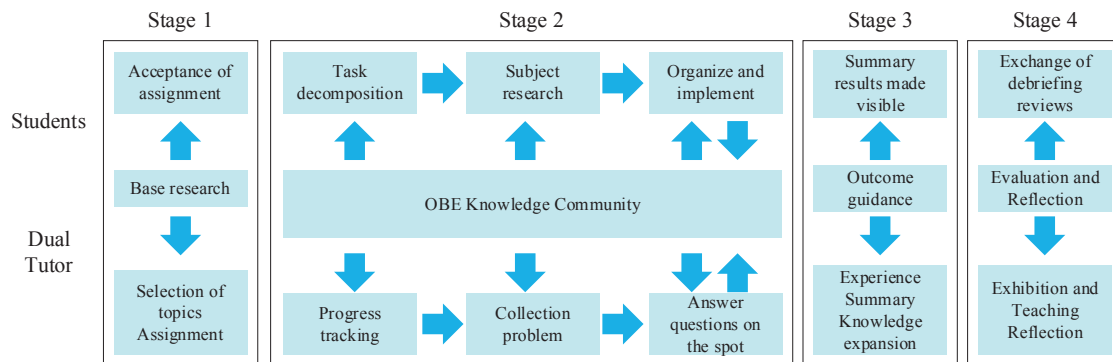
The course is organized into two classes, "Creative Classroom" and "Knowing and Doing Classroom", which are combined with summer social practice and full participation of instructors to enhance students' awareness and ability to serve the society through "collaborative, base and on-site" teaching methods.

#### 4.3 Diversification of teaching methods

As shown in Figure 2, the course is student-oriented, teacher-led, and teacher-student participation, forming a new teaching method of "OBE teacher-student knowledge community" to help the implementation of "craftsmanship". Project-driven



teaching is used to guide students to learn independently online and offline, to mobilize students' enthusiasm and cultivate their ability of independent learning, division of labor and social service by conducting base site research, designing project plan, implementing project construction process and summarizing practice independently.



**Figure 2** Dual Tutor Teaching Programme

Through group research, group discussion, group construction, group practice at the base to train students' communication and teamwork skills, through the whole process of participation, systematic training, the formation of a community of knowledge between teachers and students. Students will establish the concept of "knowledge in action", promote the professionalism of craftsmanship and cultivate lifelong learning habits.

## 5. CONCLUSION

On the whole, it is necessary to accelerate the integration of ideological education into all teaching aspects of landscape architecture courses, as landscape architecture students are mostly engaged in environment-related work after they enter society, and their physical and mental cultivation is of vital significance to the future development of ecological and environmental construction in China. Therefore, it is important to grasp the ratio between professional courses and ideological education in the teaching content, and to teach both of them in concert to provide correct ideological and political guidance to landscape architecture students. In this paper, under the guidance of OBE theory, the integration of professional and ideological education in landscape architecture is developed through dual classroom teaching and dual tutor teaching programs as a way to provide a new direction for university undergraduate students in landscape architecture vocational education and thus cultivate well-rounded talents.

## FUNDING

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### ABSTRACT

Exploring the construction of human resource management system based on deep learning model is to provide research direction for intelligent human resource management. Starting from HRM, this paper analyzes the logic of the impact of artificial intelligence technology under deep learning model on HRM practice. The development direction of HRM evolves through HRM intelligence as a way to provide new directions for building an efficient, scientific and rational HRM system. The strategic performance management system, HRM mechanism and networked HRM technology are used to provide theoretical support for the future intelligent HRM system.

### KEYWORDS

deep learning models; human resource management; artificial intelligence techniques; HRM intelligent evolution; strategic performance management; networking

### 1. INTRODUCTION

With the deep development of various industries, it is crucial for enterprises to enhance their core competitiveness in the market, which is directly related to human resource management, and the traditional single, lagging management concept and management mode are difficult to meet the objective requirements of modern enterprise development [1-2]. Modern enterprises should pay close attention to changes in market demand, analyze the actual situation of their own human resource management, improve all aspects of human resource management on the basis of exploration, deeply link their own development and job staff development in the process of transformation and upgrading, enhance internal staff cohesion, centripetal force and comprehensive quality, and simultaneously improve human resource management as well as comprehensive operational efficiency [3-4].

The evolution of HRM is also closely related to the technological revolution, and the current artificial intelligence under deep learning models representing the latest technological power has entered the workplace, and the question of how these technologies will affect HRM practices and whether they will bring about changes in HRM models has received increasing attention from academia [5-6]. The development

of deep learning models also provides a new opportunity for change in HRM, in the face of the fact that job matching has become a pain point in HR recruitment management and the traditional manual management methods are subjective, unscientific in judging, and heavy in workload [7-8]. The use of deep learning models can realize scientific analysis of massive data and objective judgment of candidates, thus providing a more effective way to deal with human resource management.

Starting from the definition and functions of HRM, this paper analyzes the logic of the impact of AI technologies on HRM practices under the deep learning model, which includes symbolism, connectionism, and behaviorism technologies. Then the HRM intelligent evolution of HRM model by AI technology is analyzed, and the evolution direction in four different contexts is given. Finally, the direction of HRM system construction in the era of AI is given, and the strategic performance management system, HRM mechanism and networked HRM technology should be used as the focus point to achieve the innovative development of HRM system of enterprises.

## **2. HUMAN RESOURCE MANAGEMENT**

Human resources are the most valuable and important resources in all enterprises, and the primary driving force for economic development. Proper human resource management can maximize the potential of workers, achieve knowledge innovation, continuously optimize the knowledge structure of enterprise employees, enhance working ability, create a good working environment and promote the development of value-added enterprise resources.

### **2.1 HUMAN RESOURCE MANAGEMENT DEFINITION**

Human resources is the general term for the education, ability, skills, experience, and physical strength possessed by people in an organization that can be used by the company and contribute to the value of its role in a certain period of time. The essence of human resources is the sum of mental and physical strength that people have, which can be collectively referred to as labor power. Human resource management is the use of scientific methods and systematic management, combined with capital, equipment, markets and other elements, the full use of human physical and mental power, to create economic benefits for the organization. At the same time, the process of improving the subjective ability of people, stimulating their potential and creating greater wealth.

### **2.2 FUNCTIONS OF HUMAN RESOURCE MANAGEMENT**

The functions of human resource management are usually divided into six modules, but summarized in four words "selection, training, employment, retention", combined with the internal and external operating environment of the enterprise, to form a series of systems and implementation methods, and implementation, so as to build a systematic human resource management system.

## **3. THE LOGIC OF DEEP LEARNING MODELS TO INFLUENCE HRM PRACTICES**

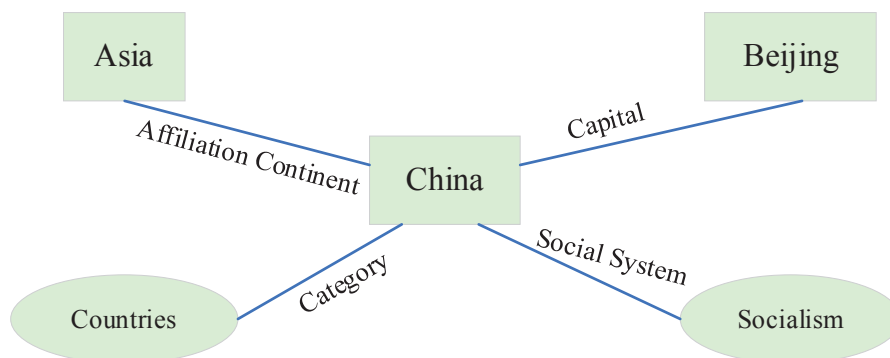
Whether artificial intelligence is an intelligent enhancement or an intelligent replacement for human HR depends on the specific application of different genres of technology in HRM. And what will be the impact of intelligent enhancement and

intelligent replacement on HRM respectively, again, has to be analyzed in the specific HRM practice.

### 3.1 THE LOGIC OF INFLUENCE OF SYMBOLIST TECHNOLOGY

During the heyday of symbolism, relevant technologies did not penetrate the field of human resource management. It was not until the 1990s that industrial engineers and scholars in management science gradually began to experiment with the development of HRM tools such as recruitment and training based on expert system technologies. But nowadays, the symbolism technology that is more frequently used in HRM is knowledge mapping, which is a new approach to knowledge acquisition in the information explosion Internet era.

Deep learning techniques are sometimes used in the process of building knowledge graphs, but in general, knowledge graphs emphasize logical relationships between things and are a symbolic logic system. A typical simple knowledge graph is shown in Figure 1, which consists of nodes and edges, where squares and ellipses are nodes, which represent things and abstract concepts, respectively, and solid lines represent relationships between things and dashed lines represent properties of things.



**Figure 1** A simple example of knowledge mapping

### 3.2 THE IMPACT LOGIC OF CONNECTIONIST TECHNOLOGY

The question and answer system, when combined with connectionist technology, can result in a more intelligent chatbot, thus taking the role of the AI "HR assistant" one step further and becoming the "HR senior assistant". This is made possible by two types of technologies: natural language processing, speech recognition, speech synthesis and image recognition based on deep learning, which allow bots to communicate with applicants as comfortably as real people. The second is machine learning algorithms such as deep learning, which allow recruitment bots to make initial predictions and judgments about applicants for HR's reference.

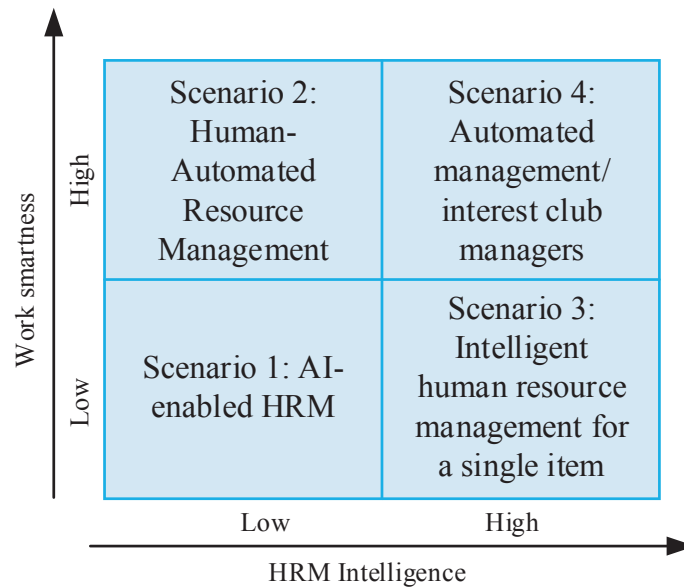
### 3.3 THE IMPACT LOGIC OF BEHAVIORIST TECHNOLOGY

Behaviorism focuses on the imitation of human "behavioral intelligence", and the technical results are mainly expressed in robots. There are three generations of robots. The first generation of robots is controlled by a set program and does not have intelligence. The second generation of robots can obtain information about the operating environment and the operating object, and adjust their behavior accordingly,

and have some intelligence. The third generation robot is still in the experimental stage of research and development, and it has a high degree of self-adaptability and can make complex reasoning, judgments and decisions, and has a high degree of intelligence.

### 3.4 EVOLUTION OF HUMAN RESOURCE MANAGEMENT MODEL IN THE ERA OF ARTIFICIAL INTELLIGENCE

It is clear from the previous analysis that whether the human resource management model will change or not is closely related to the degree of intelligence of work. The work here refers not only to the work of the management subject, but also the work of the management object. Accordingly, based on the two dimensions of HRM intelligence and work intelligence, combined with the emphasis on organizational contextual factors from the constructivist perspective in the study of technology and organization, we initially constructed an analytical framework for the evolution of HRM in the AI era, the specific structure of which is shown in Figure 2.



**Figure 2** An analytical framework for the evolution of HRM

The degree of intelligence in the framework refers to the extent to which the work is done by AI. When the degree of intelligence is low, AI is more like "intelligence augmentation", which only assists humans in their work. The different levels of HRM intelligence and work intelligence form four organizational contexts, and accordingly, HRM will evolve different models in each of these four contexts.

## 4. CONSTRUCTION OF HUMAN RESOURCE MANAGEMENT SYSTEM IN THE ERA OF ARTIFICIAL INTELLIGENCE

### 4.1 OPTIMIZE STRATEGIC PERFORMANCE MANAGEMENT SYSTEM

Modern enterprises should build a new strategic performance management framework system based on their own strategic planning objectives, strategic requirements, etc., combined with the current stage of operation and development of

each branch, and based on innovation and sustainable development, etc. Take job positions as the entry point and set up feasible performance evaluation index system. Modern enterprises should adhere to the principles of scientificity, feasibility, comparability, systematization and precise quantification in the process of contacting strategic performance management system, and scientifically set up the quality evaluation index system based on human resource management around job staff recruitment, welfare treatment, basic salary, performance salary, training, incentive and restraint.

#### **4.2 BUILDING A NEW HUMAN RESOURCE MANAGEMENT MECHANISM**

Improve the mechanism of attracting, recruiting and retaining talents. Modern enterprises should be guided by the new human resource management system built in the process of contacting the actual, improve the mechanism of attracting, recruiting and retaining talents formulated. Adopt the method of mainly cultivating, introducing and cultivating at the same time, and optimize the introduction of talents based on the change of job requirements. While broadening the introduction channels, we also use various feasible strategies to attract all kinds of high-end talents from the perspectives of operation development, job salary, welfare, development space, etc.

Modern enterprises should also reasonably set up the mechanism of talent incentive constraints and talent training, seamlessly connect individual interests, collective interests and strategic goals of each stage, and make short-term, medium-term and long-term incentives coordinated, including material incentives, spiritual incentives and emotional incentives.

#### **4.3 IMPROVING NETWORKED HUMAN RESOURCE MANAGEMENT TECHNIQUES**

Focus on the application of information network technology in human resource management, realize the office automation of human resource management work, create a good working atmosphere for employees, and ensure that employees have a good sense of belonging in the enterprise. Focus on the application of digital human resource management mode, play an important role of networked human resource management.

### **5. CONCLUSION**

Exploring the construction of HRM system based on deep learning model, this paper starts from HRM and analyzes the logic of the impact of artificial intelligence technology under deep learning model on HRM practice. The effective evolution of AI HRM model is used to provide the direction for the construction of HRM system, to take strategic performance management system, HRM mechanism and networked HRM technology as the main driving force, and then build an efficient, rational and, scientific HRM system.

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# THE APPLICATION OF COMPUTER TECHNOLOGY IN CYBER SECURITY EDUCATION IN THE CONTEXT OF DATA MINING

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## ABSTRACT

With the popularity of Internet technology, the importance of network security education is increasing. This paper first analyzes the characteristics of virtual machine technology, and explores the problems in the current network security education in colleges and universities from two aspects of network security awareness and network security education methods. In response to these problems, virtual machine technology is applied to network security education. The current network security education in colleges and universities is still carried out mainly by special lectures, accounting for 66.6%. At the same time, college students' network security awareness is very high only accounts for 16.5%. This paper lays the foundation for a more effective application of virtual technology in teaching computer network security courses.

## KEYWORDS

security education; virtual machine technology; network security awareness; security education methods

## 1. INTRODUCTION

In the era of information technology, people's activities such as clothing, food, housing, transportation, and entertainment and learning are closely related to network information services. And there are various objective risk factors in the network, such as computer viruses, cyber crimes, etc., which may bring potential threats and harm to the people [1-2]. Therefore, it is especially important to carry out network safety education. In their daily learning life, adolescents widely use computers and cell phones; however, due to their poor self-control and risk awareness, they easily lose themselves on the Internet and become victims of cybersecurity [3-5]. Strengthening the application of computer technology in network safety education has positive significance for maintaining social security and stability and protecting the healthy growth of adolescents.

The current cybersecurity education has formed a complete social synergy. The study of literature [6] summarized the connotation and significance of cybersecurity

education, identified the problems of cybersecurity education in colleges and universities, and put forward relevant suggestions. The literature [7] focused on the application of MOOC hybrid teaching mode in the practice of cybersecurity education for college students. The literature [8] objectively analyzed the problems in cybersecurity education in colleges and universities by means of a questionnaire survey. The literature [9] constructs a four-in-one innovation mechanism of university cybersecurity education in the era of mobile Internet from four dimensions: systematic education system, diversified education mechanism, professional education capability, and comprehensive education platform. According to the above research, this paper proposes to explore the application of computer technology in network security education in the context of data mining, and proposes the application method of virtual machine technology in it based on the analysis of the current problems of network security education in colleges and universities.

## **2. VIRTUAL MACHINE TECHNOLOGY**

### **2.1 VIRTUAL MACHINES IN THE CONTEXT OF DATA MINING**

Virtual machine technology actually refers to a virtual computer, a virtual product. Virtual computers have similarities to physical computers in terms of operation and practice. However, these virtual machines are able to operate independently of each other without interference between computers and also have the ability to constantly change computer configuration elements. In the context of data mining, there is no need to worry about the negative impact of improper operation on the physical computer, so it is necessary to promote virtual machines in the teaching of network security technology in universities.

### **2.2 FEATURES OF VIRTUAL MACHINE TECHNOLOGY**

#### **2.2.1 COMPATIBILITY FEATURES**

The structure of virtual machines is unique. Generally speaking, a virtual machine has a self-contained client operating system, and this system also has a more complete set of applications. The virtual machine also has various internal structures of a normal computer, such as the network card and the graphics card, which are very similar to a computer. On the one hand, this shows that virtual machines are different from ordinary computers to a certain extent, but they still have similar roles to ordinary computers. On the other hand, the difference between a virtual machine and an ordinary computer is that each system of a virtual machine is independent and cannot be viewed as a whole in the same way as a computer system. Therefore, it can be said that virtual machines are more compatible than ordinary computers.

#### **2.2.2 ISOLATION CHARACTERISTICS**

Virtual machines have many characteristics, and one of the most prominent is isolation. Virtual machines are used to share computer screens and systems. At the same time, virtual machines allow people to easily create a sandbox-like structure that helps staff to have a clear and comprehensive view of the physical computer and prevent viruses from invading the computer during the sharing process and affecting

the normal use of the computer. The independence of virtual machines is another outstanding feature. When people use virtual machines, it is easy to see that the virtual machine system is able to display the combination of its own hardware and operating system in a clear and independent way.

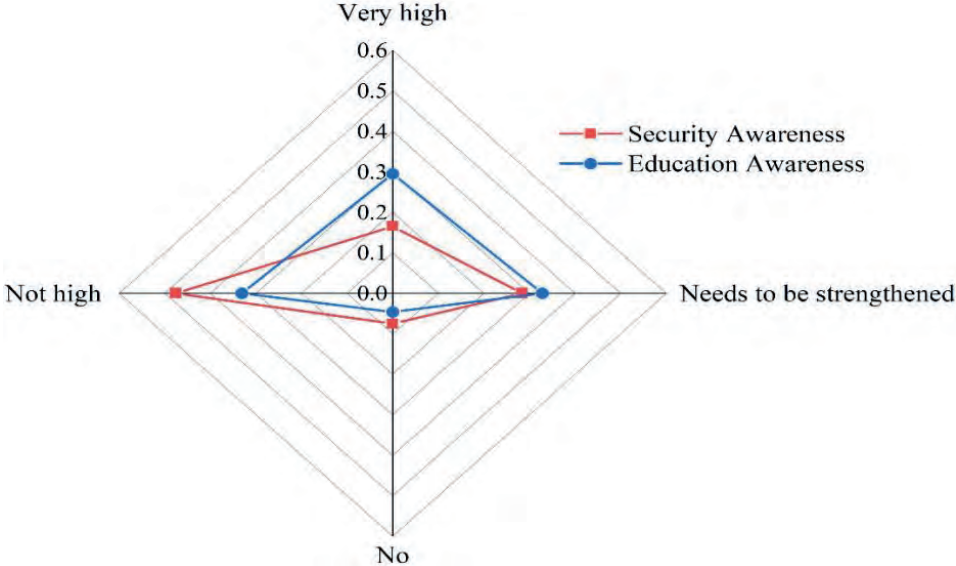
**2.2.3 SELF-INDEPENDENCE**

Another feature of virtual machines that needs attention is their independence. In studying virtual machines, one needs to pay attention to their independence and not treat them as a whole. If we look at the user level, each user of a virtual machine is able to independently configure the hardware and components of the virtual machine to achieve different needs and results.

**3. Analysis of the current situation of cyber security education**

**3.1 Analysis of the current situation of network security awareness**

The current situation of college students' network security awareness is shown in Figure 1. 16.5% of college students' network security awareness is very high. 28.4% of college students' network security awareness is okay and needs to be continued to be strengthened. 47.6% of college students' network security awareness is not high. 7.5% of college students have almost no network security awareness. Colleges and universities do not know enough about the importance of network security education, and always make relevant remedial work only after a series of network security problems happened to college students. Even if there are some related lectures and propaganda, they are only formal and do not really think about the actual problems for students. The reason is that they do not realize the great harm of network to college students, to campus harmony, to social stability and to national security, and do not deeply appreciate the pain that these hazards bring to colleges and universities.



**Figure 1** The current situation of college students' awareness of cyber security

### 3.2 ANALYSIS OF INTERNET SECURITY EDUCATION METHODS

The distribution of network security education methods in colleges and universities is shown in Figure 2. At present, colleges and universities still carry out network security education mainly by special lectures, accounting for 66.6%. It is followed by publicity through exhibition boards or windows, accounting for 9.2%. The way of classroom teaching is 15.4%, generally mostly for computer school students in professional classes involving some knowledge of network security, the teacher will teach with the class. Student unions, college student groups and other organizations of publicity activities club activities accounted for 8.8%. Although the current situation of network security education has improved, but there is still in the emphasis on "security management" light "security education" as the dominant ideology.

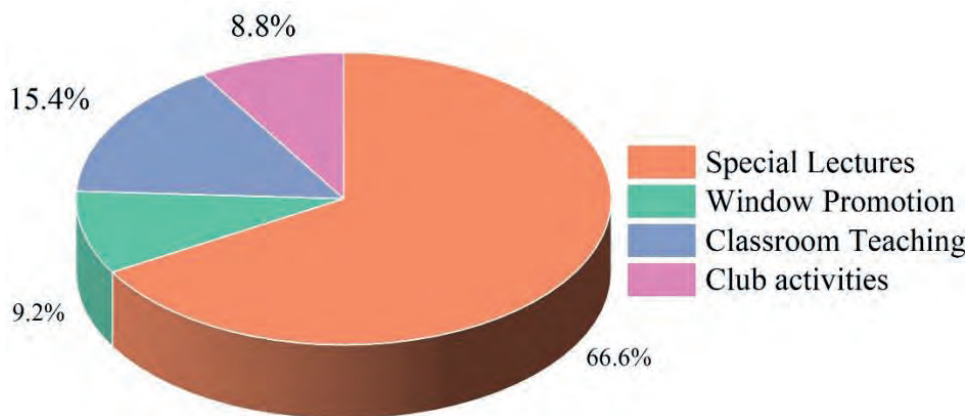


Figure 2 Network security education approach

## 4. APPLICATION OF VIRTUAL MACHINE TECHNOLOGY IN NETWORK SECURITY EDUCATION

### 4.1 CONDUCTING HANDS-ON TEACHING

In the current higher-level computer network security teaching, most teachers mainly explain theoretical knowledge, and students lack the proper practical ability. The use of virtual machine technology can build a training platform, allowing students to have a deeper understanding of knowledge in the teaching process. Teachers can classify the course teaching content in the teaching process, and start teaching from two aspects of attack methods and attack objects to strengthen students' understanding of network security knowledge.

### 4.2 CARRY OUT VARIOUS FORMS OF TEACHING

The method of teacher demonstration and student learning is no longer suitable for modern college computer teaching. Teachers can explore a new teaching mode. In the whole teaching process of computer network security, relevant competitions can be held to improve students' knowledge; exercise students' operation ability, effectively improve students' understanding of computer knowledge through the comparison of attack and defense between students, and also can stimulate students' interest in learning to a certain extent, so as to learn computer network security knowledge more efficiently.

## 5. CONCLUSION

Through the analysis of the current situation of network security education in colleges and universities, this paper proposes the application of virtual machine technology to network security education for the problems existing in it. As the core curriculum of higher education institutions, computer network security course realizes comprehensive, practical and application as one. In today's progress of education, it is necessary for us to continuously innovate teaching forms, adjust education methods and education concepts, and promote the progress and development of society. Under the command of virtual machine technology, we can alleviate the problem of insufficient space and experimental equipment, and improve the rationality and safety of experimental equipment in all aspects. Use the process to reduce the difficulty of laboratory management, bring students more interesting and rich practical training content, and improve the fun of practical training while controlling expenses.

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**ANALYSIS OF DATA FROM A SURVEY ON POLITICAL AND BUSINESS  
TALENT DEVELOPMENT POLICIES IN THE CONTEXT OF DATA COLLECTION**

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**ABSTRACT**

In order to explore the implementation of political and business talent development, this paper designs a data survey and analysis model of political and business talent development policy in the context of data collection. The data collection is fully utilized to monitor and evaluate the effects of the policy. Multi-dimensional evaluation indicators are used to investigate the relationship between the dependent and independent variables, and the degree of influence of each factor on political and business talent is investigated through regression analysis. The results showed that the implementation of political and business talent development policies including research participation, thesis performance and gender optimization were all positively related to the performance of talent cultivation. It is clear that the survey has a positive impact on the development of data collection and innovation in the area of talent development policy, and is an important guide for governments, universities and enterprises.

## KEYWORDS

political and business talent development policy; performance of talent cultivation; data collection; survey; multidimensional evaluation; regression analysis

## 1. INTRODUCTION

With the rapid development of Internet technology and the advent of the era of big data, data collection has become an important topic in the information age <sup>[1-2]</sup>. The cultivation of political and business talents, as the key to the current social and economic development, is attracting more and more attention. Both governments and enterprises are actively exploring how to cultivate more political and business talents to promote sustainable economic development <sup>[3-5]</sup>.

Big data, also known as huge data collections, is a term used in the computer industry to refer to large collections of data that cannot be processed with conventional tools and must be processed in a way that requires a new information-based processing model to unlock the value of the massive growth in data. The literature <sup>[6]</sup> selected 35 OECD economies for the study to address the issue of equality with their World Talent Survey data. Data from three different directories were transformed with the Gini index to achieve a pattern of distribution across economies. Cluster analysis was performed to determine the interpretation of the best clusters, the Gini index could be used to appropriately transform data with classical indicators of equality, and a tree diagram showing the two clusters between the economies provided meaningful information for further interpretation of the dataset. The aim of the literature <sup>[7]</sup> is to provide a useful exercise in the use of virtual reality technology in student education and the main points of teaching at this stage, thus opening up ideas for further research. The current state of research and some important concepts of virtual reality technology are introduced to clarify the importance and some drawbacks of education in the traditional education model. Through the collected literature and survey data, the feasibility of combining virtual reality technology with education is analyzed and a theoretical basis is provided.

Based on this, this paper designs a data survey and analysis model for political and business talent training policies in the context of data collection. Firstly, the technical means of data collection and analysis are fully utilized to support and analyze the data. Secondly, the policy effects are monitored and evaluated, using multi-dimensional evaluation indicators, with the number or growth rate of political and business talents as the dependent variable. Finally, the experiment proves that research can provide data and methodological support for theoretical as well as practical research on the policy of cultivating political and business talents.

## **2. DATA COLLECTION BACKGROUND APPLICATIONS**

### **2.1 INTEGRATING AND OPTIMISING DATA**

The cultivation of political and business talents refers to the cultivation of talents with both political and business acumen, aiming to promote the coordinated development of politics and economy. In the current era of big data, the cultivation of political and business talents also needs to make full use of the technical means of data collection and analysis to better meet the needs of society and the economy <sup>[8-9]</sup>. Policy formulation and implementation of political and business talent cultivation needs to be based on adequate data support and analysis, including monitoring and evaluation of policy effects. Government departments can use questionnaires, interviews and case studies to gain an in-depth understanding of the needs of political and business talent and the implementation of policies, as a basis for formulating more scientific and practical policy solutions.

### **2.2 POLITICAL AND BUSINESS TALENT DEVELOPMENT**

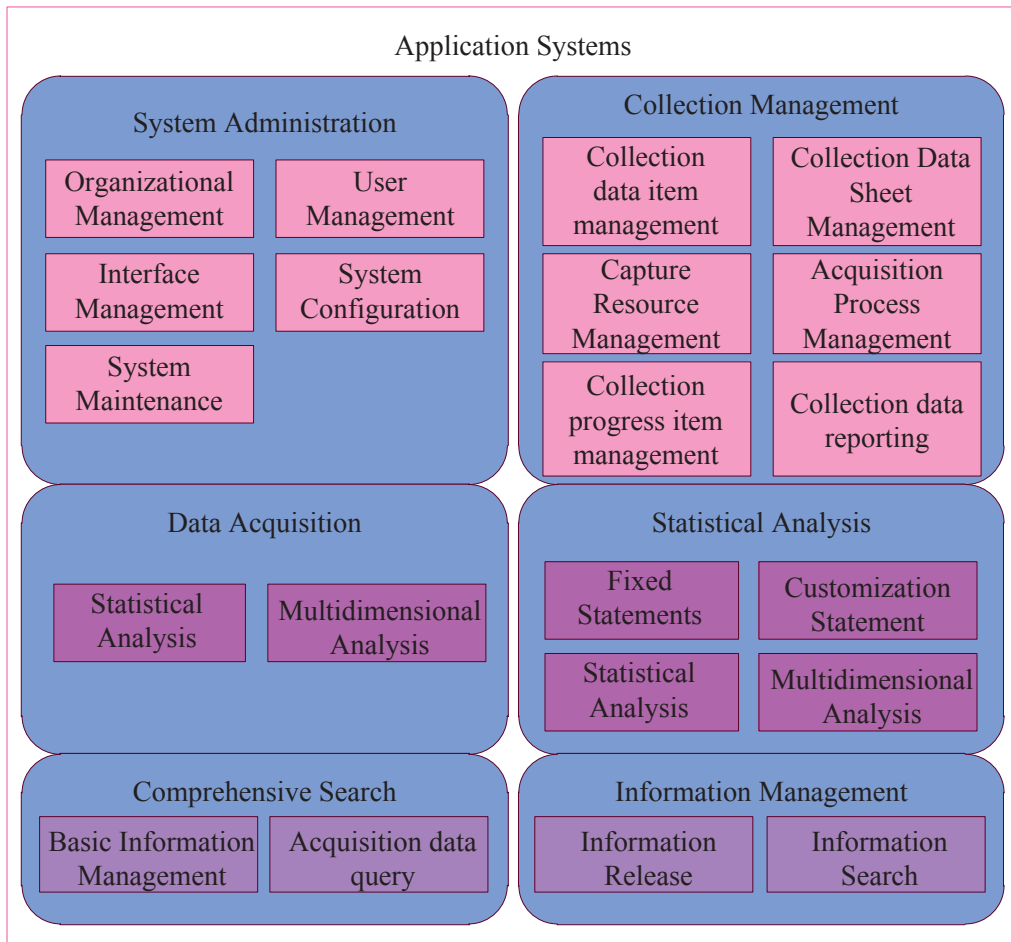
The evaluation and selection of political and business talents also needs to fully consider the methods of data collection and analysis, and adopt multi-dimensional evaluation indicators and models, including comprehensive quality evaluation, behavioral interviews and psychological tests, in order to improve the accuracy and fairness of the evaluation <sup>[10]</sup>. It is also necessary to establish and improve talent pools and talent information platforms to facilitate resource sharing and information exchange among political and business talents. The training and development of political and business talents also needs to make full use of technological means of data collection and analysis, including big data analysis, artificial intelligence and virtual reality, in order to improve the accuracy and personalization of training effects and personal development. There is also a need to establish and improve the incubation mechanism and ecological environment for innovation and entrepreneurship in order to stimulate the innovative spirit and entrepreneurial passion of political and business talents.

### **2.3 BUILDING A MODEL FOR TRAINING POLITICAL AND BUSINESS TALENT**

Regression modelling is a statistical method used to analyze the relationship between variables and is usually used to examine the relationship between the dependent and independent variables. In constructing models, regression models can be used to explore the effects of policy factors and other influences on political and business talent, as well as to predict the effects and trends of policy implementation. In the survey data on political and business talent cultivation policies, policy factors, talent factors and other influencing factors can be used as independent variables, and the number or growth rate of political and business talent can be used as the dependent



variable to explore the degree of influence of each factor on political and business talent through regression analysis. The analysis model of the survey data on the cultivation policy of political and business talents is shown in Figure 1.



**Figure 1** Political and business talent training model

As can be seen from Figure 1, the data collection in the political and business talent training model includes two parts: data collection and data audit. The management of data collection of political and business includes the management of collected data items, the management of collected data tables, the management of collected resources, the management of collection process, the management of collection progress and the management of collected data reporting. Statistical analysis of the collected data can be carried out, mainly including four parts: fixed reports, custom reports, statistical analysis and multi-dimensional analysis of advanced statistics. The collection processing engine is the business processing layer of various functions, and is the core and brain of the collection platform, including the collection engine, process management engine, report engine, interface engine and system security engine. The database is the storage layer of system data, storing system data, collected state data and statistical analysis data respectively.

### 3. TALENT DEVELOPMENT POLICY REGRESSION DATA ANALYSIS STUDY

In this paper, a regression analysis model of political and business talent cultivation policy was designed in the context of data collection, and 220 undergraduate and master students in a university were randomly selected as the research subjects for regression data analysis. The independent variable is political and business talent cultivation policy, which includes three dimensions, X1 is "research participation", X2 is "thesis performance", X3 is "gender optimization", and the dependent variable Y is the performance of talent cultivation, where Model 1, Model 2 and Model 3 are the early, middle and late effects (one semester apart for each stage) of the policy implementation respectively. The academic research of the paper is evaluated by the production quantity of the paper, and the thesis performance are quantified by the evaluation results of the school. The comprehensive quality evaluation score of talents is used as the target. By inviting experts to score (1 ~ 100), the results of the training effect are quantified. Descriptive statistical analysis of the independent and dependent variables is shown in Table 1.

**Table 1** Descriptive statistical analysis of talent training

Variables	Y		
	Model 1	Model 2	Model 3
C	-18.622** (-2.449)	-7.828*** (-3.695)	-4.989*** (-4.800)
X1	0.146** (2.446)	0.093*** (4.886)	0.028** (2.458)
X2	0.202 (1.260)	0.040 (0.869)	0.065*** (3.983)
X3	0.482*** (3.980)	0.067 (1.157)	0.009 (0.414)
N	220	220	220

The R<sup>2</sup> values and F-test values in Table 1 show that the model passed the test. Comparing the corresponding terms among the tested sample models, the regression coefficient of "research participation" was 2.458, while the coefficient of "thesis performance" was 3.983 and the coefficient of "gender optimization" was 0.414. The empirical results show that the improvement of thesis performance, the optimization of a more balanced gender ratio of political and business talents, and the improvement of research participation of students with academic research careers can effectively increase the development performance of political and business talent cultivation; from the perspective of personal initiative, such graduate students are demanding themselves strictly, and their degree course grades and thesis scores are both high. The model can understand the situation and effect of policy implementation, provide

the basis for government, universities and enterprises, etc. to optimize the policy and further improve the effectiveness of the policy.

#### **4. CONCLUSION**

In this paper, a data analysis model was designed in the context of data collection for the cultivation of political and business talents, and the experimental results were analyzed to verify the model. The results show that research participation, thesis performance and gender optimization policy are all contributes to the improvement of talent cultivation performance. The results indicate that by studying the role of government and business talent training policies in promoting data collection and innovation development, we can provide more ideas and solutions for governments, universities and enterprises to further promote data collection and innovation development.

#### **FUNDING**

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# A STUDY ON THE HISTORY OF HEALTH CULTURE IN SHAANXI DURING THE TANG DYNASTY BASED ON THE CONTEXT OF DATA COLLECTION INFORMATION

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## ABSTRACT

This paper designs a model for researching the history of health culture in Shaanxi during the Tang Dynasty in the context of data collection information. The information is analysed and mined through web crawler data collection. The Tang dynasty Shaanxi query terms were selected as topics, the initial resource system was located, and topic relevance predictions were made so as to improve the accuracy and timeliness of the information. The results show that the selection confidence level  $\alpha=0.05$  in Tang Dynasty Shaanxi health culture, the effective rule of mutual influence degree is greater than 0.5, and the possibility of analytical output is 99.5%. It can be seen that the data and information collection helps to explore the history of health culture in Shaanxi during the Tang Dynasty in depth, and is of some significance in promoting the inheritance and development of China's traditional health culture.

## KEYWORDS

data collection; web crawlers; relevance prediction; selection confidence level; valid rules

## 1. INTRODUCTION

In recent years, with the development of information technology and data collection techniques, data analysis methods in historical and cultural research have been widely used [1-2]. The Tang Dynasty was an important period in China's history, and Shaanxi was one of the political, economic and cultural centres of the Tang Dynasty. In the

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Shaanxi region during the Tang Dynasty, people had unique characteristics in terms of lifestyle, dietary habits, medical knowledge and health concepts [3-4].

The development of the Internet has led directly to the rapid growth of information on the Internet, which is becoming a huge digital information resource. The Internet covers a wide variety of Tang Dynasty health culture histories and is a crucial first step for the collection and measurement of Tang Dynasty health information data, both from the perspective of information retrieval and scientometric analysis. The literature [5] establishes a foundation that allows for the understanding and acceptance of other cultures. Travel, which appears in traditional Chinese culture, also evolved with Chinese history, and was more developed in the Tang dynasty than in the past, as the openness that characterised the Tang dynasty transformed it into a systematic form. In addition, the nomadic character that emerged in Tang scholarly travel is an area that requires continued attention and research, as it has a different value from the nomadic peoples discussed in contemporary society. The literature[6] created a new cultural norm that did not exist in any other dynasties before or after it. Qujiang culture grew as a unique culture in the Tang dynasty, and it was able to see its own golden age. The Qujiang culture allowed literature and feasting to be combined and did not neglect any part of the culture. This culture with this characteristic developed and reached its golden age. In summary, the artistic culture of the Tang dynasty could not be raised to a level unmatched by any other dynasty.

Based on this, this paper uses data collection information technology to design a research model for the history of health culture in Shaanxi during the Tang Dynasty. Firstly, data collection was carried out by means of web crawler technology, which was generated using search engine development. Secondly, the query words of the history of health culture in Shaanxi of the Tang dynasty were taken as the theme, and the initial resource system was positioned for theme relevance prediction. Finally, it was demonstrated through experiments that the model can not only provide a reference for our understanding of the history and culture of Shaanxi region in the Tang Dynasty, but also provide useful insights for promoting the inheritance and development of traditional health culture in China.

## **2. DATA INFORMATION COLLECTION BACKGROUND**

### **2.1 TANG DYNASTY HEALTH CULTURE COLLECTION IN SHAANXI**

Data collection can be done through various technical means, such as web crawlers and sensors, to collect data and use various data processing techniques to analyse and mine the data to obtain valuable information and knowledge [7-8]. Data collection not only improves the accuracy and timeliness of information, but also provides support and basis for research in various fields. In historical research, data collection also plays an

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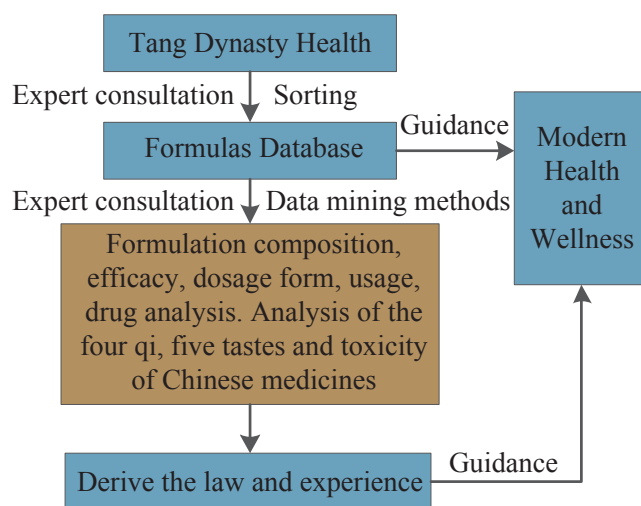
important role. Traditional historical research mainly relies on documents, historical materials and other information for analysis and inference, but such information is usually not comprehensive and accurate enough. With the development of modern technology, however, historians can obtain more comprehensive and accurate historical data through various technological means, such as digital processing and geographical information systems, so as to study historical events and phenomena in greater depth.

## **2.2 WEB CRAWLER DATA COLLECTION**

Web crawlers enable the automatic collection of information data from the Internet, thus making up for the shortcomings of manual collection. Web crawlers are a generic information gathering technology that emerged with the development of search engines and are a core part of search engines [9]. The thematic web crawler is an extension of the general-purpose web crawler, which conducts queries for relevant information based on specific themes within the field of health culture, searches the Internet to crawl downloadable web pages, and collects information data and hyperlinks related to the history of health culture in Shaanxi during the Tang Dynasty from the web pages. Using the Tang dynasty Shaanxi health culture history query term as the theme, all hyperlinks in the web page are accessed from the selected initial resource location system, subject relevance is predicted for these resource location systems according to some search strategy, data resources that meet the requirements are added to the queue to be accessed, and are extracted from the queue in order of priority as the next object to be accessed, and this pattern is executed until The queue is empty, or some stopping condition is met.

## **2.3 A MODEL FOR THE STUDY OF THE HISTORY OF HEALTH CULTURE IN SHAANXI DURING THE TANG DYNASTY**

The Tang Dynasty (618-907) was a very important period in Chinese history, and one of the most prosperous periods in Chinese history in terms of culture and art [10-11]. During this period, the health culture of the Shaanxi region also developed and progressed greatly. The Shaanxi region in the Tang Dynasty was very distinctive in terms of medicine. The medical theories of the Tang Dynasty were mainly based on the Yellow Emperor's Classic of Internal Medicine and the Book of Difficulties. Based on the medical theories of the Shaanxi region in the Tang dynasty, including the theoretical systems based on the Huangdi Neijing and the Nangjing, Figure 1 shows the model for the study of the history of health culture in Shaanxi during the Tang dynasty constructed in this paper.



**Figure 1** Model of Shaanxi Health Culture History in Tang Dynasty

As can be seen from Figure 1, the model of health culture history research in Shaanxi during the Tang Dynasty combines the theoretical approaches of basic Chinese medicine theory, prescription science and traditional Chinese medicine, and uses traditional Chinese medicine documentation methods to systematically sort, analyse and summarise them, on the basis of which a database of health culture history in Shaanxi during the Tang Dynasty is established. Using modern statistical methods and techniques, the history of health culture is classified and organised to further the systematic study of health culture in Shaanxi during the Tang Dynasty. Through the establishment of this model, the experience of the history of health culture in the Tang Dynasty is summarised, the historical significance of health culture in Shaanxi during the Tang Dynasty is evaluated, and reference and methodological enlightenment is provided for modern health culture.

### 3. ANALYSIS OF THE EFFECTS OF HEALTH CULTURE AND WELLNESS

In this paper, based on the background of data collection information, we designed a research model for the history of health culture in Shaanxi during the Tang Dynasty, and conducted correlation analysis on the selected four health and wellness drugs, and the experimental results are shown in Table 1.

**Table 1** The effect of health preservation in the Tang Dynasty

Prescription	Support	Confidence	Chi-square Value	Impact Rate
Angelica Sinensis	0.0758	0.6887	86.6482	0.83
Cinnamomum Sassia	0.0596	0.5222	98.7268	0.6426
Rhizoma Zingiberis	0.0684	0.4893	84.7944	0.5484
Dendrobe	0.0588	0.385	65.866	0.5961

As can be seen from Table 1, among the four Tang dynasty health and wellness drugs, namely Angelica, Cinnamon, Dendrobium and Atractylodes, the selection

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confidence level of Atractylodes was found to be  $\alpha=0.05$  according to the cardinality table, and the cardinality value was transformed into the correlation odds ratio with a mutual influence degree greater than 0.5 valid rules, and the analytical output likelihood was 99.5%. It indicates that the model can be used to dig out drug combinations with clear meaning and guidance for clinical application from a large number of Tang Dynasty compound prescriptions, to better understand and use the health and wellness culture of Shaanxi in the Tang Dynasty, and to provide a convenient and systematic reference basis for modern health culture.

#### **4. CONCLUSION**

This paper actively explores the history of health culture in Shaanxi during the Tang Dynasty based on the background of data collection information. In the process of exploration, a research model for the history of health culture in Shaanxi of the Tang Dynasty is designed and the practical feasibility of the model is demonstrated through the analysis of experimental results. The results show that the selection confidence level  $\alpha=0.05$  in the health culture of Shaanxi in the Tang Dynasty, the effective rule of mutual influence degree is greater than 0.5, and the analytical output possibility is 99.5%. It indicates that the research on the history of health culture in Shaanxi during the Tang Dynasty based on the background of data collection information contributes to the transmission of traditional Chinese health culture and has extremely important research value for future generations.

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# THE ROLE OF POSITIVE PSYCHOLOGY IN GUIDING UNIVERSITY STUDENTS' VIEWS ON ENTREPRENEURSHIP AND EMPLOYMENT IN THE CONTEXT OF INTERNET+

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## ABSTRACT

In this paper, a positive psychology model of entrepreneurial employment is designed in the context of the Internet+ perspective. Using a systematic research approach, it provides a thorough analysis of the entrepreneurial mindset of university students. From a holistic and systematic perspective, the cultivation of entrepreneurial thinking among university students in "Internet+" is explored to improve the systematicity and scientificity of the discourse. The results show that 34.32% of college students are interested in entrepreneurship and 54.4% of college students have the courage to overcome the difficulties of entrepreneurship. The percentage of university students who have a positive mindset to face setbacks is 82.46%. 25.39% of students were brave enough to bear the consequences of their actions. It can be seen that positive psychology in the Internet+ perspective can help university students develop positive psychological qualities for entrepreneurship and improve their willingness and ability to start a business.

## KEYWORDS

internet+; entrepreneurship and employment;; systematic research method; systematicity; scientificity

## 1. INTRODUCTION

With the onslaught of the "Internet Plus", many traditional industries have found their own "Internet Plus" solutions, ushering in the opportunity to leapfrog the dragon. This shows that only those who are good at discovering and innovating, and who seize the opportunities, may be able to return with a full harvest in the process of development of the times [1-3]. Innovation is the fundamental driver of the "Internet Plus" era, and the

gradual increase in demand for innovation and opportunities for innovation will inevitably link the advent of the entrepreneurial era, providing a broader platform for those who truly have entrepreneurial dreams [4-5].

With their own unique mindset, enthusiasm for knowledge and strong ability to integrate network resources, university students are gradually participating in the huge team of online entrepreneurship through the new space and new momentum given to them by the "Internet +" in terms of entrepreneurial environment, entrepreneurial thinking and entrepreneurial paths, and are rapidly becoming the "Internet +" era entrepreneurial situation of the backbone of the force. The literature [6] shows that support vector machine algorithms are applied to the management of university students' employment and entrepreneurship in order to improve their work efficiency. Literature [7] points out that some university students are confused about their future career development and have lost confidence. In the face of this development situation, Premier Li Keqiang advocated the new concept of "mass entrepreneurship and innovation", which undoubtedly pointed out a new development direction for universities. Combining with the current development situation, the current situation of entrepreneurial ability cultivation of college students is analyzed and corresponding cultivation strategies are proposed, which is of great significance to cultivate entrepreneurial ability of college students for their future development. In summary, the cognitive bias of entrepreneurship among university students, the lack of grasp of market orientation and the deficiency of psychological quality.

In this paper, a positive psychology model of entrepreneurship and employment is designed in the context of the Internet Plus. Firstly, it analyses the unique characteristics of university students' entrepreneurial groups and analyses the entrepreneurial employment space given to them by the Internet Plus. Secondly, we collect information on the entrepreneurial environment for comparison and thoroughly analyse the literature on entrepreneurial thinking among university students to form our personal view. Finally, the positive psychology model of entrepreneurship and employment is shown to offer the possibility of expanding the entrepreneurial horizons and platforms of university students.

## **2. POSITIVE PSYCHOLOGY IN THE CONTEXT OF INTERNET+**

### **2.1 POSITIVE PSYCHOLOGY APPROACH TO ENTREPRENEURSHIP**

In the era of Internet +, all industries are in full swing and have started to connect with the Internet. As a group with an active mind and a strong desire for knowledge, university students have undoubtedly become the driving force of "mass entrepreneurship and innovation" [8-9]. Firstly, according to the situation of entrepreneurship and employment in the era of "Internet+", we analyze the new space

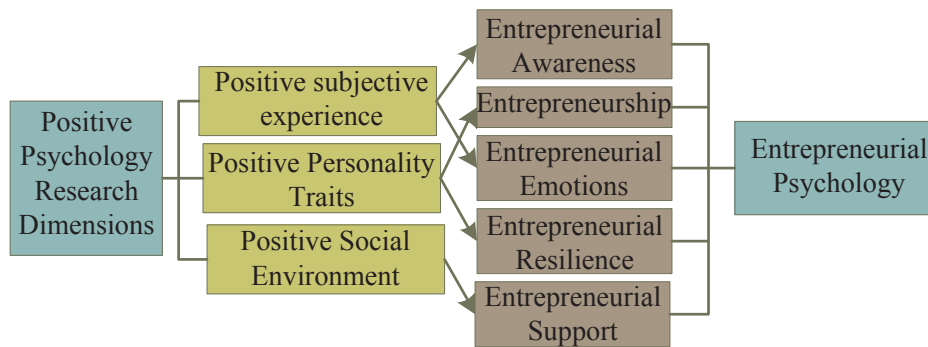
of entrepreneurship and employment given by "Internet+" in conjunction with the analysis of the uniqueness of college students' entrepreneurial group. Secondly, it is not enough for students to grasp the opportunities of the "Internet +" era, to have innovative ideas and to become the trendsetter of entrepreneurship and employment, but a good entrepreneurial mindset is the inner motivation of students' entrepreneurial activities. By carefully comparing the data collected on the entrepreneurial environment of the Internet Plus and thoroughly analysing the reasonable components of the literature on university students' entrepreneurial thinking, we form our own viewpoint. Using a systematic research approach, we explore the cultivation of entrepreneurial thinking among university students in the Internet Plus era, thereby improving the systematic and scientific nature of the thesis.

## **2.2 GUIDANCE FOR UNIVERSITY STUDENTS ON THE CONCEPT OF ENTREPRENEURSHIP AND EMPLOYMENT**

To successfully transform college students from potential entrepreneurs into practical entrepreneurs, the main thing is to help them develop good entrepreneurial psychological qualities and college students firmly establish their entrepreneurial dreams [10]. Therefore, a systematic, scientific and comprehensive entrepreneurial psychological quality education should be carried out for college students, so that they can have a positive entrepreneurial consciousness, a tenacious entrepreneurial will and a unique entrepreneurial personality, etc. This will enable more college students with entrepreneurial ideas to actively engage in entrepreneurial practice, so as to realize entrepreneurship-driven employment and relieve employment pressure. Successful entrepreneurship can also effectively convert knowledge into productivity, promote the development of social economy, create more employment opportunities and achieve the purpose of entrepreneurship-led employment.

## **2.3 BUILDING A POSITIVE PSYCHOLOGY MODEL OF ENTREPRENEURIAL EMPLOYMENT**

Positive psychology is a new trend in the field of psychological research, dating back as far as the 1930s to the study of marriage, happiness and the meaning of life [11-12]. Positive psychology organically integrates theoretical foundations with practical teaching and the systematic study of positive organisation at the group level, which is the inspiration point for constructing positive entrepreneurship psychology education. In the entrepreneurship education of college students, the research of positive psychology is applied to positive entrepreneurship psychological education and its role in improving the psychological quality of college students' entrepreneurship is explored. Based on this, a positive psychology entrepreneurship employment model is constructed as shown in Figure 1.

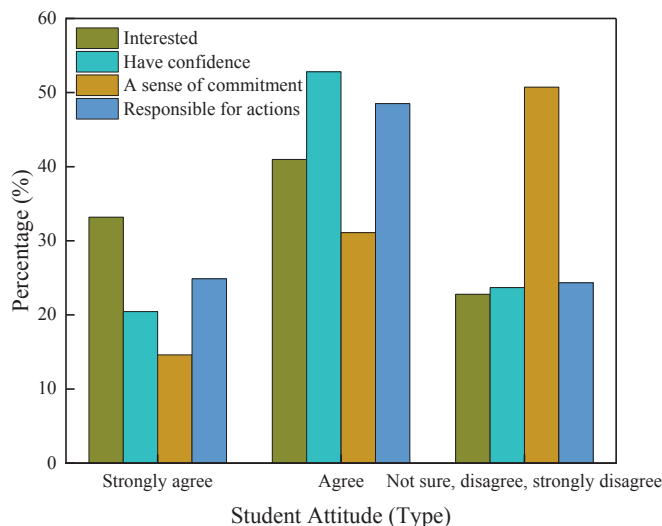


**Figure 1** Positive psychology entrepreneurial employment model

From Figure 1, it can be seen that in the positive psychology entrepreneurship and employment model, the positive subjective experience of entrepreneurship education has an enhancing effect on entrepreneurial consciousness and entrepreneurial emotion. Entrepreneurial consciousness directly influences whether college students have a positive attitude towards entrepreneurship, whether they are adequately prepared for entrepreneurship and whether they are committed to entrepreneurial practice. Positive entrepreneurial motivation, needs and interests match with the psychological needs and subjective experiences of university students in order to stimulate endless entrepreneurial employment potential and motivate the continuous development of entrepreneurial practice activities. The role of education on positive entrepreneurial personality traits in enhancing entrepreneurial ability and entrepreneurial resilience. The focus is on cultivating students' positive self-confidence in entrepreneurship and employment and their courage to deal with entrepreneurial setbacks, and on the continuous development of students' entrepreneurial and employment potential, which plays a decisive role in guiding students' entrepreneurship and employment.

### **3. ANALYSIS OF THE CURRENT SITUATION OF UNIVERSITY STUDENTS' ENTREPRENEURSHIP AND EMPLOYMENT**

In this paper, a positive psychology entrepreneurship and employment model is designed in the Internet+ perspective to conduct entrepreneurship and employment experiments on university students, and the results of the experimental analysis are shown in Figure 2.



**Figure 2** Survey of entrepreneurial psychology of college students

From Figure 2, it can be seen that 34.32% of the students who chose "strongly agree" when asked "I am interested in starting a business" and 54.4% of the students who chose "strongly agree" when asked "do you have the courage to overcome When asked "Do you have the courage to overcome the difficulties in starting your own business", 21.04% of students chose "strongly agree" and 54.4% of students chose "agree". When asked if they had a positive mindset to face the setbacks they encountered in starting their own business, 82.46% of students chose "strongly agree" and "agree". When asked if they were brave enough to bear the consequences of their actions, 25.39% of students said "strongly agree". This indicates that students have a correct perception of entrepreneurship and have developed positive entrepreneurial qualities in the context of positive psychology.

#### 4. CONCLUSION

This paper conducts an effective study on the positive psychology entrepreneurial employment view of university students in the Internet+ perspective. In the research process, a model of positive psychology entrepreneurship and employment based on the Internet+ perspective was designed, and the application effect of the model was verified through the analysis of experimental results. The results show that; 34.32% of college students are interested in entrepreneurship, and 54.4% have the courage to overcome college students in the face of entrepreneurial difficulties. The positive mindset to face setbacks was 82.46% of the university students. The courage to bear the consequences of their actions was 25.39% of college students. This shows that giving full play to the role of positive psychology in motivating and stimulating potential in the Internet+ perspective can cultivate entrepreneurial talents with good psychological quality.

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# DESIGN STUDY OF AN INTELLIGENT AQUACULTURE ENVIRONMENT MONITORING SYSTEM BASED ON STM32 MICROCONTROLLER

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## ABSTRACT

This paper designs an intelligent aquaculture environment monitoring system based on STM32 microcontroller, including three parts: water environment terminal node, field display node and upper computer software, combined with NB-IoT communication in order to achieve real-time monitoring of various key indicators of aquaculture water quality environment. The results show that the time interval for temperature is 15 min, pH is 2 min and dissolved oxygen is 5 min. Therefore, the system has high stability, reliability and accuracy, which not only improves economic efficiency, but also reduces material and human resources and improves the survival rate of aquatic organisms.

## KEYWORDS

STM32 microcontroller; intelligent aquaculture; environmental monitoring system; key indicators; dissolved oxygen

## 1 . INTRODUCTION

In recent years, the aquaculture industry has developed rapidly, producing aquatic products that are not only self-sufficient but also exported in large quantities abroad [1-3]. However, the traditional aquaculture industry has many problems in terms of environmental water quality monitoring [4-5]. The traditional method of manual monitoring not only wastes a lot of human and financial resources, but also leads to errors in the collected data due to manual monitoring, and users are unable to make correct judgments on changes in water quality, making the development of the industry subject to greater constraints. With the rapid development of wireless sensor network technology, it has begun to be widely used in various industries, and also provides new solutions for aquaculture environmental monitoring [6-7]. Therefore, research on how

to better use wireless sensor networks to monitor aquaculture has received widespread attention and has become a hot issue.

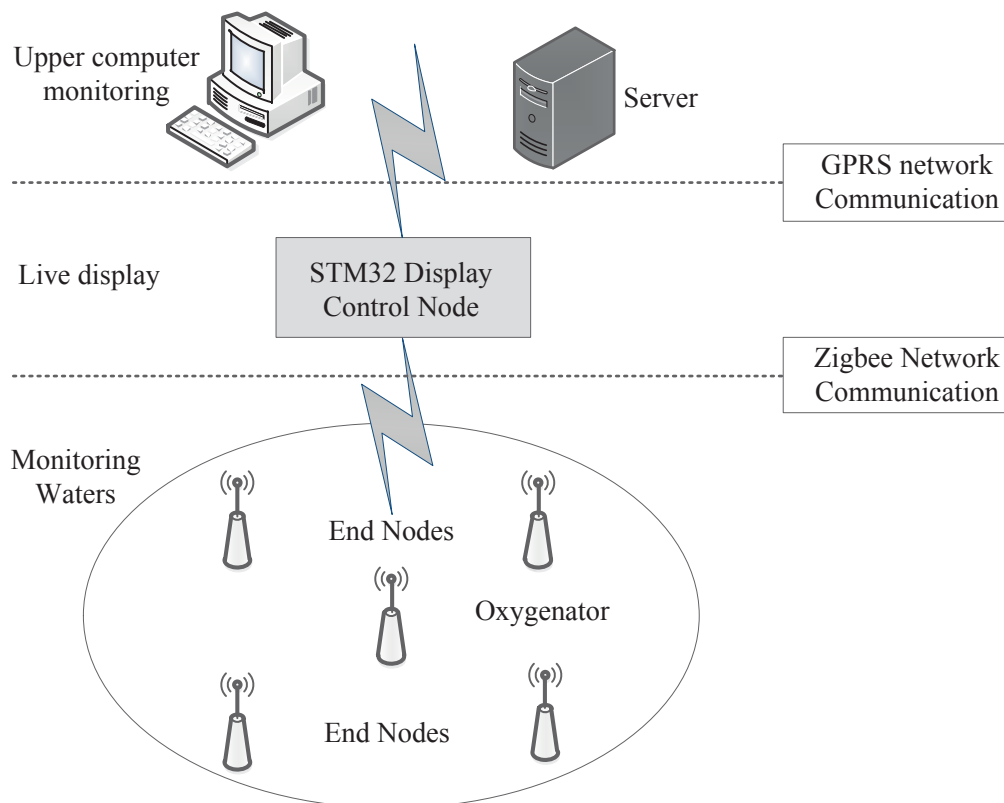
The establishment of 'aquaculture environmental monitoring systems' is an important tool to improve the quality and efficiency of aquaculture. In the literature [8], progress in marine research to understand environmental change and its effects on marine ecosystems has relied on the use of heavy and invasive biological instruments and sensory telemetry networks to collect data on the physiology of species, their habitats and their movement patterns. In the past, a lightweight compliant environmental monitoring system. Literature [9] Plastic pollution has become one of the most pressing environmental challenges and has received a correspondingly wide range of attention. Although it is a top priority for policy makers and scientists, the knowledge needed to guide decision-making, implement mitigation actions and evaluate their results is still inadequate. An integrated global plastic pollution monitoring system is needed to provide comprehensive, harmonised data for environmental, social and economic assessments. The initial focus on marine ecosystems has been expanded to include atmospheric transport and terrestrial and freshwater ecosystems. The literature [10] proposes an environmental monitoring system based on spatial and temporal correlation in order to provide accurate environmental maps while avoiding unnecessary transmissions from IoT devices. In the ST-EMS (environmental monitoring system), IoT devices decide whether to transmit sensed data to the IoT gateway by considering the temporal correlation and energy level of the sensed data. The optimal policy is obtained through the formulation of a Markovian decision process and it is shown that the optimal policy has a threshold structure that is easy to implement through the use of the submodular concept. The environmental monitoring system proposed in the above literature has low sampling frequency, poor real-time performance and security concerns.

Therefore, this paper studies an intelligent aquaculture environmental monitoring system that can meet the requirements of intelligent management. The system is based on the STM32 microcontroller chip and accomplishes a large number of tasks with repetitive nature, making the monitoring content more comprehensive and improving the timeliness and accuracy of environmental monitoring. The results show that the system has timely warning and efficient reporting functions, and the key indicators extracted, Ph and dissolved oxygen, meet the requirements of accurate monitoring.

## 2 . OVERALL SYSTEM DESIGN

### 2.1 SYSTEM FRAMEWORK

This design is mainly based on microcontrollers and technology to design an intelligent aquaculture environment monitoring system. It includes three parts: the water environment terminal node, the field display node and the upper computer software, and the overall structure is shown in Figure 1.



**Figure 1** System overall framework diagram

As can be seen from Figure 1, the terminal node on the water surface is responsible for the collection and forwarding of water temperature, values and water dissolved oxygen concentration through the module and can control the oxygen concentrators. The on-shore field display node is responsible for receiving, storing and analysing the data via the coordinator. It also performs the functions of displaying parameters and communicating with the host computer via the module, and automatically controls the oxygen concentrators according to the weather conditions issued by the host computer. The software of the upper computer can complete the functions of serial debugging, network debugging, protocol analysis and sending control commands. This system can better monitor and control the water environment required for aquaculture. Not only can it automatically adjust the dissolved oxygen content to prevent fish from being deprived of oxygen and improve the safety factor. It is also possible to view parameters on site

and store them so that control commands can be issued remotely and data collected for long-term research.

## **2.2 MONITORING PARAMETER SELECTION**

To ensure proper growth of fish and shrimp, etc. The culture environment usually requires consideration of the following parameters:

(1) Dissolved oxygen is the molecular state of oxygen dissolved in water. Aquatic plants and animals must survive in conditions where dissolved oxygen is suitable. When dissolved oxygen falls below, fish head floating will occur. When there is a severe lack of oxygen, fish will suffocate and die. Generally the dissolved oxygen in a body of water should be maintained at, or at least above, the level of dissolved oxygen. However, it is important to note that oversaturated oxygen can cause fish to get bubonic disease.

(2) Depending on the type of culture, most are between. For mariculture, the value is on the shouty side. In between, the daily difference must not be greater than.

(3) Water temperature is an extremely important element in the production conditions of aquatic products. Temperature directly affects the reproductive and metabolic activities of aquatic products, which in turn affects the production quality of aquatic products. At the same time, the water temperature also affects the amount of dissolved oxygen.

## **2.3 OXYGENATION SOLUTIONS**

The state of the oxygenator is divided into several conditions. The first is the off state; the second is when the dissolved oxygen concentration is lower than the set value. This is the state with the highest priority for passive oxygenation, in which the oxygenator continues to work until the detected dissolved oxygen concentration reaches the set saturation limit. In addition to receiving the dissolved oxygen concentration and water temperature data from the terminal node, the field display node also measures the current temperature and receives information from the server about tomorrow's weather, which automatically controls the start-up of the aerator through the weather conditions.

## **3. SOFTWARE DRIVER DESIGN**

### **3.1 NB-IOT COMMUNICATION PROGRAMMING**

In accordance with the objectives of this design, the aquaculture environmental monitoring system software program is to be set up to drive the motor to inject baking soda, if too alkaline to inject carbon dioxide. The design mainly has the following points, respectively: STM32 initialization, PH value detection, oxygen concentration 4 system implementation degree detection, temperature measurement, manipulation of DC

motors to NB-IoT communication, etc. Selected according to the subject design, the system can achieve the monitoring and regulation of water quality, water quality PH value detection program and NB-IoT communication program for detailed description.

### **3.2 PH VALUE TESTING PROGRAM DESIGN**

The PH detection module selected for this system, the analog output pins of the module are connected to the PA0 port of the STM32, the PH module is initialized and the PH value is corrected, the PH module reads the potential difference between the two electrodes, after which the output voltage signal is converted into the PH value of the solution to be measured according to the standard curve, if the detected PH value is too acidic when compared with the threshold value, the motor is driven to inject baking soda, if it is too alkaline, carbon dioxide is injected.

### **4. ANALYSIS OF SYSTEM DATA MEASUREMENT RESULTS**

The designed intelligent aquaculture device will be tested, the test items mainly include network data loss rate, water quality data collection and equipment operation, the network data loss rate is used to verify the accuracy of network transmission, water quality data collection is to test the reliability of sensor data collection and transmission data, equipment operation is used to test the stability of equipment operation. In the aquaculture company will be placed in 6 sensor nodes in 6 fish ponds, placed 6 router nodes and 1 convergence node, where the sensor nodes are mainly responsible for the collection of water quality environment, router nodes are responsible for forwarding data, convergence nodes as a monitoring centre. Sensor node every 30s to collect data, the whole system packet loss rate of 0.62%.

When detecting the system water quality information and motor status, the water quality was partially interfered with, allowing the water quality data to be between equipment start-up and shutdown. In general, the values of temperature, pH and dissolved oxygen in the fish pond were set at  $\geq 20^{\circ}\text{C}$ ,  $\leq 6.5$  and  $\geq 6\text{mg/L}$ . The system measurement data and error results are listed in Table 1.

**Table 1** System testing data and error results

Control parameters	Testing time	System detection value	Accuracy instrument detection value	Equipment Status	Alarm or not	Actual relative error/%
Temperature/°C	21;05;00	16.2	17.4	ON	Yes	-6.3
	21;20;00	18.8	19.3	ON	Yes	2.7
	21;35;00	20.7	21.2	OFF	No	-1.5
pH	21;40;00	5.3	5.3	ON	Yes	-3.6
	21;42;00	6.2	6.3	ON	Yes	-1.5
	21;44;00	7.4	7.3	OFF	No	1.5
Dissolved oxygen	22;00;00	4.6	4.2	ON	Yes	4.8
	22;05;00	5.4	5.4	ON	Yes	-3.7
	22;10;00	7.7	7.8	OFF	No	-1.4

As can be seen from Table 1, pH and dissolved oxygen respectively from the database to extract three times the data results, the time interval of temperature is 15min, pH is 2min, dissolved oxygen is 5min, the above three control parameters for the actual relative error calculation, from the calculation results can be seen that the relative error of water quality measurement is not very large. The control parameters obtained three times critical data can clearly see that the electric heating rod, lime powder thrower, oxygenator and alarm device are running normally. Through the table can be seen to detect the accuracy of the sensor measurement, the real-time wireless transmission and the reliability of the equipment control, basically in line with the design requirements.

## 5. CONCLUSION

This paper designs an intelligent aquaculture testing system based on the STM32 microcontroller Intelligent monitoring centre can be set up in various places, in the remote console users can browse equipment operation and water quality data information through computers, mobile phones, tablets and other electronic devices. Through the STM32 microcontroller to the system of water quality monitoring, SMS alarm, automatic adjustment of water quality, so that the whole system more intelligent, technology. The whole system is based on automation and automatically starts oxygenators, thermoelectric rods and other equipment, which greatly avoids economic losses caused by unqualified water quality, improves the production and quality of aquaculture, reduces the consumption of human and material resources in the aquaculture process and has good economic benefits.

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# STUDY ON THE OPTIMIZATION OF THE CULTIVATION PATH OF "THREE AGRICULTURAL SENTIMENTS" AMONG UNIVERSITY STUDENTS BASED ON DATA COMPRESSION ALGORITHM IN THE CONTEXT OF RURAL REVITALIZATION

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## ABSTRACT

Based on the data compression algorithm, this paper integrates the design of the education and teaching cultivation system of "three agricultural sentiments", and constructs an optimal analysis of the cultivation path of sentiments that takes university students as the main body, takes serving the three rural areas as the goal, encourages students to participate in relevant experimental activities, and combines theory and practice. The results of the analysis show that: the second experiment was scored separately, and the number of people who scored 5 in the second experiment rose by 8 compared with the first, with a total number of 25. Therefore, in the context of rural revitalisation, it is of great importance to actively cultivate students' sentiment for the "three rural areas".

## KEYWORDS

rural revitalization; data compression algorithm; three rural sentiments; cultivation system; path optimization

## 1. INTRODUCTION

Facing the cause of the "three rural areas", cultivating high-quality technical and skilled talents, and cultivating a workforce that understands agriculture, loves the countryside and loves farmers, is the mission and responsibility given to contemporary university students in the new era[1-4]. Agriculture is the foundation of the country. The issue of agriculture, rural areas and farmers is a fundamental issue related to the people's livelihood of the country, and it is necessary to accelerate the modernization of agriculture and rural areas, implement the strategy of revitalizing the countryside, and cultivate a workforce that understands agriculture, loves rural areas and farmers



[5-6]. At present, the quality of the student population is declining, some students are not deeply attached to the "three rural areas", their political awareness is weakened and their professional thinking is unstable, especially some graduates are not willing to work in agriculture, and their employment is in an awkward situation of "not being able to get high but not being able to get low"[7]. How to promote students' determination to strengthen agriculture and promote farming, and implement the fundamental task of educating people with moral character has become a new proposition for universities at this stage.

The successful implementation of the modernisation of agriculture and rural areas and the revitalisation of the countryside requires the support of a large number of highly qualified technical and skilled personnel with a "three-farm sentiment". The literature[8] shows that intervention in the revitalisation and development of artistic villages is one of the ways to brand rural areas, to meet contemporary aesthetics and to satisfy the diversified needs of modern life. At the same time, it is not limited to artistry per se, but is a comprehensive artistic activity with modernity, industrial relevance and sustainability. The experimental results of the dataset show that rural planning and design with artistic intervention is a way to respect local memory, to pass on folk craftsmanship, to reshape historical culture and to identify with the countryside itself. It also proposes new development ideas and guidance methods for sustainable rural development. The literature [9] reveals the difficulties faced in implementing rural revitalisation strategies. Design/methodology/approach. The difficulties in implementing rural revitalisation strategies were systematically analysed from three aspects: people, land and money. The findings concluded that it is necessary to revitalise rural human resources by introducing skilled labour; and to deal with the relationship between farmers and land by deepening land reform and providing facilities for farmers. The literature [10] proposes rural revitalisation as an attempt to reform China's rural programme. Among other things, the pastoral complex emphasises the integration of agriculture and tourism, extending the agricultural industry chain and integrating medical care, technology, tourism, creativity and leisure. The complex factors affecting the pastoral complex are analysed. Fuzzy calculation theory is introduced into the pastoral complex to discuss the operational characteristics of the pastoral complex system and further explore how to construct an adaptive system evaluation system at different system levels. Therefore, more attention should be paid to the operational mechanism factors in the composite pastoral process to make the composite pastoral system more scientific. The lack of rural talents, the lack of distinctive industries and the relatively weak competitiveness of rural revitalisation as suggested by the above literature.

Therefore, this paper constructs a system for cultivating the sentiment of the three farmers based on the data compression algorithm, and analyzes the optimization of the cultivation path of the "sentiment of the three farmers" among university students. In the new development stage of comprehensively building a socialist modern country, university students are the head of the tide of heavy responsibilities and the new impetus for the whole nation to move forward. Cultivating their "three rural sentiments" is the key point to properly solve and deal with the three rural issues, which is related to the fundamental issue of rural revitalization and has extremely important implications of the times.

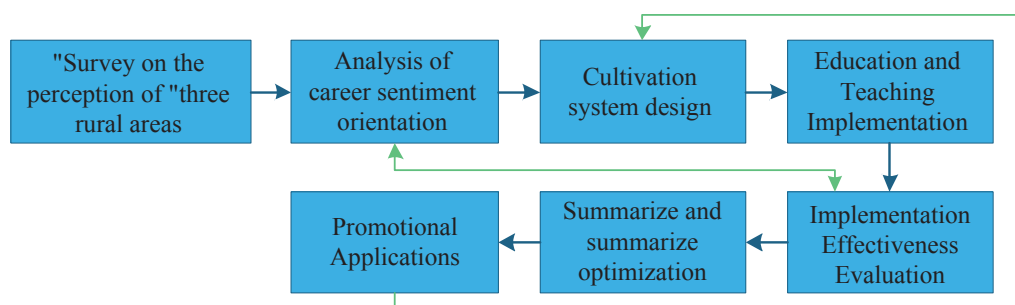
## 2. A DATA COMPRESSION ALGORITHM BASED SYSTEM FOR CULTIVATING THE SENTIMENT OF THE THREE FARMERS

### 2.1 DATA COMPRESSION ALGORITHMS

The application of data compression algorithms must meet the requirements for high data compression rates and large amounts of data storage. At the same time, data compression and decompression should be efficient and rapid in order to meet the requirements of real-time data recording and querying. Therefore, the data compression algorithm in the real-time database should be studied in detail to master its characteristics and principles, so as to better serve the production activities. And on this basis, a three-farm sentiment cultivation system should be constructed.

### 2.2 A SYSTEM FOR NURTURING LOVE FOR THE THREE FARMERS

The University insists on cultivating people with moral values, takes the guiding ideology of "three comprehensive education", aims to serve the "three rural areas", takes students as the main body, focuses on the actual situation of the "three rural areas" in the student's place of origin, and cultivates This paper is based on the guiding ideology of serving the "three rural areas", with students as the main body, and cultivating students' "three rural issues" around the actual situation of the "three rural areas" in their places of origin. The system of cultivating the sentiment of the three rural areas constructed in this paper is shown in Figure 1.



**Figure 1** Three agricultural sentiment cultivation system

As can be seen from Figure 1, according to the college's aim of "serving the three rural areas", on the basis of investigation and analysis of students' "three rural areas" cognition and career orientation, the "three rural areas sentiment" education and teaching cultivation system is designed in an integrated manner, exploring the cultivation path of "three rural areas sentiment" for agricultural students and continuously summarizing the implementation effect to achieve the integration of students' vocational skills and "three rural areas sentiment". Based on the survey and analysis of students' awareness of the "three rural areas" and their career orientation, the College will design an integrated education and teaching cultivation system for the "three rural areas", explore and practice the cultivation path of the "three rural areas" for students majoring in agriculture, and continuously summarise the effects of the implementation to realise the integration of students' vocational skills and "three rural areas". The programme will actively guide students and teachers to pay attention to the development of modern agriculture, care about the construction of socialist villages and farmers' lives, and effectively promote students' service to the "three rural areas", serve their hometowns and contribute to the revitalisation of the country's rural areas.

### **3. THE CULTIVATION PATH OF STUDENTS' SENTIMENT FOR THE THREE RURAL AREAS IN THE CONTEXT OF RURAL REVITALIZATION**

#### **3.1 CULTIVATING THE IDEA OF "THREE AGRICULTURAL SENTIMENTS" AMONG UNIVERSITY STUDENTS**

"The education process should focus on the three rural issues in their hometowns, with service to the three rural areas as the goal, so that students can form a strong love for their hometowns. The process of cultivating students' sentiment for the three rural areas in higher education is to achieve the integration of students' vocational skills and their "sentiment for the three rural areas". It should be a general education subject that all students should study, regardless of their major. Universities should encourage their teachers and students to pay more attention to information about agricultural development, to devote more attention to the construction of the new socialist countryside in China, and to deeply appreciate the hardships of farmers, so as to effectively promote the process of university teachers and students serving the three rural areas and their hometowns, and to devote more powerful strength to the development of the new countryside.

#### **3.2 THE GOAL OF DEVELOPING A SENSE OF FARMING IN UNIVERSITY STUDENTS**

Through the education of the "Three Rural Issues", students will be able to gain a comprehensive understanding of the three rural issues, so that they can grasp some of the issues in modern agriculture and gain a deeper understanding of their own

hometown. The cultivation of students' "three rural sentiments" requires them to have a good grasp of agricultural and rural issues, a process that can be achieved through student research. Universities should encourage students to take part in more research activities to improve their practical investigative skills. Students can also contribute their own suggestions for the development of their hometowns through the results of their research. In the process of research, students can form more tacit understanding with the team and feel the important power of the team in advance, so that they can provide certain conditions for future entrepreneurship.

### 3.3 EDUCATIONAL DESIGN FOR UNIVERSITY STUDENTS' "THREE AGRICULTURAL SENTIMENTS"

The first is the theoretical part, which can be implemented in two ways: the creation of a curriculum and the development of lectures. Teachers should make full use of multimedia tools in the teaching process, so that students can turn passivity into initiative, gain a deep understanding of the background of the "three rural sentiments" and master the knowledge of rural areas and agriculture. In addition, schools should actively organise practical activities for students to develop a more systematic understanding of the subject and to learn more useful things in the process of practice, to improve their skills and to develop their professionalism.

### 4. ANALYSIS OF THE OPTIMIZATION OF THE CULTIVATION PATH OF THE THREE AGRICULTURAL SENTIMENTS OF UNIVERSITY STUDENTS

This paper is based on a data compression algorithm to build a system for cultivating the sentiment of the three farmers, and to optimize the cultivation path of the students' "three farmers" sentiment by the relevant departments and instructors of the school. The experiment was divided into two sessions, with scores of 1-5 and a total of 50 students, and the results are shown in Table 1.

**Table 1** Optimization assessment of students' activities in "agriculture"

	1 Point	2 Points	3 Points	4 Points	5 Points
First experiment	5	7	9	12	17
Second experiment	1	3	8	13	25

As can be seen from Table 2, the number of people who rated 5 in the first experiment was 17, and the number of people who rated 5 after the second experiment was 8 higher than that of the first experiment, with a total of 25 people and only 1 person who rated 1. To sum up, the cultivation of university students' sentiment for the "three rural areas" should not only be based on the foundation of moral education, but also be

fully integrated with the specific development of the country and the actual needs of university students' employment and entrepreneurship, so as to ensure that the "three rural areas" sentiment can be put into practice in the integration of the macro development of the times and individual micro choices. The three rural areas" sentiment should take root in the ground, so as to provide a solid contribution to the development of the "three rural areas" of the country.

## **5. CONCLUSION**

The strategy of revitalizing the countryside is an important way to solve the problems of the three rural areas, and is of practical significance to the overall development of the countryside and the modernization of agriculture. The precise cultivation of university students' sentiment for the "three rural areas" is a realistic requirement for the innovation of talent cultivation in higher education institutions in the new era of comprehensive implementation of the rural revitalization strategy. This not only points out the direction for higher education institutions to innovate talent cultivation mode and improve the quality of talent cultivation, but also cultivates a large number of high-quality talents with "one knowledge and two loves" for the development of "three rural areas". Of course, this cultivation process is gradual and is a task that needs to be adhered to in the long term, based on the historical background of agricultural development and in line with the continuous innovation of the talent revitalization strategy. Only by adhering to the coexistence of modernity and creativity and pooling the concerted efforts of all parties can university students "know agriculture" in theory, "love agriculture" in emotion and "help agriculture" in action, so as to consciously contribute to the construction and revitalisation of the countryside.

## **FUNDING**

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# INNER MECHANISMS AND PRACTICAL STRATEGIES OF BIG DATA TO FACILITATE RURAL REVITALIZATION

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## ABSTRACT

Big data is one of the powerful tools for promoting rural revitalization, which can promote the modernization and informatization process of the countryside and inject new vitality into the development of the countryside. How to better play the role of big data in promoting the transformation and upgrading of rural economy in the era of big data has become an important issue facing agricultural and rural work in the new era. This paper explores the inner mechanism and practical strategies of big data in promoting rural revitalization, aiming to deeply explore its potential driving role, taking province H as an example, discusses the problems in big data to boost rural revitalization, by analyzing the intrinsic mechanism of big data to promote rural revitalization and taking into account the geographical characteristics and agricultural development of Province H, we propose a practical strategy for rural revitalization in Hunan to promote the economic and social development of the region. The results show that: through the big data + rural revitalisation model, 8.1% of the value added of industry in province H is composed of the agricultural digital economy, an increase of 4.15 percentage points compared with last year. It indicates that the Big Data + Rural Revitalisation model has led to a year-on-year increase in the digitalisation of agriculture and improved the potential for rural development.

## KEYWORDS

big data; rural revitalization; modernization; intrinsic mechanism; informatization; practical strategies

## 1. INTRODUCTION

Against the background of global economic slowdown and sluggish growth, the digital economy, with its excellent ability to enhance total factor productivity and improve the quality and efficiency of traditional industries, has shown a strong vitality against the

trend and is widely regarded as a new driving force for global economic growth and a new lever for economic development [1-3]. With the arrival of the "Internet+" era, digital technologies and applications have had a profound impact on various fields of economy and society, giving rise to a number of new industries and new business models. Globally, the development of digital economy has become a general consensus, and developed countries generally show a trend that the growth rate of digital economy is higher than the growth rate of GDP in the same period, for example, the growth rate of digital economy in the United States, the growth rate of digital economy in the United States, and the growth rate of digital economy in the United States, Japan and the United Kingdom in 2016 were 7.3%, 5.2% and 4.7% respectively [4]. This compares with GDP growth rates of 1.7 per cent, 0.8 per cent and 2 per cent respectively over the same period[5]. The US digital economy reigned as the world's largest in 2019, reaching US\$13.87 trillion and accounting for 58.3 per cent of GDP[6]. This is sufficient to see that the continuous upgrading of digitalization in various industries, high-tech renewal under the relevant industries and fields of business form changes and industrial restructuring, for all sectors of society and the deep integration of economic and social fields to accelerate [7-9].

In this paper, we consider big data as the foundation and key production factor for developing digital economy, which promotes efficiency improvement and economic structure optimization. In this thesis, we argue that big data is an important foundation for the development of digital economy and an important production factor for the development of digital economy, which is conducive to improving efficiency and optimizing economic structure. Combining big data with rural revitalization, we make full use of the advantages of big data to promote intelligent agricultural production, efficient agricultural management and convenient agricultural information. In this way, we can provide comprehensive and powerful support for the implementation of the rural revitalization strategy and truly realize the rural revitalization strategy.

## **2. ANALYSIS OF THE MECHANISM OF THE ROLE OF BIG DATA ON RURAL REVITALIZATION**

The organic integration of big data and rural revitalization will provide new ideas and effective ways for the implementation of rural revitalization strategy. With the deepening of the national big data strategy, it can also provide more means and tools for agricultural upgrading, rural progress and farmers' development, which will help the realisation of smart countryside, intelligent agriculture and beautiful countryside, thus realising the comprehensive revitalisation of the countryside.



## **2.1 . AGRICULTURAL MODERNISATION MODEL**

A thriving industry is the basis and focus of rural revitalization, and industrial revitalization must be taken as the primary task of rural revitalization.

At present, the smallholder economy still dominates the development of agriculture in China, and there is still a low degree of intensification, low production efficiency and waste of factor resources in agricultural production, In this case, the traditional agricultural production methods are no longer well adapted to the needs of modern agricultural development. The focus of developing modern agriculture lies in the rationalisation of industrial structure and maximisation of economic benefits through the efficient allocation of production factors such as land, capital and labour.

Based on big data technology, cloud computing and the Internet of Things can effectively enhance the efficiency of agricultural resources, and promote the intensive and large-scale transformation of agriculture. By establishing an agricultural product quality traceability mechanism, the issue of agricultural product quality and safety can be addressed. In order to meet the needs of accelerating the transformation of traditional agriculture to modern agriculture, to regulate the current chaos of agricultural production and layout through precise guidance of agricultural production, to solve the current contradictions of supply and demand of agricultural products, and to establish a scientific and convenient comprehensive data information platform for agricultural products, thereby promoting the structural reform of the agricultural supply side

## **2.2 ECOLOGICAL AND ENVIRONMENTAL PROTECTION EFFECTIVENESS MODEL**

While the rural economy is developing well, the problem of rural ecological environment is becoming increasingly prominent, and ecological environment is a major social issue related to people's livelihood. Rural areas are the construction of rural areas with green ecological and environmental rational development is the focus of China in ecological protection.. Through big data technology, We can maximize the use of ecological resources, provide new methods for ecological prevention and control, and also effectively improve the rural ecological environment and provide technical support for pollution prevention and control.

Firstly, using big data technology, we can manage the mountain, water, forest, field, lake and grass systematically, and plan and promote it as a whole, and from the perspective of data ecosystem, design the whole element, whole system and whole process of beautiful countryside construction, implement resource development activities according to local conditions and improve the science of resource allocation.

Secondly, the application of big data technology can assess and analyse the level of agricultural green development and rural environmental remediation. Through the monitoring and early warning of rural waste collection and sewage treatment, the construction of a soil environment monitoring system and an agricultural surface source pollution monitoring system, relevant pollution sources can be quickly identified and the causes of pollution can be effectively analysed.

Finally, Promote agricultural ecological compensation. The prerequisite for the application of big data technology is accurate data. In agricultural ecological compensation, big data can provide more accurate carbon sink measurement and compensation data for different regions and crops, so as to provide a more scientific basis for the formulation and accounting of compensation standards for agricultural ecological compensation. At the same time, big data can provide technical support for agricultural and rural green development and promote the implementation of rural revitalization strategy.

### **2.3 INNOVATIVE MODES OF INTERACTIVE CULTURAL COMMUNICATION**

The construction of rural culture and civilization is both an important driving force and a reflection of the soft power of rural revitalization. The good wishes of rural residents in their future life are mainly supported by the current intellectual support and spiritual motivation enriched by rural culture and civilization.

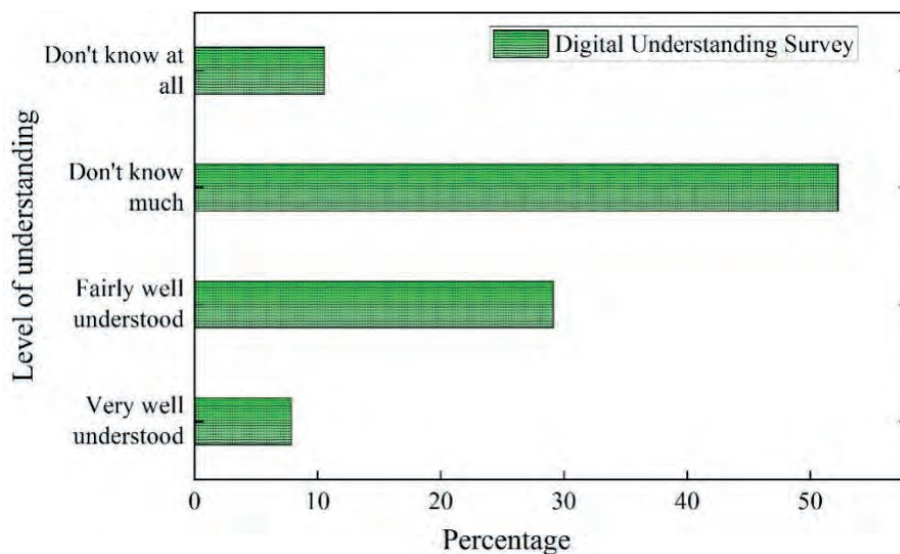
The full integration of high-tech in rural civilization can improve the cultural literacy of farmers, and has a very good effect in enriching the connotation of rural civilization, and the unique local charm and humanistic charm of Pei can develop and change with it, and has been actively inherited on the basis of excellent traditional culture and modern culture docking.

Based on big data as a tool, the sharing and dissemination of scientific knowledge, agricultural production techniques and other resources can be realized on the big data teaching platform, thus breaking through the limitations of time and space, allowing more agricultural and urban education to combine, realizing the interconnection of urban and rural education resources, shortening the gap between urban and rural education, and thus improving the overall quality of farmers.

By building cultural databases, memorials and libraries with rural culture as the main body, traditional culture and humanistic cultural materials of the countryside are stored in the databases and disseminated on the network, thus achieving the purpose of inheriting and developing rural cultural memory and enriching the spiritual and cultural life of farmers. Through the means of big data, the scientific and cultural cultivation of farmers will be improved, the civilisation of rural society will be enhanced and new vitality of rural culture will be stimulated.

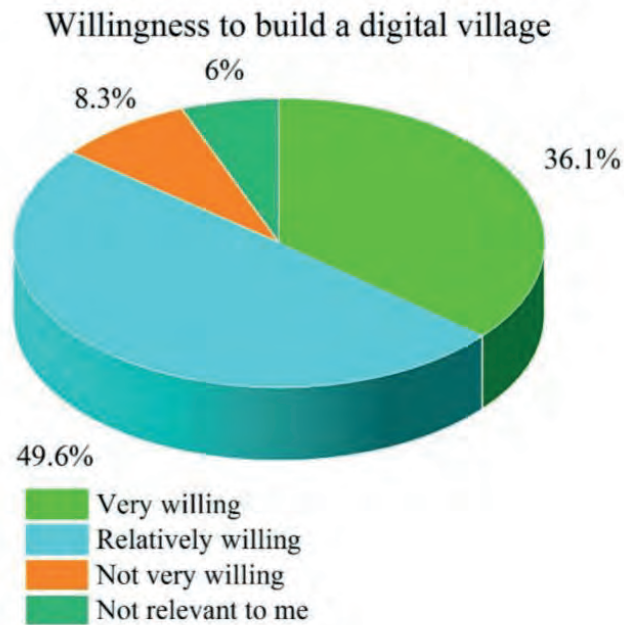
### 3 ANALYSIS OF THE PROBLEMS OF DIGITAL VILLAGE CONSTRUCTION IN THE CONTEXT OF RURAL REVITALIZATION

People living in the countryside, as the main group in the construction of digital countryside, still have no understanding or incomplete understanding of the construction of digital countryside in the construction of the countryside. The results of the survey on rural residents' understanding of the construction of digital villages in the context of rural revitalization are shown in Figure 1. Among them, 7.24% of the villagers said they understood it very well, 31.31% said they understood it relatively well, 52.06% said they did not understand it very well, and 9.39% said they did not understand it at all.



**Figure 1** Rural residents' willingness to participate in digital village construction

At the same time, Analysis of rural residents' awareness of digital village construction in Figure 2, in which 36.1% of the respondents said they were very willing, 49.6% said they were more willing, 8.3% said they were not very willing and 6% said they had nothing to do with me. This indicates that a large proportion of rural residents have an indifferent attitude towards participating in digital village construction practices. In practice, rural residents are not highly motivated to participate in the construction of digital villages, lack initiative and feel that it has little to do with them, which reduces the effectiveness of the application of new generation information technology in the countryside and makes the application of new technologies in agriculture and rural areas restricted, affecting the overall construction of digital life, digital agriculture and digital governance in the countryside Progress.



**Figure 2** Rural residents' knowledge of digital village construction

Talent is the focus of rural revitalization. In the construction of rural informatization, a large number of talents are inevitably needed to support and promote the development and implementation of projects, but at present, the majority of big data talents are gathered in first-tier cities, therefore, the number of rural big data talents can be increased in rural revitalization in two ways: training and introducing. In addition to the above construction of agricultural platforms and big data infrastructure, as well as the introduction of talents, in the process of Based on the current development of the use of big data for the construction of rural revitalization and other aspects of use. In terms of e-commerce of agricultural products and agricultural by-products, rural tourism, etc., the whole industrial chain of agriculture and the development of tourism in Hunan Province will be further promoted, thus facilitating the revitalisation of the countryside and increasing farmers' income.

#### **4. CONCLUSION**

Under the rural revitalisation strategy, rural planning and development in H Province can be integrated with big data technology to optimise rural development planning and promote rural revitalisation through modern technology. This paper optimises rural development planning and promotes rural revitalisation through modern technology. Big data technology can accelerate the process of agricultural modernisation, enhance rural ecological and environmental protection, and innovate cultural interaction and dissemination. At the same time, big data technology can make rural governance more modern and broaden farmers' income generation channels, further promoting rural revitalisation. The development of agriculture and the presence of big data in promoting

rural revitalization, the results show that: through the model of big data + rural revitalization, the share of agricultural digital economy in the value added of industry in H province is 8.1% and an increase of 4.15 percentage points compared with last year. This shows that an agricultural sharing platform has been established by using big data technology to promote rural revitalization, improved relevant supporting facilities, and increased rural development potential and economic income.

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# ANALYSIS OF INNOVATIVE TEACHING MODE AND TEACHING INFLUENCING FACTORS OF UNIVERSITY ENGLISH BASED ON INTERNET TERMINAL PLATFORM AND DECISION TREE ALGORITHM

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## ABSTRACT

In this research, the variables impacting the teaching of English in colleges and universities are thoroughly examined from a holistic, systematic, and developmental viewpoint using a decision tree method, using 500 students from 10 colleges and universities in X city as the research subjects. The results of the study show that the factor of "number of students' participation" is 0.456, this comes in second place to "preference" and "teacher's skill level" in the decision-making process. The most significant element in the decision branch is "students' participation," which has an effect value of 0.456. "Preference" and "teachers' skill level" are next with 0.384 and 0.305, respectively. This paper adopts the Internet terminal platform and decision tree algorithm means to promote the progress of university students' media literacy to a higher level.

## KEYWORDS

decision tree algorithm; college English; practical teaching; impact factor; decision branching; terminal platform

## 1. INTRODUCTION

Internet terminal platform is a new product formed under the progress and development of social science along with a new type of communication media [1-2]. Breaking the constraints of time and space, presenting information in a number of forms, combining images, text, video, and audio, and acquiring and receiving information in a variety of methods. [3-4]. The use of new media technologies in college and university English instruction can successfully throw off the constraints of the conventional teaching approach and has significant practical value[5]. According to

literature [6], the introduction of the Internet era has also created new development chances and difficulties for the English teaching profession in colleges and universities. According to literature [7], in order to improve the standard of English instruction in the Internet era, it is essential to combine the Internet with innovative English teaching methods and incorporate Internet terminal platform technology into the English classroom in order to develop high-caliber talents that are suitable for the needs of the new era. Therefore, English education in colleges and universities should actively use new media, improve the education and teaching system, effectively strengthen the effectiveness of English education and pave the way for contemporary college students to grow up and become successful[8].

In this essay, the elements impacting the instructional process of English practice in higher education institutions are discussed from several angles in relation to a research on the subject. The given set of indicators is ranked in order to determine the most significant influences on the practice of teaching English in colleges and universities, which serves as a guide for the practice of teaching public physical education in colleges and universities. This is done by building a decision tree from the value of the attributes of each indicator.

## **2. DECISION TREE ALGORITHM APPLICATION IMPLEMENTATION**

### **2.1 DATA PREPARATION**

A database of 500 students from 10 universities in X city was randomly selected for the study, and a database of English course students was created based on basic information collected from various sources and questionnaires. Four factors are included in the pupils' fundamental data: age, gender, IQ, and English proficiency. The student questionnaire contains 28 items of survey information, including English course grades, English course hours, enjoyment of English, number of English speaking competitions, technical level of English teachers in their schools, English teaching content, teaching methods used by English teachers, and assessment of physical education instructors' performance as teachers.

### **2.2 DATA PREPROCESSING**

Data pre-processing was mainly done by cleaning, integrating, selecting, transforming and conceptual layering of attributes to form a tuple of data training sets. The major goal of data cleaning is to eliminate a total of 26 information pieces that could not be queried for student physical fitness data and 30 information items that were left blank on the questionnaire. Data integration is the process of combining survey responses and fundamental student data into a dataset for study.

Six statistically significant variables were sieved from the 30 analyzed variables at the level of , using English course grades as the response variable, and made use of to build a decision tree model of the variables influencing the practical teaching of English in universities and colleges. The data chosen as the training set tuples are displayed in Table 1 based on the conceptual stratification of the six analytical variables.

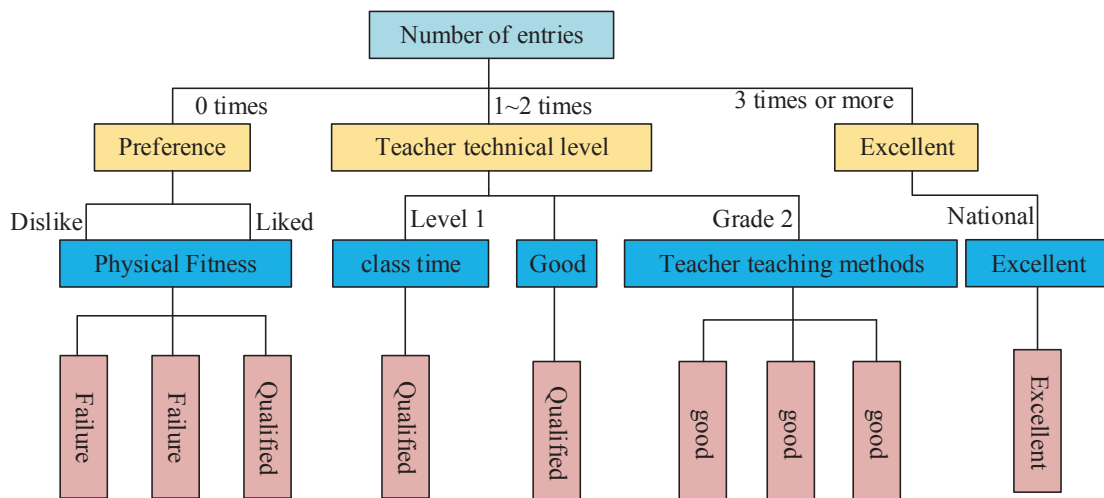
**Table 1** Tuple of training set of analysis variables selected in the database

Sample	Intelligence level	Lesson time	Student participation	Teaching Skills	Course Achievement	Physical fitness
1	Excellent	Unqualified	Liked	3 kinds	1 visit	64
2	Excellent	Qualified	Liked	1 kind	2 visit	72
3	Qualified	Qualified	Liked	1 kind	1 visit	64
4	Good	Good	Dislike	2 kinds	3 visit	48
5	Qualified	Qualified	Dislike	2 kinds	3visit	48
6	Good	Qualified	Liked	3 kinds	2 visit	72
...	...	...	...	...	...	...

### 2.3 CONSTRUCTING DECISION TREES

By randomly choosing 20% and 80% of the valid data, respectively, training samples (285 instances) and testing samples (50 cases) were created. The former were utilized to create a decision tree model of the variables influencing the practice of teaching English at colleges and universities, while the latter were utilized for the model's evaluation and assessment [9].

The decision tree's structure is depicted in Figure 1, where it is clear that the number of student entries serves as the model's root node and is therefore the most important factor influencing students' performance in English courses. Figure 1 also demonstrates that as student entries rise, so does the percentage of students who excel in English.



**Figure 1** Decision tree model structure



### 3. ANALYSIS OF DECISION TREE RESULTS

In the SpssClementine 12.0 data mining program, the model fitting procedure was carried out via the C5 decision tree node. According to Table 2, the branch nodes' attributes were chosen to have the highest rate of information acquisition and to not be less than the average rate of information gain for all attributes.

**Table 2** Information gain and information gain rate of each attribute

Attributes	Information Gain	Information gain rate
Number of student entries	0.2236	0.6787
Teacher's skill level	0.2018	0.6531
Student preference	0.1395	0.5352
Teacher's Teaching Tools	0.1516	0.3914
Lesson time	0.0769	0.3379
Intelligence level	0.0635	0.2941
Physical ability	0.0553	0.1314

The reasons for this may include the following:

(1) In English teaching, some teachers still adopt the old teaching point of view that the main task of learning is to take examinations, which leads to students' learning English also attaching too much importance to their examination results. Therefore, when learning English, they only learn by rote and do not adopt a flexible learning style, which eventually makes students bored with the English subject and even fearful of English.

(2) Higher education is different from secondary school in that it is not only about developing students' ability to listen, speak, read, write and translate, but also about improving their overall English language ability and proficiency. Some students may be afraid of English, thinking that it is a difficult subject and that they will not be able to learn it, and gradually lose interest in learning English.

### 4. CONCLUSION

English education at colleges and universities nowadays must keep up with the changes and use new media to innovate in order to increase teaching efficacy. Information technology is advancing quickly. In order to undertake a thorough and in-depth analysis of the variables impacting the teaching of English in higher education from a holistic, systematic, and developmental viewpoint, a decision tree algorithm is utilized in this research. It is shown that the influence factor of "number of students' participation" is 0.456, which, after "preference" and "teacher's skill level," has the most effect over the choice branch. The influence factor of "preference" and "teacher's skill level" are 0.384 and 0.305 respectively, which are also important aspects of teaching English in higher education.

The discussion above is merely an attempt to use decision tree data mining technology to elevate the application of data from low-level description and inference to knowledge mining from data, building predictive models, and providing decision support. The growth of English at colleges and universities will be given new life by the integration of Internet technologies.

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**ANALYSIS OF THE EFFECT OF AROMATHERAPY ON THE RELIEF OF  
INSOMNIA SYMPTOMS IN THE ZHUANG ETHNIC GROUP MOMIE SPICE BAG  
BASED ON AN INTELLIGENT OPTIMIZATION ALGORITHM**

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## **ABSTRACT**

In this paper, 96 patients with chronic insomnia who attended the clinic from March 2022 to January 2023 were randomly divided into three groups for the study, one group received Zhuang ethnic group the Momie Spice bag aromatherapy treatment. One group received cognitive behavioural therapy and one group received pharmacological treatment. The relief of insomnia symptoms in the three study groups was compared after 5 and 10 weeks of treatment respectively. Normal measures were analysed by ANOVA and count data by chi-square test. The results showed that the anxiety and depression self-rated scores of the Zhuang ethnic group the Momie Spice bag aromatherapy group were  $39.18 \pm 2.24$  and  $49.52 \pm 3.11$  respectively after treatment, which were also the lowest compared to the other two treatments. This indicates that the Zhuang ethnic group the Momie Spice bag aromatherapy was superior to cognitive behavioural therapy in terms of overall sleep evaluation and the alleviation of negative psychological states in insomnia patients, and that the long-term effect of Morita therapy was significantly higher than that of pharmacological treatment.

## **KEYWORDS**

insomnia patients; Zhuang ethnic group Momie Spice; bag; aromatherapy; cognitive behavioural therapy; pharmacotherapy; chi-square test

## 1. INTRODUCTION

Sleep plays an extremely important role in the ability to think and function physically, and people need sufficient length and quality of sleep to ensure a normal working life [1-2]. Insomnia is a sleep disorder that usually manifests itself as the patient being physically tired but unable to fall asleep. Insomnia mostly occurs at night and can be primary or secondary [3]. Long-term insomnia can lead to depression, emotional disorders and a serious reduction in quality of life [4-5]. In recent years, as the pace of life continues to increase, the number of insomnia sufferers is increasing year by year, so research into effective treatments for chronic insomnia is necessary [6]. Current mainstream treatments for long-term insomnia include cognitive behavioural therapy and pharmacotherapy, of which cognitive behavioural therapy is a psychologically based treatment system that is currently designated as the treatment of choice for long-term insomnia by several treatment guidelines [7]. Medication refers to the use of sleeping pills to relieve insomnia, which can quickly improve the quality of sleep in the short term but do not address the root cause of the problem, Some patients have relapsed after stopping the drug while others have even shown drug resistance or addiction [8].

In this study, the Zhuang ethnic group Momie Spice bag aromatherapy was used to confirm the efficacy of the Zhuang ethnic group Momie Spice bag aromatherapy for patients with chronic insomnia, and to compare the efficacy of the Zhuang ethnic group Momie Spice bag aromatherapy with cognitive behavioural therapy and pharmacotherapy. The Zhuang ethnic group Momie Spice bag aromatherapy was compared with cognitive behavioural therapy and pharmacological treatment. The relief of insomnia symptoms in the three groups was compared after 5 and 10 weeks of treatment respectively. The data were analyzed by ANOVA and the data were analyzed by chi-square test.

## 2. INSOMNIA PATIENT PROFILE AND RESEARCH METHODOLOGY

### 2.1 GENERAL INFORMATION

A total of 96 patients with chronic insomnia were admitted to the study and all subjects were informed of the relevant instructions. The subjects signed the informed consent form for the experiment. Inclusion criteria:

(1) The patient's condition meets the conditions associated with chronic insomnia in the International Classification of Sleep Disorders, 3rd edition.

(2) The duration of the illness is more than six months and no other type of sleep treatment has been received within one month.

Exclusion criteria:

- (1) Patients with insomnia due to medication or somatic illness.
- (2) Those with a history of substance abuse.
- (3) Female patients during pregnancy and lactation.
- (4) Patients with a significant life event in the month of January.

## **2.2 RESEARCH METHODOLOGY**

The Zhuang ethnic group Momie Spice bag aromatherapy (ZM) group, cognitive behavioural therapy (CBT) group and pharmacotherapy (DT) group were divided into three equal groups (32 cases each) for the study. The Zhuang ethnic group Momie Spice bag aromatherapy, cognitive behavioural therapy (CBT) and drug treatment were applied to the three groups for a period of 10 weeks.

For the ZM group, the treatment was carried out according to the Zhuang ethnic group Momie Spice bag aromatherapy standardised practice guidelines, taking into account the linguistic and cultural characteristics of the patients in the area. The psychological mechanisms of insomnia are explained to the patients at the beginning of the treatment and the principles of spiritual interactions to help them rationalise their anxiety about insomnia itself and other real life factors. In addition, each patient is helped to set goals, change the status quo and break the bondage according to their specific situation. The intervention is conducted once a week for the first 5 weeks of treatment and once every 1 week for the second 5 weeks, with patients invited to give feedback on their feelings and experiences at the end of each intervention.

For the CBT group, a combination programme based on sleep hygiene education, sleep restriction therapy and stimulus control therapy is used. The core of this is for patients to improve their sleep both cognitively and behaviourally at the same time. In the treatment layer, patients are introduced to the science of sleep and given the correct knowledge about sleep. CBT is administered once a week for the first 5 weeks and once a week for the next 5 weeks.

For the DT group, the sleeping medication was eszopiclone tablets (1 mg/tablet), with the study subjects taking 4 mg each night at bedtime for the first 5 weeks and reducing the dose to 2 mg for the second 5 weeks.

## **2.3 OBSERVED INDICATORS**

- (1) Pittsburgh Sleep Quality Index Inventory (PSQI)

It includes 18 self-assessment entries and consists of 7 dimensions: sleep quality, time to fall asleep, sleep duration, sleep efficiency, sleep disorders, hypnotic drug application and effects of daytime functioning. For each dimension, scores are given on a scale of 0 to 3, with higher scores associated with poorer sleep quality.

## (2) Self-Rating Scale for Neuroticism by Tethering (SSTN)

The SSTN consists of 20 items and is composed of 6 dimensions: mental interaction, attention fixation, thought ambivalence, body social functioning, symptom tolerance, and desire for perfection. Each dimension is scored on a scale of 1 to 4, with the higher the score the more severe the degree of restraint.

### 3. INTERVENTION TRIAL TREATMENT RESULTS AND ANALYSIS

#### 3.1 COMPARISON OF CHANGES IN PSQI BEFORE AND AFTER PATIENTS RECEIVED THE INTERVENTION

The changes in PSQI scores of the three study groups before and after receiving the intervention are shown in Table 1. The PSQI performance of the study subjects improved significantly under all three therapies. When the experiment reached week eight, the ZM group had the lowest PSQI scores.

**Table 1 Comparison of changes in patients' PSQI scores**

Group	Before treatment	After treatment		F	P
		5 weeks	10 weeks		
ZM group	18.39±1.53	11.96±1.74	9.81±1.31	4.733	0.0005
CBT group	18.95±1.32	14.93±2.05	13.14±1.83	3.841	0.028
DT group	18.55±1.09	15.15±1.61	14.51±1.78	3.522	0.039

#### 3.2 COMPARISON OF CHANGES IN SSTN BEFORE AND AFTER PATIENTS RECEIVED THE INTERVENTION

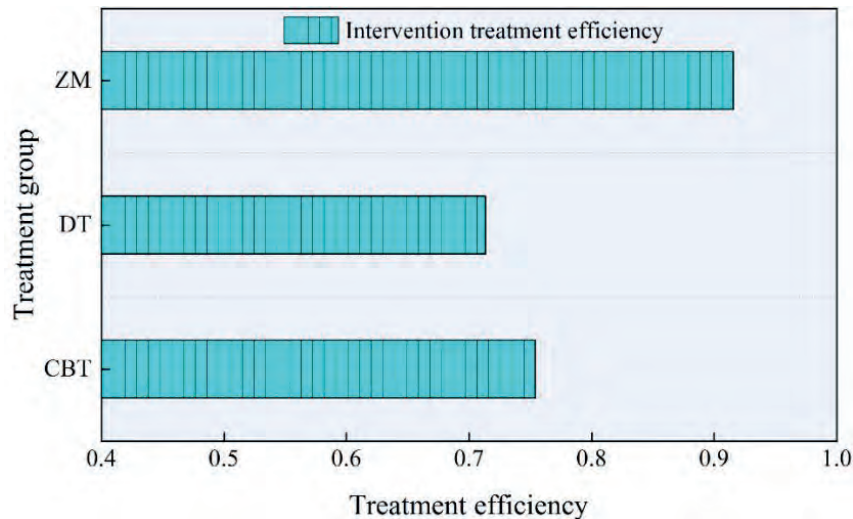
The changes in SSTN before and after the three groups of patients received the intervention are shown in Table 2. The indicator in the MT group decreased from a mean of 54.43 to 41.79 among the three groups of patients, while the other two groups did not change by more than 2.

**Table 2 Changes in patients' SSTN scores**

Item	ZM group (n = 32)		CBT group (n = 32)	
	Before treatment	After treatment	Before treatment	After treatment
Mental interaction	13.41±2.41	10.32±1.63	13.88±3.19	12.15±3.08
Attention fixation	8.41±3.15	6.75±1.22	8.93±1.37	8.09±1.39
Thought ambivalence	10.24±3.13	8.19±7.05	10.71±2.36	10.08±2.43
Body social functioning	6.48±0.96	5.86±1.47	7.39±0.99	6.63±1.42
Symptom tolerance	7.18±1.44	6.54±1.35	9.38±1.39	8.38±0.93
Total perfection desire score	4.96±0.63	4.96±0.74	4.55±0.81	4.25±0.55
Total Score	54.43±9.15	41.79±7.27	53.96±8.48	52.74±8.14

### 3.3 A COMPREHENSIVE COMPARISON OF THE EFFECTIVENESS OF TREATMENT FOR CHRONIC INSOMNIA SYMPTOMS

A comparison of the combined efficacy of the three therapies on chronic insomnia symptoms is shown in Figure 1. 75.41% and 71.33% were achieved in the CBT and DT groups respectively, while the ZM group achieved 91.58%.



**Figure 1** Comparison of the combined efficacy of the three therapies on insomnia symptoms

#### 4. CONCLUSION

In this paper, the Zhuang ethnic group Momie Spice bag aromatherapy was used to treat insomnia and to compare the relief of insomnia symptoms in the three groups after 5 and 10 weeks of treatment respectively. The normal measures were analysed by ANOVA and the count data by chi-square test. According to the PSQI test results of this trial, the PSQI scores of the ZM group decreased rapidly as the treatment proceeded, with a mean score of 8.83 at the eighth week of treatment. the CBT group showed the same downward trend, but the decrease was significantly less than that of the ZM group. the trend of the DT group showed a rapid decrease followed by a rebound, with the lowest PSQI score in the DT group at 5 weeks after the treatment examination, which represented The patients in this group had the best sleep. However, the DT group showed an increase in scores at week 8. The Zhuang ethnic group achieved a combined efficacy of 91.58% for the Momie Spice bag aromatherapy in this trial, while the other two treatments ranged from 70% to 80%. Overall, the Zhuang ethnic group Momie Spice bag aromatherapy showed the best long-term efficacy in the treatment of chronic insomnia. It was also effective in relieving anxiety and depression as well as the symptoms of being tied up in chronic insomnia, with better efficacy than traditional cognitive behavioural therapy and medication.



## FUNDING

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# RESEARCH ON DESIGN SEMIOTICS IN THE DESIGN OF GUANGXI RED TOURISM CULTURAL AND CREATIVE PRODUCTS IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

This paper analyses the development ideas of Guangxi's red tourism cultural creative products and taps into red tourism cultural resources with regional characteristics to promote the development of the local red tourism industry. With the help of a mixed qualitative and quantitative research method, it explores the relationship between the composition of the semiotic system of the tourist place and the influence it has on the construction of youth red memories. The results show that the standardised path coefficient value is  $0.231 > 0$  when the choice of semiotic design has an impact on plot memory, and this path shows a significance at the 0.01 level ( $z = 2.631, p = 0.005 < 0.01$ ). Therefore it indicates that semiotic design will have a significant positive influence relationship on red plot memory, which can effectively combine the value information, the symbolic characteristics of the tourist place, and the needs and experiences of the youth to promote the transmission of red culture.

## KEYWORDS

red tourism in Guangxi; creative products; regional characteristics; semiotics; plot memory; path coefficient; red culture

## 1. INTRODUCTION

Revolutionary museums, memorials, party history museums and other red tourism destinations are responsible for the important mission of red culture inheritance[1-3]. The Party and government have always attached importance to the status and role of red culture in ideology, and memory is an important part of culture. Whether the people can form correct and profound red memories is related to the inheritance of red culture and spirit, social identity and the enhancement of national cohesion [4-5]. Red tourism

is different from school education in that a large number of historical relics can shape a relatively independent and complete space of reality [6-7]. The literature [8] discusses the relationship between archives and memory construction, and the memory construction function of archives. It enables visitors to immerse themselves in historical sites, participate in red activities and commemorative ceremonies, and use symbolic carriers to awaken memories, pass on and promote the red spirit [9]. Based on the transformation of the memorial space into a networked space, this paper focuses on its impact on red memory and attempts to explore how red memory can be better written and passed on in the new context. With the help of a mixed method of qualitative and quantitative research, the relationship between the composition of the semiotic system of tourist places and the construction of red memories of youth is explored.

## **2 RED TOURISM CULTURAL AND CREATIVE PRODUCTS**

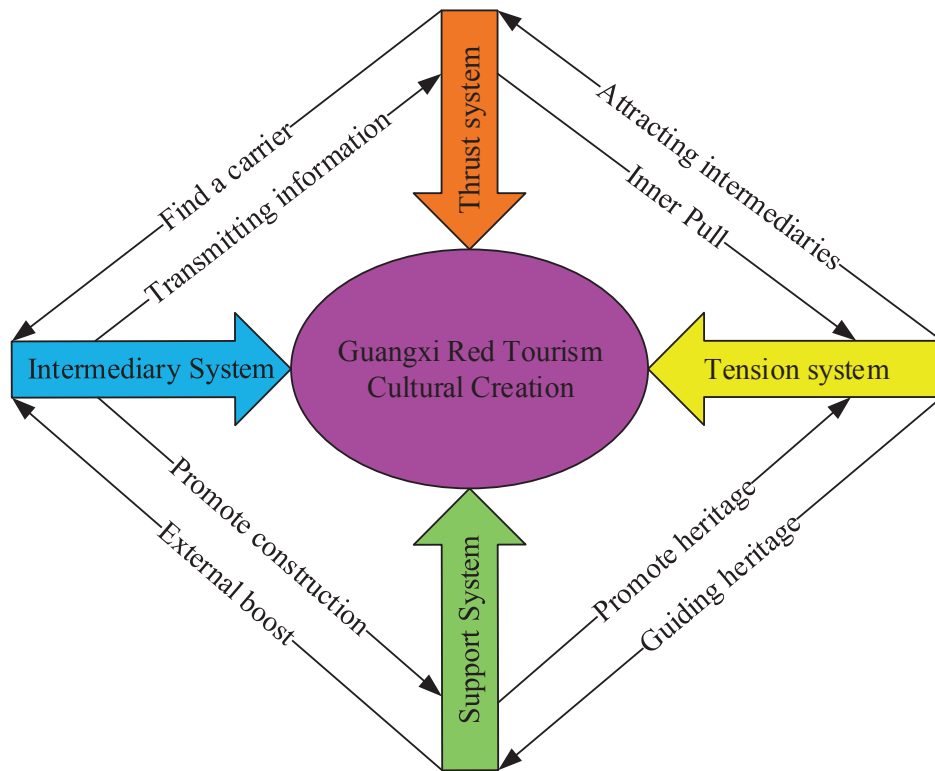
The so-called red tourism cultural creative products, as the name suggests, refer to products with creative and cultural design developed according to red tourism, which are an important part of the red tourism industry. On the one hand, they are monumental for the purchaser, and on the other hand, they can promote the local red history and culture.

### **2.1 DESIGN AND DEVELOPMENT OF RED TOURISM CULTURAL AND CREATIVE PRODUCTS**

The development and design of red tourism cultural creative products not only spreads local red culture to customers and conveys red sentiments through materialised cultural and creative products, but is also an important driving force for the development of the tourism industry for the better, and good cultural and creative products can greatly promote consumers' desire to buy. As can be seen from the above, the development and design of red tourism cultural and creative products have special significance in terms of cultural dissemination and economic development. The developers and designers should give full play to local red cultural resources and use creative expressions to design cultural and creative products with local characteristics.

### **2.2 THE RED TOURISM CULTURAL AND CREATIVE PROCESS**

In the process of developing red tourism in Guangxi region, extra attention needs to be paid to the development and design of cultural and creative products, which not only need to inject cultural connotations into the products, but also should have certain brand awareness, develop and design a series of red tourism cultural and creative products by combining the red cultural resources in Guangxi region, and build them into influential brands of cultural and creative products, the process of designing red cultural tourism cultural and creative products is shown in Figure 1.



**Figure 1** Red culture tourism creative product design process

The significance of this specifically includes:

(1) Make full use of revolutionary historical and cultural resources to form an effective protective role for various types of local revolutionary cultural heritage.

(2) Play the role of a bridge for cultural and creative products to awaken the red gene in people, revitalise red culture and convey the excellent red culture and immortal revolutionary spirit through cultural and creative products.

(3) Stimulating the growth of the local economy and promoting orderly and coordinated economic and social development, the market for cultural and creative products has unlimited vitality and possibilities, especially for red cultural and creative products, which carry special historical and cultural significance and will occupy a place in the market for cultural and creative products as long as care is taken in their development and design.

(4) Promote the development of local tourism. The cultural and creative industry with red tourism cultural derivatives as its core will become an important industry for tourism in the future, and the development and design of cultural and creative products will also have a leading and promoting role for the development of tourism.

### **3. SEMIOTIC DESIGN FOR THE CONSTRUCTION OF CULTURAL MEMORY IN RED TOURISM**

As a social memory, red memory does not only mean that the past is preserved, but also that it is reorganised, filtered, integrated and reconstructed on the basis of the 'present'. Therefore, young people's perception of the symbolic dynamics of a tourist destination is likely to influence their perception and construction of red memories. In addition, as young people generally perceive the spatial environment first when they arrive at a tourist destination, and then acquire more specific information, the place memory that may be formed has a positive effect on the episodic memory. In order to verify the influential relationship between these variables, the following hypothetical relationship is proposed in this study.

Hypothesis H1 is that the symbolic choice of tourist destination has a significant positive effect on youth's perception of episodic memory.

Hypothesis H2 is that the symbolic choice of place of travel has a significant positive effect on youths' perception of place memory.

Hypothesis H3 is that the symbolic interpretation of tourist places has a significant positive effect on youths' perception of episode memory.

Hypothesis H4 is that the symbolic interpretation of tourist places has a significant positive effect on youth's perception of place memory.

It is hypothesised that the symbolic reproduction of H5 as a tourist place has a significant positive effect on youths' perception of episode memory.

It is hypothesised that H6 is a significant positive effect of symbolic reproduction of tourist places on youths' perception of place memory.

Hypothesis H7 was that youths' place memory perceptions had a significant positive effect on their episode memory perceptions.

### **4. EMPIRICAL ANALYSIS**

The path analysis lies in the study of model impact relationships and is used to test the model hypotheses. The results of the path analysis and model testing are shown in Table 1.

**Table 1** Path analysis and model test results

Assumptions	X	Y	z-value	p-value	Path factor	Results
H1	Symbol Selection	Episodic memory	2.631	0.005	0.235	YES
H2	Symbol Selection	Place memory	2.259	0.000	0.219	YES
H3	Symbol Explanation	Episodic memory	0.137	0.836	0.009	NO
H4	Symbol interpretation	Place memory	2.582	0.035	0.153	YES
H5	Symbol Reproduction	Episode Memory	4.638	0.000	0.293	YES
H6	Symbol Reproduction	Place memory	4.833	0.000	0.337	YES
H7	Place memory	Episodic Memory	6.937	0.000	0.437	YES

The path analysis (adjusted for  $MI > 10$ ) yields whether the effect relationship between the variables is significant and whether the discriminant hypothesis relationship holds, as described in the specific data results below:

(1) The standardised path coefficient value was  $0.235 > 0$  when symbol selection had an effect on plot memory and this path showed a significance at the 0.01 level ( $z = 2.631$ ,  $p = 0.005 < 0.01$ ). Thus indicating that symbol choice produces a significant positive influence relationship on plot memory.

(2) The standardized path coefficient value was  $0.219 > 0$  for the effect of symbol selection on place memory, and this path showed a significance at the 0.01 level ( $z = 2.259$ ,  $p = 0.000 < 0.01$ ), thus indicating a significant positive relationship between symbol selection and place memory.

## 5. CONCLUSION

Relying on a semiotic perspective to examine the construction of memory in the mechanism of the red tourism process, this paper finds that the specific ways in which symbols are dynamically encoded and the effects of their presentation are important influencing factors in the construction of youth red memories. The display of tangible symbols such as artefacts, archives, pictures and sculptures, the restoration of regional places, additional explanations and descriptions, activities and rituals are the sources of information perceived by youth and the process of experience. At the same time, the perception of memory spaces stimulates the perception and memory of the historical episodes they carry. The diversity of backgrounds, perceptions of experiences and behaviours of young people all contribute, to varying degrees, to differences in the construction of memories. Therefore, red tourism sites need to take a holistic and

systematic approach, combining the value messages that the party and government must convey, the symbolic characteristics of the tourism site, and the needs and experiences of youth, in order to better realise memory construction and cultural transmission.

## FUNDING

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# ANALYSIS OF THE FACTORS INFLUENCING CONSUMERS' WILLINGNESS TO BUY ONLINE BASED ON PERSONALISED RECOMMENDATIONS

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## ABSTRACT

With the rapid development of online shopping, a variety of shopping websites have grown and competition has become increasingly fierce. This paper examines consumers' willingness to buy online under personalized recommendations in four aspects: information arrangement, recommendation strength, recommendation validity and visual cues. The findings show that recommendation strength has a significant positive effect on consumers' perceptions of emotions, while recommendation strength has no significant effect on consumers' perceived economic benefits, perceived privacy risks and perceived performance risks. Recommendation validity has a significant effect on perceived economic benefits, perceived emotional benefits and perceived performance risks. This study provides a comprehensive and objective analysis of consumers' purchase intentions, which is of guiding value to the study of online economic consumption.

## KEYWORDS

personalised recommendation; online shopping; purchase intention; influencing factors; consumers

## 1 INTRODUCTION

With the continuous growth of residents' income, residents' consumption needs are also increasing, from the original focus on consumption quantity gradually changed to focus on consumption quality [1-3]. For many shopping platforms, it is important to fully consider consumers' consumption wishes, bring them consumption convenience and make them have a good shopping experience so that they can win consumers' trust and achieve continuous improvement in performance [4-7]. At present, many shopping websites use accurate personalised recommendation systems to recommend products to consumers, but how to ensure that personalised recommendations can achieve good



marketing effects within reasonable limits, but also to satisfy consumers and maximise the value of personalised recommendations [8].

In this study, four dimensions of information arrangement, recommendation strength, recommendation effectiveness and visual cues are used to build the research model. The impact of these four dimensions on consumers' perceived benefits and perceived risks is firstly tested, and the perceived benefits are divided into perceived emotional benefits and perceived economic benefits, and the perceived risks are divided into perceived privacy risks and perceived performance risks. This is followed by an in-depth analysis of the effects of independent and mediating variables on purchase intentions. The research model in this paper covers independent, mediating and dependent variables, where the independent variable is the influence of personalised recommendations, the mediating variable is the perceived value of the consumer and the consumer's purchase intention is the dependent variable.

## **2 PERSONALISED RECOMMENDATION MODEL CONSTRUCTION AND RESEARCH HYPOTHESIS**

### **2.1 ANALYSIS OF THE FACTORS AFFECTING PERSONALISED RECOMMENDATIONS**

The online shopping market is very competitive, and how to accurately recommend products to consumers based on their preferences is an important part of the success or failure of the competition. In this regard, shopping websites should have an accurate understanding of the factors that influence personalised recommendations. Although many e-commerce companies market their products to consumers based on personalised recommendation systems, few scholars have analysed them in depth, let alone identified a personalised recommendation effectiveness model with certain applicability. For factors affecting personalised recommendation, this paper was obtained through literature reading method and interview method. The collation found that information arrangement, recommendation strength, recommendation validity and visual cues are the main factors affecting personalised recommendations.

### **2.2 RESEARCH HYPOTHESIS**

With the advent of powerful online shopping software, information is no longer presented in one form or another, and the ability to sell a product through text alone is a thing of the past. Images, audio and video are now essential content, and with the rise of live streaming, many personalised recommendation platforms are following this trend. As you can see, personalised recommendations are becoming more and more diverse and lively, and are ultimately designed to quickly capture the interest of consumers among the tens of thousands of products available, leading to purchase decisions.

Based on the above analysis, this paper proposes the following set of hypotheses: H1: Personalised recommendations have a significant impact on consumers' perceived value. H1.1: Information scheduling has a significant positive impact on consumers' perceived economic benefits. H1.4: Information arrangement has a significant negative effect on consumers' perceived performance risk. h1.5: Recommendation strength has a significant positive effect on consumers' perceived economic benefits. h1.6: Recommendation strength has a significant positive effect on consumers' perceived emotional benefits. h1.7: Recommendation strength has a significant negative effect on consumers' perceived privacy risk. h1.8: Recommendation strength has a significant positive effect on consumers' perceived performance risk. h1.9: Recommendation strength has a significant positive effect on consumers' perceived emotional benefits. H1.9: Recommendation validity has a significant positive effect on consumers' perceived economic benefits. h1.10: Recommendation validity has a significant positive effect on consumers' perceived emotional benefits. h1.11: Recommendation validity has a significant negative effect on consumers' perceived privacy risks. h1.12: Recommendation validity has a significant negative effect on consumers' H1.13: Visual cues have a significant positive effect on consumers' perceived economic benefits. h1.14: Visual cues have a significant positive effect on consumers' perceived emotional benefits. h1.15: Visual cues have a significant negative effect on consumers' perceived privacy risks. h1.16: Visual cues have a significant negative effect on consumers' perceived performance risks. h1.17: Visual cues have a significant negative effect on consumers' perceptions. h1.18: Visual cues have a significant negative effect on consumers' perceptions. H2: Personalised recommendations have a significant effect on consumers' purchase intentions H2.1: Information arrangement has a significant positive effect on consumers' purchase intentions H2.2: Recommendation strength has a significant positive effect on consumers' purchase intentions H2.3: Recommendation validity has a significant positive effect on consumers' purchase intentions H2.4: Visual cues have a significant positive effect on consumers' purchase intentions H2.4: Visual cues have a significant positive effect on consumers' purchase intention.

### **3 AN EMPIRICAL ANALYSIS OF THE IMPACT OF PERSONALISED RECOMMENDATIONS ON CONSUMERS' WILLINGNESS TO BUY ONLINE**

#### **3.1 RELEVANCE ANALYSIS**

Correlation analysis of personalised recommendations and perceived value. The correlations between the various dimensions of personalised recommendations and consumer perceived value using SPSS 20.0 software are shown in Table 1.

It can be seen that information arrangement, recommendation validity, recommendation strength and visual cues have a significant positive correlation on

consumer perceived economic benefits and consumer perceived emotional benefits, and information arrangement, recommendation strength, recommendation method and visual cues have a significant negative correlation on consumer perceived privacy risk and consumer perceived performance risk.

**Table 1** Correlation analysis of personalised recommendations and perceived value

Name		Economic	Emotional	Privacy	Performance
Rank	Pearson correlation	0.527**	0.427**	-0.427**	-0.413**
	Significance (two-sided)	0.00	0.00	0.00	0.00
Validity	Pearson correlation	0.556**	0.467**	-0.336**	-0.433**
	Significance (two-sided)	0.00	0.00	0.00	0.00
Strength	Pearson correlation	0.418**	0.444**	-0.296**	-0.324**
	Significance (bilateral)	0.00	0.00	0.00	0.00
Visual	Pearson correlation	-0.426**	0.562**	-0.493**	-0.476**
	Significance (bilateral)	0.00	0.00	0.00	0.00

The correlation analysis between perceived value and purchase intention, the correlation analysis between the dimensions of consumer perceived value and consumer purchase intention is shown in Table 2.

The results in the table show that both consumer perceived emotional benefits and perceived economic benefits have a significant positive relationship with consumer purchase intentions at the 0.02 level, while consumer perceived performance risks and consumer perceived privacy risks have a significant negative relationship with consumer purchase intentions at the 0.02 level.

**Table 2** Correlation analysis of perceived value and purchase intention

Name		Rank	Method	Strength	Visual
Purchase	Pearson correlation	0.598**	0.583**	0.511**	0.624**
	Significance (two-sided)	0.00	0.00	0.00	0.00

### 3.2 REGRESSION ANALYSIS

In this paper, information layout, recommendation validity and perceived economic benefits are selected as independent variables and purchase intention as the dependent variable, and the regression results obtained are shown in Table 3.

According to Table 3, the coefficient on the validity of the information layout recommendation is significant at the 0.99% level when the model introduces perceived economic benefits, which indicates that there is a partial mediating effect of perceived economic benefits on the validity of the information layout recommendation and purchase intentions. Similarly, the analysis of the mediating effect of perceived affective benefits shows that there is a partial mediating effect between the four variables and purchase intention for perceived affective benefits. For perceived privacy risk, there is also a partial mediating effect between the four variables and purchase intention.

**Table 3** Regression analysis results

Dependent variable	Independent variable	Non-standardised coefficients		Standard factor	T	Sig	VIF
		B	Standard error	Beta			
Willingness to buy	(constants)	0.325	0.178		1.804	0.071	
	Information layout	0.352	0.047	0.328	7.151	0.00	1.423
	Recommendation validity	0.291	0.045	0.291	6.211	0.00	1.485
	Perceptual economy	0.292	0.049	0.287	5.692	0.00	1.724

#### 4 CONCLUSION

As the advertising market continues to evolve, advertising that includes graphic and video content provides a detailed presentation of the product, allowing consumers to gain a more intuitive sense of the product, increasing consumer convenience and thus perceived emotional benefits. In addition, both perceived privacy risk and perceived performance risk are detrimental to the growth of consumers' purchase intentions, with perceived privacy risk having a greater detrimental effect than perceived performance risk. This suggests that there is some concern about consumers' personal privacy being compromised when purchasing products on websites through personalised recommendations, and that consumers' willingness to purchase will decrease or even disappear if they have serious risk concerns about the recommended products.

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# EXPLORING THE DEVELOPMENT AND APPLICATION OF COMPUTER SOFTWARE TECHNOLOGY IN THE CONTEXT OF BIG DATA

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## ABSTRACT

With the continuous development of information technology, this has also triggered a higher demand for computer-related software technology and service quality in the current society. In this paper, we first study computer software technology from three aspects: virtualization technology, cloud storage technology and data mining technology, and then analyse the application of data mining technology through simulation experiments to specifically analyse the strengths and weaknesses of cognitive function in different groups of elderly people, who maintain various ability indicators between [-2.5-1.3]. In the face of the increasing number of elderly groups, it is This will help patients and families to plan ahead and minimise financial loss and family burden. This study has practical implications for the dissemination of knowledge about cognitive function and the screening and prevention of cognitive impairment.

## KEYWORDS

virtualization technology; cloud storage technology; data mining technology; elderly population; cognitive function

## 1 INTRODUCTION

The use of computer-assisted training has been greatly promoted due to the popularity of computers and the increasing level of software development technology, which makes it convenient and flexible, greatly reduces the time of health care workers, and allows the difficulty of the training to be adjusted according to the patient's needs and cognitive ability [1-3]. The development of computer software technology has led to the increasing use of computer-assisted cognitive training in the diagnosis of dementia, disease tracking, carer support and more [4]. A cognitive scale based assessment and data management system has been developed to help cognitive

training professionals to screen and assess cognition in older adults, manage data more easily and improve the efficiency of healthcare workers [5-6].

The literature [7] describes the use of computer graphics and imaging software in marine graphic design. The authors describe how these software can be used to produce marine related visual elements and designs and illustrate the application of these tools in the marine sciences. The literature [8] describes the benefits of using computer-aided software engineering tools to develop and document product configuration systems, assesses the advantages of such tools in developing and maintaining product configuration systems, and discusses how it can be used to improve productivity and product quality.

The first part of this paper: computer software technology. Virtualisation technology, cloud storage technology and data mining technology are studied respectively, and the characteristics and application prospects of computer software technology are discussed.

The second part of this paper: analysis of the application of data mining techniques. Firstly, a simulation experimental environment is constructed, and then the cognitive ability of the elderly population is analysed by clustering with five attributes related to cognitive function, and corresponding cognitive training strategies are developed to provide personalised cognitive training services to different groups of elderly people.

## **2 COMPUTER SOFTWARE TECHNOLOGY**

### **2.1 VIRTUALISATION TECHNOLOGY**

Virtualisation technology is favoured by many Internet companies as well as research institutes to improve the content of the company's work and the progress of the research projects of the research institutes. Virtualisation technology can be used not only in computers, but also in the everyday life of the public. The incorporation of virtualisation technology in Big Data can increase the height of research in virtual technology. With the support of big data, virtualisation technology can further improve the functions of virtualisation software. In the process of virtualisation software development, some previously envisaged functions are solved by the inclusion of big data, allowing for further improvements in the innovation and future development of virtualisation technology.

### **2.2 CLOUD STORAGE TECHNOLOGY**

The most important feature of cloud storage technology is that it breaks the boundaries of time and space. When users need to access and download the stored content, they only need to connect the network terminal to the network through a computer to download and access the stored data from the cloud storage space, which

provides a lot of convenience for many enterprises and individuals. With cloud storage technology, information that is difficult to store can be stored effectively and for a longer period of time through cloud storage. These are features that are not possible with traditional storage methods. Cloud storage is a whole consisting of several storage units, and the use of virtualisation technology in computers can effectively improve the processing of information within the company, making it possible to bring the various departments of the company closer together and promote cooperation between them. As the cloud storage function is a multi-functional integration, it makes the process of storing information more convenient and provides more convenience for users.

### **2.3 DATA MINING TECHNIQUES**

Figure 1 shows the eight major application areas of data mining. Data mining is the process of collecting, collating and analysing the vast amount of information that has exploded in the current era of big data, revealing the potential value of the information hidden in this vast amount of data. Through data mining, many unrelated and illogical data can be effectively collated through data mining technology, so that the potential value hidden in it can be unearthed, enabling companies to plan their future development routes more effectively through data mining technology. Data mining can also be used in various fields such as healthcare and the military. Data mining is the process of analysing the knowledge in a database to discover its potential value. The main steps are:

(1) Preliminary data collection is needed for preparation. Through the web crawler technology or some usual accumulated data, do the preliminary data preparation work.

(2) Data pre-processing work, through which a number of different data types can be transformed, a large number of duplicate values, null values, missing values of data or the current data to find the variance, summation and other operations.

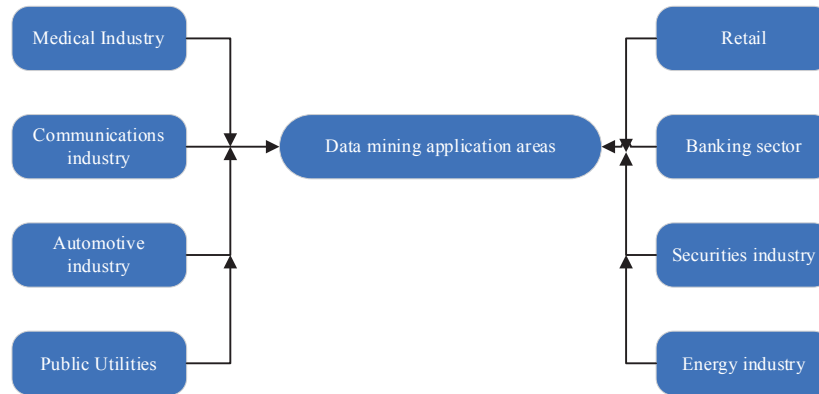
(3) Data mining. By organising the pre-processed data through algorithms, the current data can be analysed effectively and valuable information hidden behind the data can be unearthed.

(4) Interpretation and validation of mining results. By dividing the data into training data and test data, these different data are interpreted and restricted.

Data mining technology is a complex and tedious technique. Preparation and planning in the early stages are the basis on which the subsequent work can be carried out in an orderly manner. The pre-processing of the data in the medium term is what takes up the longest time in the data mining process. The invalid data has to be eliminated and the valid data retained for the operations to be carried out and in the context of the actual situation. This step also requires a lot of time and effort on the part



of the engineer, including the purification of data, the integration of variables and the linking of data tables.



**Figure 1** Eight application areas for data mining

### **3 ANALYSIS OF THE APPLICATION OF DATA MINING TECHNIQUES**

#### **3.1 SIMULATION OF EXPERIMENTAL ENVIRONMENTS**

The experimental environment requires an Intel core series i5 or above processor, 4.0GB or above capacity memory and 100GB or above capacity hard disk. In terms of software, a Windows operating system is used and the system needs to have Java software and Matlab software installed as well as other commonly used software.

#### **3.2 CLUSTER ANALYSIS OF OLDER PEOPLE WITH DIFFERENT COGNITIVE ABILITIES**

The results of the cluster analysis of the cognitive ability of the elderly population using five attributes related to cognitive function are shown in Table 1 below. It can be seen that the older adult group 1 is the largest on the D (delayed recall ability) attribute and the smallest on the O (orienting power) attribute. Older adult cohort 2 was the largest on the O (orienting power) attribute and the smallest on the A (attention and computational power) attribute. Older adult group 3 has the greatest I (immediate memory) attribute and the least O (orienting power) attribute. Older adult group 4 was greatest on the A (attention and computational power) attribute and least on the D (delayed recall ability) attribute.

**Table 1** Clustering results of the elderly with different cognitive abilities

Cluster Category	Number of clusters	Cluster center				
		O	A	L	I	D
Elderly population 1	5	-2.446	-1.168	-1.355	-0.953	-0.945
Elderly population 2	17	0.212	-0.943	0.161	0.084	0.203
Elderly population 3	11	0.634	0.827	0.702	1.310	1.208
Elderly population 4	21	0.041	0.642	-0.227	-0.623	-0.672

#### 4 CONCLUSION

With the continuous development of society, science and technology have made great contributions to the residents of China, and the rapid development in computers has made the people now in the era of big data. This paper uses data mining techniques to classify the elderly population, explore and analyse the impact of personal factors on cognitive ability, and analyse the strengths and weaknesses of different categories of the elderly population in various cognitive functions. Early screening for cognitive function is therefore crucial, and early prevention can help patients and families plan for it.

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# BIG DATA-BASED ANALYSIS OF PLASMA AND SLIDING ARC DISCHARGE PLASMA TECHNOLOGY FOR FORAGE SEED DISINFECTION AND STERILIZATION

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## ABSTRACT

With the continuous development of computer technology and big data, residents' lives cannot be separated from various types of computer software. This paper studies the production principle of strong acidic oxidized ionized water, sterilization mechanism, use characteristics, precautions, application prospects and problems. The technology is an environmentally friendly disinfection and sterilization technology with a wide sterilization spectrum, strong sterilization effectiveness, low price and easy production. The results of the disinfection treatment of 15 species of seeds for ecological restoration of mine waste sites, such as alfalfa and purple acacia, with chlorothalonil, potassium permanganate, formaldehyde and boiling water scalding showed that the mould rate was the highest when treated with potassium permanganate solution and the lowest when treated with chlorothalonil, and the difference between the two was significant at the level of 4.99% and not significant at the level of 0.99%. This study has some ecological and economic significance in the disinfection of seeds with bacteria.

## KEYWORDS

strong acidity; plasma; disinfection and sterilization; carrier seeds; mould rate

## 1 INTRODUCTION

With the development of the global livestock industry, natural grasslands have been overloaded and overgrazed for a long time, degradation is serious, and good forage grasses are decreasing day by day. To carry out grassland improvement, excellent grass seeds are needed first [1-2]. However, due to the unregulated seed market and the imperfect quarantine system for the transfer of domestic germplasm resources, the purchased seeds often carry a large number of fungi, bacteria and other harmful microorganisms, and the use of such seeds not only affects seed germination, but also causes the spread of diseases and pollution of the soil and ecological environment [3-

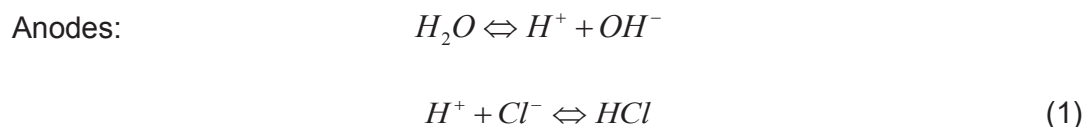
4]. The disinfection of seeds with bacteria before sowing has certain ecological and economic significance [5]. Licorice, also known as sweet grass, is a perennial herb in the legume family. Its rhizome and roots contain a variety of substances such as dried oxalic acid, reducing sugar, starch and gum, which can clear heat and detoxify the body, tonify the spleen and benefit the qi, treat sore throat, cure hyperalgesia, have significant effects on peptic ulcers and jaundice, and enhance human immunity [6-7]. As a result, it has high medicinal value and is classified as a key proprietary medicinal material by the state. Due to the exponential increase in global usage, wild licorice resources are increasingly depleted. Therefore, the state and relevant departments strongly advocate the artificial cultivation of licorice on a large scale to solve the demand of licorice pharmacogen [8-9].

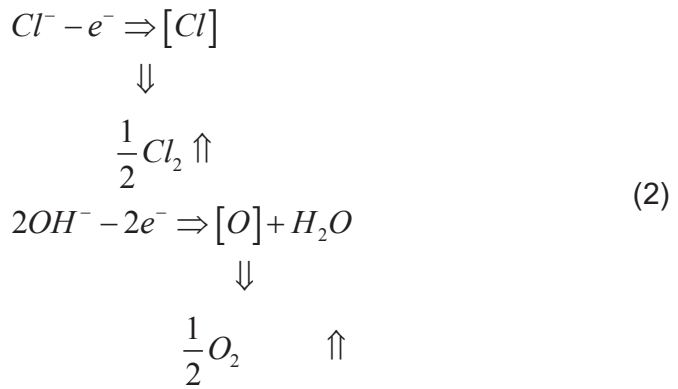
This paper firstly investigates the generation principle of strong acidic oxidised ionised water technology, as well as the bactericidal properties and mechanism of strong acidic oxidised ionised water. Then experimental materials and methods are selected to analyse the effect of strong acidic oxidised ionised water technology on forage seeds with bacteria and germination, and the effect of different disinfection treatments on the rate of mould, and the importance of the research results to promote the growth and medical development of liquorice seeds.

## **2 STRONGLY ACIDIC OXIDISED IONISED WATER TECHNOLOGY**

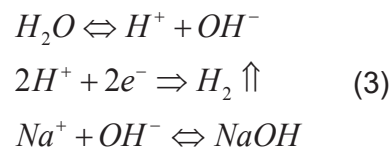
### **2.1 PRINCIPLE OF THE GENERATION OF STRONGLY ACIDIC OXIDISED IONISED WATER**

Strongly acidic oxidised ionised water is generated by adding less than 0.1% NaCl to normal tap water and then electrolysing it in an electrolytic cross with an ion exchange diaphragm between the cathode and anode, as shown in Figure 1. The following electrochemical reactions will occur in the vicinity of the anode and cathode respectively:

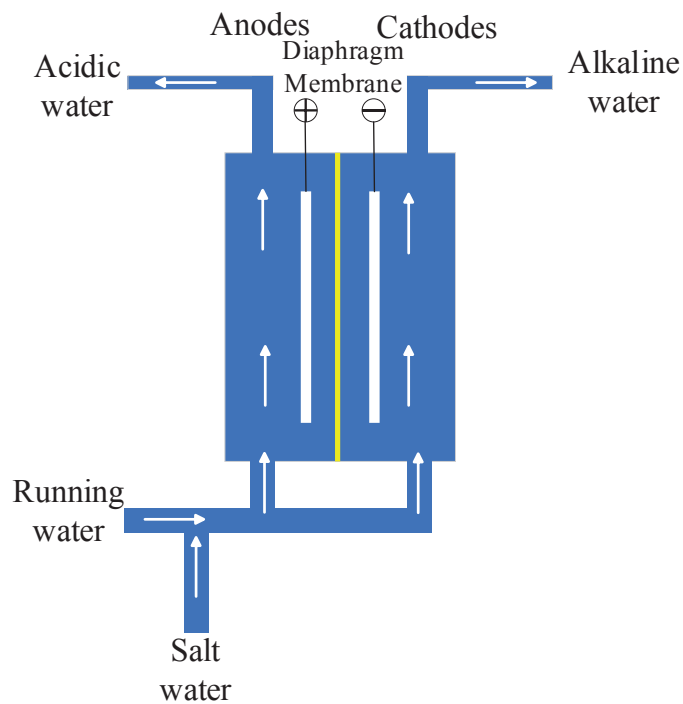




Cathodes:



Thus a colourless, transparent, non-irritating and odourless liquid with strong acidity and redox capacity and low residual dissolved chlorine is obtained at the anode. Its redox potential (ORP value) is >110mv and acidity (pH value) <2.6 residual solution is 2049ppm.



**Figure 1** Principle of strongly acidic oxidised ionised water generation

## 2.2 STERILISATION PROPERTIES AND MECHANISM OF STRONGLY ACIDIC OXIDISED IONISED WATER

Table 1 shows the sterilization effect of strongly acidic oxidized ionized water on *Bacillus subtilis* black variant budding hold. A number of studies at home and abroad have proved that strongly acidic oxidised ionised water has a broad bactericidal

spectrum and is rapidly sterilised, killing not only bacterial propagules, viruses, but also a wide range of pathogenic microorganisms such as budding spores. The time required to kill pathogenic microorganisms generally does not exceed 5 seconds, and the longest is 2.5 minutes. Killing of fungi generally takes between 5 and 30 seconds, with the longest being no more than 5 minutes for *Bacillus cereus*. Antifungal does not exceed 2.5 minutes.

Laboratory sterilisation tests show that strong acidic oxidised ionised water without organic matter can completely kill bacterial colonies such as *E. coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* including MRSA and gonococcus in 15 to 30 seconds. 30 seconds of action can completely destroy the surface antigen of hepatitis B and kill the AIDS virus. It can kill *Candida albicans* in 10 minutes and *Bacillus subtilis* black variant in 10-20 minutes.

Strong acidic oxidation ionized water sterilization mechanism has physical theory, chemical theory, electron movement theory and electric conduction theory, etc., but the current academic community recognized as the physical theory and chemical theory.

Physical theory: mainly including redox potential theory, electron movement theory and electric conduction theory, etc. Before 1994, people generally accept the physical chemistry theory proposed by Becking in 1960, that the acidic oxidation potential of water with low pH2.7 and high ORP+1100mV is beyond the survival range of microorganisms, and make the membrane potential of microbial cells change, which leads to cell membrane Increased permeability and destruction of cellular metabolic enzymes for the purpose of killing microorganisms.

The low pH and high ORP is not the main factor in its bactericidal properties. The main components of bactericidal activity include hypochlorous acid, hydrogen peroxide and OH groups. Interestingly, these components are identical to the composition of reactive oxygen species, which are responsible for the bactericidal effect of neutrophils. 1998 saw the confirmation of the effective oxygen theory, which established that effective chlorine in acidic oxidation potential water is the most important flash factor in the killing of pathogenic microorganisms.

**Table 1** Sterilization of *Bacillus subtilis* black variant bud-hold by strongly acidic oxidized ionized water

Redox potential ORP value (mV)	pH value	Organic concentration ( % )	Killing rates at different times of action ( % )				Number of control bacteria ( $\times 10^6$ cfu/ml)
			2min	5min	10min	20min	
1131	2.7	0	39.51	99.96	100.0	100.0	1.14
1022	3.2	0	89.75	90.25	89.43	89.33	9.51
1131	2.7	9.9	15.00	18.91	17.51	19.51	2.01

### 3 EFFECT OF STRONGLY ACIDIC OXIDIZED IONIZED WATER TECHNOLOGY ON FORAGE SEED CARRYING AND GERMINATION

#### 3.1 TEST MATERIALS AND METHODS

##### 3.1.1 TEST MATERIAL

The seeds for ecological restoration were ryegrass, chokeberry, wattle, malan, white-flowered grey-leaved bean, grass mignonette, hoodia, multi-flowered mullein, sativa, acacia, purple-fringed acacia, horse spurge, bermudagrass, beautiful hoodia and forage seeds of 15 species. The seeds were purchased from Henan Huafeng Seed Company, and the reagents and containers required were chlorothalonil, potassium permanganate, formaldehyde, filter paper and petri dishes.

##### 3.1.2 EXPERIMENTAL METHODS

Table 2 shows the experimental design. The experiment was set up with 5 treatments, seeds were soaked in chlorothalonil wettable powder 500 times, 0.49% potassium permanganate solution, 0.079% formaldehyde solution for 12 h. The seeds were scalded in boiling water for 5 min, followed by soaking in sterile water for 12 h. The control was soaked in sterile water for 12 h. Twenty sterile Petri dishes of the same size were taken. Incubate at room temperature, observe and record regularly every day, and after 7d, count the percentage of mouldy seeds and germination rate of each treatment. Repeat 3 times and take the average.

**Table 2** Experimental design

Processing number	Pharmaceuticals	Processing time
1	Chlorothalonil 500 times solution	12h
2	0.49% potassium permanganate solution	12h
3	0.079% formaldehyde solution	12h
4	After scalding the seeds in boiling water for 5min, soak the seeds in sterile water for 12h	5min
5 ( CK )	Soaking seeds in sterile water	12h

#### 3.2 EFFECT OF DIFFERENT DISINFECTION TREATMENTS ON THE RATE OF MOULD DEVELOPMENT

Table 3 shows the mould rate of the seeds with different treatments, and Table 4 shows the difference test of the effect of several chemical treatments on the mould of the seeds. From Table 3, it can be seen that different disinfection treatments have different effects on the disinfection of different seeds, and the best treatment with Chlorothalonil 500 times solution, 15 seeds have no mould. The next best treatment was with 0.079% formaldehyde solution, only a small amount of mildew was found in the small crown flower and purple acacia, the others were free of mildew. Treatment with 0.49% potassium permanganate solution and treatment with boiling water scalding



seeds, the effect is not significantly different from warm water immersion seeds, as can be seen from Table 4, the treatment with potassium permanganate solution is the highest rate of mould, while the lowest treatment with chlorothalonil, the two at the level of 4.99% difference is significant, at the level of 0.99% difference is not significant. The differences between the other treatments were not significant. The highest percentage of mould was found in the control treatment of purple locust seeds up to 68.29%, which may be related to the quality of the seeds.

**Table 3** Mold rate of seeds with different treatments

Processing number	Rye grass	Small crown flower	thorns	Malan	white flower grey	Herb Mignonette	Eyelash beard seeds
1	0	0	0	0	0	0	0
2	0	3.29	4.99	3.29	13.29	0	0
3	0	1.69	0	0	0	0	0
4	0	0	0	0	0	0	1.69
5	0	3.29	0	0	6.69	0	0
Multiflora Magnolia	Sardarwan	Acacia	purple locust	horse thorn	Passiflora	beautiful beard seeds	molasses grass
0	0	0	0	0	0	0	0
0	0	11.69	53.29	1.69	0	3.29	0
0	0	0	9.99	0	0	0	0
0	0	3.29	9.99	0	0	0	0
0	0	3.29	68.29	9.99	0	1.69	0

**Table 4** Examination of differences in the effects of several chemical treatments on seed mold

Processing	Mold rate (%)
1	0
2	6.32
3	0.77
4	0.91
5	5.97

#### 4 CONCLUSION

In this paper, on the basis of big data, this paper uses chlorothalonil potassium permanganate A and boiling water scalding to sterilise 15 kinds of seeds for ecological restoration of mine waste land, such as purple flowering first purple spike acacia, the results show that the best sterilisation effect on seeds with chlorothalonil and the worst effect with potassium permanganate: boiling water scalding has a better sterilisation effect on larger leguminous seeds, while it has a greater harm to small leguminous seeds From the point of view of improving germination rate, the best effect This may be related to the germination characteristics of the seeds themselves. In combination with the practical application of ecological restoration in mines, the seeds can be disinfected with 500 times solution of Bacitracin and the germination rate can be used to calculate the amount of seeds used to ensure that the seeds can produce enough seedlings to play a role in ecological restoration.

## ABOUT THE AUTHOR

Hanchu Jia(2003.10), female, Han, from Dandong, Liaoning, is a 2021 undergraduate student at Yantai Research Institute of China Agricultural University, whose main research direction is facility agricultural science and engineering.

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# ANALYSIS OF THE IMPACT OF REFLECTIVE JOURNALING ON ENGLISH WRITING SKILLS IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This study focuses on the effects of reflective journaling on English writing skills. In the context of big data, the attention received and students' engagement in all aspects of writing were explored by analyzing students' timely records of the entire process of completing time-limited compositions under the teaching experiment, including records of the first draft, revised draft, and final draft of each writing. Results showed that no student among the 40 students engaged in only one level of reflection, and every student engaged in at least two levels of reflection. The study used the reflection logs to gain an accurate understanding of the variability in students' focus of attention and levels of reflection in their writing, and thus the reflection logs have some advantages for improving students' critical writing skills.

## KEYWORDS

Reflective journal; English writing skills; Teaching writing discernment; Writing engagement; Levels of reflection

## 1. INTRODUCTION

Writing is a form of social dialogue, which has commonalities and individuality with oral dialogue, the commonality being that both focus on interactivity, and the individuality being that writing is a purely theoretical dialogue with words as the carrier. It is obvious that to write a quality article efficiently requires the writer to have deep writing skills, rich material, rigorous logical thinking and organizational structure [1].

Teaching necessarily involves both "teaching" and "learning" subjects. At present, there are more studies on the factors considered by teachers in reflective teaching, but not enough attention is paid to the factors of students. The learning reflective journal coincides with the goal of developing critical thinking skills, which consists of three dimensions: analysis, evaluation, and improvement [2-3].

A reflective journal is an activity in which students critically re-conceptualize the learning process and learning outcomes mainly in the form of writing in class [4-5]. The literature [6] analyzed that reflective journal has the significance of reviewing the learning process and analyzing the learning outcomes from the content perspective, and the literature [7] that writing a reflective journal enables students to clarify the learning plan, examine the learning process, measure the learning outcomes, regulate the learning deficit, and adjust the learning

process, and DM Jannah [8] conducted an experiment to analyze the effect of reflective journal on students' writing skills by monitoring their test scores of writing, it was concluded that reflective journaling is advantageous in improving students' writing skills.

This paper designed a teaching experiment, supplemented by an empirical study with questionnaires and interview assessments to understand the effectiveness of teaching the application and writing process of reflective journaling.

## **2. REFLECTIVE JOURNAL IN THE CONTEXT OF BIG DATA**

In the context of big data, more and more English teachers are adopting a combination of reflective journaling, English writing and big data to advance students' English writing thinking skills. Students record their perceptions, feelings and strategies about their subject learning in the form of journal entries, and reflect on and evaluate their subject learning in order to achieve a learning process that has the dual effect of causing reflection with learning and promoting learning with reflection.

### **2.1. THE USE OF REFLECTIVE JOURNALING IN ENGLISH WRITING SKILLS**

Reflective journaling has a positive impact on students' learning process:

(1) Using the reflective journal learning approach to English teaching activities makes students' English learning subject status established and recognized, so that students will conduct independent English writing learning based on their own English learning foundation, learning habits and learning levels, which not only stimulates students' passion for writing, but also pulls students' self-awareness and makes them voluntarily participate in English writing teaching activities, which helps improve This helps students to improve their English writing skills.

(2) Reflective journal learning process is essentially a process of thinking movement, students reflect on their English learning through the journal, have a precise idea of their English writing ability, accordingly this understanding can drive students to improve their English writing ability, then, once students form English thinking ability, they can make their English writing level break through the limits of the text level And it is rich in connotation.

### **2.2. THE DEVELOPMENT OF STUDENTS' CRITICAL THINKING SKILLS BY REFLECTIVE JOURNALING**

Thinking ability, also known as critical thinking ability or judgmental thinking ability, is an important part of secondary school students' comprehensive quality. Writing in English is a complex thinking activity, an important way of expressing students' thoughts and a comprehensive ability, but there are few studies, especially empirical studies, on secondary school students' discursive skills and writing level. Therefore, it is necessary to understand secondary school students' current discursive tendencies and the influence of discursive skills on secondary school English writing.

## **3. THE APPLICATION OF REFLECTIVE JOURNAL IN ENGLISH WRITING**

### **3.1. HIERARCHY OF REFLECTION IN THE STUDENT REFLECTION LOG**

To investigate the effect of reflection journals on English writing skills, 120 reflection journals submitted by 40 students were analyzed to classify the difficulty of students' reflections into:

Type A general reflection, objectively describing and recording events as they occur.

Class B process reflection, vertical reflection, puts one's writing process in the time dimension and re-examines and sorts it out.

Category C comprehensive reflection, a combination of vertical and horizontal reflection, opens up ideas and analyzes causes through peer learning.

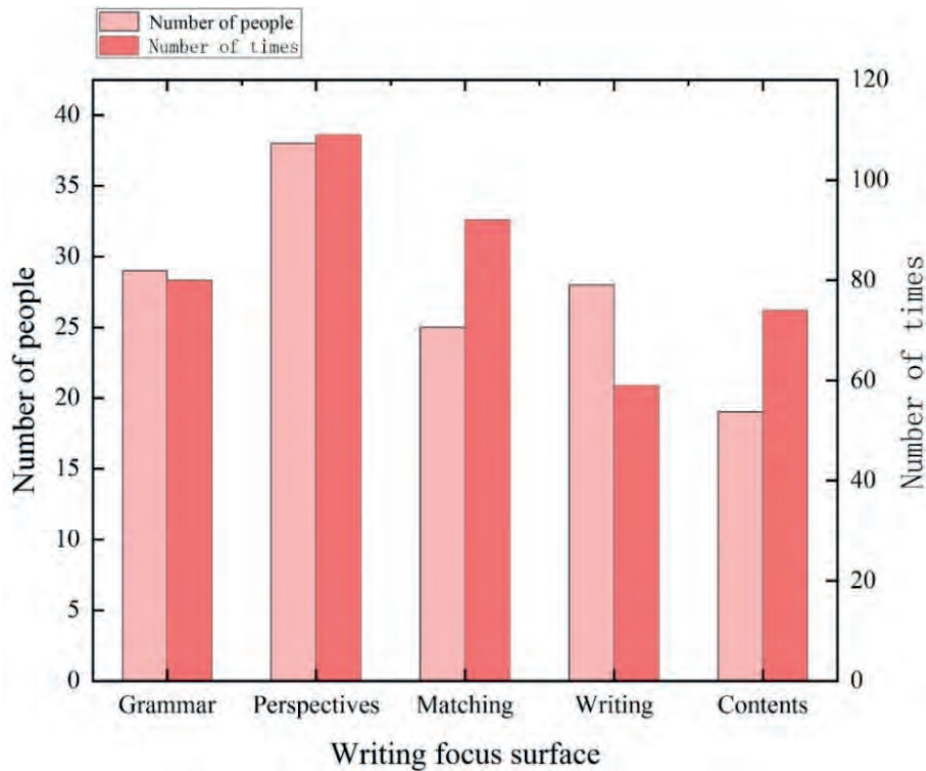
Layers of reflection were created, and the results of the layers are shown in Table 1. Students did not deliberately avoid a particular type of reflection because it was more demanding on their thinking. All students engaged in reflection at the reason identification level, which requires a high level of critical thinking skills. 40 students, none of whom engaged in only one level of reflection, each engaged in at least two levels of reflection. Specifically, if the five levels are integrated into three levels, A, B, and C, then 14 students reflected in category C, 38 students in categories A and C, 57 students in categories B and C, and 56 students in categories A and B. It can be seen that the students analyzed the problem from multiple perspectives and had a wide range of ideas.

**Table 1.** Hierarchy of reflections in the reflective journal

Levels of Reflection	Description of the event	Process review	Identification of causes	Improvements	Event Evaluation
Number of people	31	25	32	14	7
Percentage of total	77.5%	62.5%	80%	35%	17.5%

### 3.2. SURVEY RESEARCH REFLECTIVE LOG FEEDBACK QUESTIONS

Students analyze and reflect on their performance and problems in the essay and write a reflection log to be given to the teacher of the class. After receiving the students' reflection logs, the classroom teachers wrote feedback or answered the students' confusion and returned them in a timely manner. In order to accurately understand the differences in students' focus and reflection levels in writing, this study randomly selected a total of 100 reflection logs of 20 students in the experimental class for five compositions to analyze, in order to grasp the reality of secondary school students' discursive ability in English writing, compare the reflection logs centrally, set up a questionnaire, and then derive the proportion of each concern. The results of the analysis are shown in Figure 1, which shows that the main areas of concern are grammar, opinion, fixed collocation, writing, composition content, and other formal aspects of composition. The most concerned area was opinion, and 17 students reflected on how to understand the opinion of the essay in English writing in their reflection logs. On the other hand, through the descriptions in the students' reflection journals, the teachers understood the problems and confusions of the students in writing and gave them appropriate help in the classroom. The teacher also gave help to the students by describing their problems and confusions in their writing, and emphasized the logical coherence of content, chapter structure, writing skills and sentence choice in class.



**Figure 1.** The attention received by all aspects of writing

#### 4. CONCLUSION

Undoubtedly, English teachers' adoption of reflective journaling strategies to promote students' English writing thinking skills is a pedagogical exploration by English teachers to deepen the innovation of the high school English curriculum, and is also an individual demand of students' desire to be respected and recognized for their self-learning differences. Only when English teachers enhance students' English writing thinking skills at the level of reflective English writing learning strategies can they solve the current situation of students' low English writing standards at the root, and also win students' support and participation psychologically, so that students can develop English thinking skills and eventually enhance their passion for English writing and achieve breakthroughs in English writing standards.

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# RESEARCH ON THE DEVELOPMENT PATH OF UNIVERSITY THINKING EDUCATION ON STUDENTS' MENTAL HEALTH EDUCATION UNDER THE BACKGROUND OF BIG DATA

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## ABSTRACT

To provide a course for college cognitive education that will better prepare students for their mental health. This paper analyzes college students' self-perception through big data to understand students' self-perception bias and the sources of negative emotions of contemporary college students. This is used to innovate the working mode, improve mental health education and guide college students to form positive psychological qualities. The results show that negative emotions among students mainly come from academic aspects, accounting for 25.7% of the total. The next is "emotional problems", accounting for 16.4%. This study offers a fresh direction for the university students' psychological health education.

## KEYWORDS

Mental health education; Ideological and political education; Psychological quality; Self-perception bias; Negative emotions

## 1. INTRODUCTION

Psychology is the human brain's subjective reflection of reality, and the psychological content as a criteria of division primarily refers to the total of the continuous and stable psychological traits of the individual that set them apart from other individuals in different situations and operate on their own external and behavioral patterns, and personality needs to be reflected and developed by virtue of psychological processes and cannot exist independently [1-2]. When it comes to substance, ideological and political education crosses over with the development of pupils' advantageous psychological traits. Particularly, it may be seen in the education of life perspective, which includes the education of ideas and beliefs, the education of life values, and the education of life values [3-4].

First and foremost, ideological and political education's primary aim in educating college students about ideas and beliefs is to allow them to lay a solid spiritual foundation [5]. Psychological reasons are frequently the underlying cause when college students believe that the ideal and reality are quite different from one another, since this causes them to lose confidence in life and become confused [6]. College students in the modern period must possess a number of good psychological traits, according to the physiological as well as unique characteristics of the law governing their psychological development [7]. The development of college students' positive psychological traits also lays the psychological groundwork for ideological and political education and aids in the achievement of the goal of ideological and political education, which is to establish moral education. At the same time,



the development of college students' ideology and morality cannot be accomplished without the support of psychological factors [8–9].

## **2. THE IMPORTANCE OF CIVIC EDUCATION IN MENTAL HEALTH EDUCATION IN THE CONTEXT OF BIG DATA**

### **2.1. ADVANTAGES OF CIVIC EDUCATION IN THE CONTEXT OF BIG DATA**

In colleges and universities, mental health education plays a significant role in the ideological and political curriculum as well as the talent development program. The information age has penetrated modern society, and by integrating resources for civic and political education with big data and improving curriculum delivery techniques, the goal of all-round education of all staffs and processes can be realized. The advantages of Big Data Civic Education as a new type of Civic Education are:

(1) It can help conventional civic education transcend its geographical and temporal boundaries and adopt the qualities of openness and timeliness.

(2) It may encourage the thorough integration of professional knowledge education and civic education, and it can create an all-encompassing educational environment both inside and outside of the classroom, online and off.

(3) Through open curriculum learning, it may take use of the network to compile high-quality curriculum resources across the country and solve the issue of uneven educational levels brought on by regional variances.

### **2.2. MENTAL HEALTH EDUCATION AND CIVIC EDUCATION SYSTEM IN COLLEGES AND UNIVERSITIES**

Three features are now prevalent in Chinese college students' mental health education:

(1) Marxism and other political ideologies serve as the guiding ideologies for mental health education, which means that it must adhere to ideological and political standards in order to serve intellectual and political education more effectively.

(2) The administration of mental health education is controlled by the school's several administrative divisions, which are based on an ideological and political management structure. They are in charge of doing research, creating work plans, relevant systems, and coordinating the activities of mental health education.

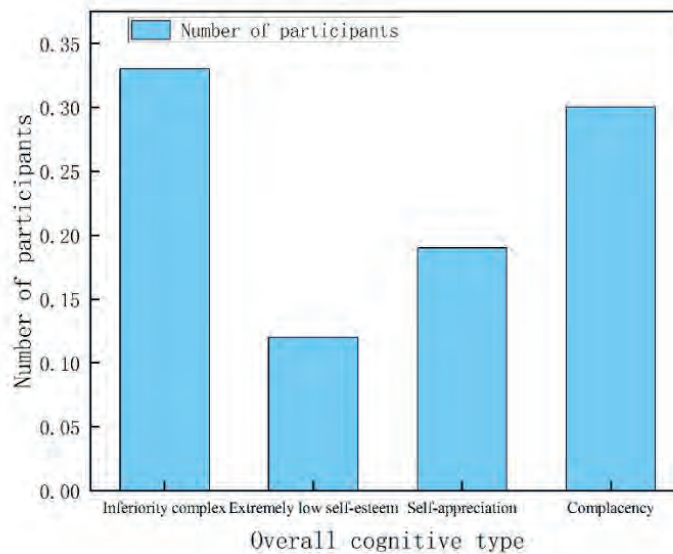
(3) Professional instructors deliver the mental health education classes, but thought and government employees provide the psychological therapy services.

## **3. ANALYSIS OF THE CURRENT PSYCHOLOGICAL QUALITY OF COLLEGE STUDENTS BASED ON BIG DATA**

### **3.1. SELF-PERCEPTION ANALYSIS**

College students' perceptions of themselves are depicted in Fig. 1 based on an investigation of big data technologies. 19% of college students have the cognitive bias of “appreciating their own merits, but sometimes being complacent about their merits”, and these students with conceited mentality tend to overestimate themselves, be proud and arrogant, and be blindly optimistic, which inevitably leads to This will inevitably lead to mistakes in life and study. 33% of college students have the cognitive bias of “appreciating their own merits, but sometimes they have low self-esteem”, and 12% of them even choose to “complain about their shortcomings and have extremely low self-esteem”. This is an emotional experience brought about by the low self-concept of college students. These college students who have low self-concept feel dissatisfied with their own ability, character or

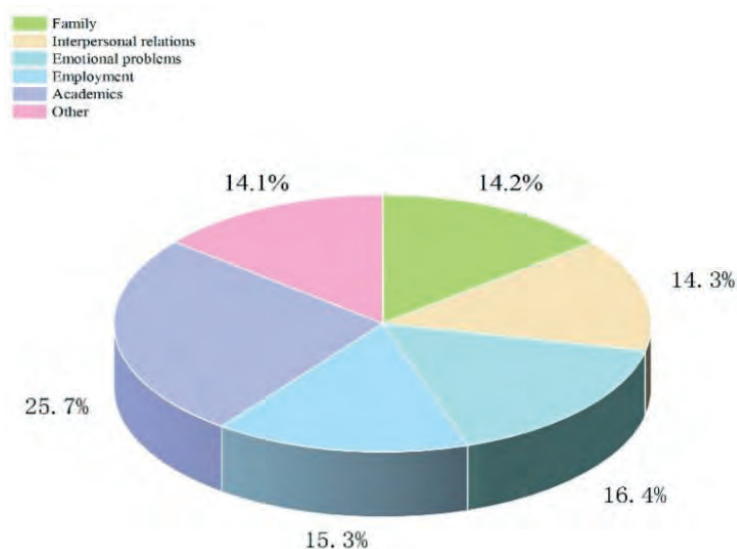
behavioral performance, lack confidence in what they want to do, easily deny themselves, and do not pay attention to the value of self-existence.



**Figure 1.** Self-perception of university students

### 3.2. ANALYSIS OF NEGATIVE EMOTIONS

As Chinese schoolchildren's psychological development moves from sensitivity to stability, their negative emotions are becoming more pronounced and are more susceptible to outside influences. Figure 2 displays the origins of unpleasant feelings among current college students after big data technology study. "Family" accounts for 14.2%, "interpersonal relationship" accounts for 14.3%, "emotional problems" accounts for 16.4%, "employment The percentage of "family" is 14.2%, "interpersonal relationship" is 14.3%, "emotional problems" is 16.4%, "employment" is 15.3%, "academic" is 25.7%, and other negative emotions are 14.1%. It can be seen that college students have various negative emotions in different degrees in academics and interpersonal communication.



**Figure 2.** Negative emotions of contemporary university students

### 3.3. THE APPLICATION OF COLLEGE CIVIC EDUCATION IN MENTAL HEALTH

(1) Encourage the co-development of thought politics and mental health education

The development of Big Data The objectives of mental health education should be reformulated and made congruent with those of civic education so that they can work together to sustain mental health and advance civic education.

(2) Encourage localization and political thought on mental health education

It is necessary to follow the principles of socialist theories with Chinese characteristics, investigate the evolution of mental health education in accordance with Chinese circumstances, encourage the localization of the fundamental theories of mental health education, and develop Chinese conceptual frameworks and theoretical models for mental health education using big data technology, study the unique behavioral characteristics and influencing factors of Chinese people, and revise and design psychometric tools suitable for Chinese people.

(3) Improve the Civic Education management system using big data as a foundation.

A big data-based approach to civic education really combines technology tools with mental health education teaching strategies. Civic education will provide better practical results if proper teaching strategies are chosen and are supported by cutting-edge technological tools.

#### 4. CONCLUSION

Chinese colleges and universities have just recently begun to build their mental health curricula. These days, even though the State and the Party have steadily managed the growth of mental health education in colleges and universities through a number of laws and regulations, despite the fact that the "political" aspect of mental health education in colleges and universities has been established at the policy level, due to misunderstandings and flaws in public perception, and because of the long way it still has to go before becoming standardized, its construction and development still need to be researched and practiced.

Considering the political and ideological training received at colleges and universities against the backdrop of big data, in combination with the state of higher education today and its defining qualities, an examination of mental health education in colleges and universities is conducted, it is sorted out how mental health education has evolved in Chinese colleges and universities, Efforts are made to reflect the fundamental elements of mental health education in Chinese colleges and universities, and the manner of mental health education in colleges and universities is strategically placed, which has significant practical value in addition to enriching the theoretical framework and substance of ideological and political education, which may more effectively adapt to and fulfill the requirements of students who are receiving mental health education services, as well as support the growth and enhancement of mental health education work at colleges and universities.

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# THE APPLICATION OF BIG DATA TECHNOLOGY IN UNIVERSITY MUSIC INFORMATIZATION TEACHING

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## ABSTRACT

This paper applies big data technology to university music informational teaching and discusses the impact of information technology on music classroom teaching. The characteristics of the information technology music teaching platform are analyzed, and on this basis the information technology platform is designed to be more suitable for music classroom teaching. The results showed that the I rating, which considered the operation simple and quick, accounted for 63% of the teachers' opinion that the use of the platform was conducive to the adoption of a variety of music teaching, while the II rating, which considered the operation somewhat difficult but improved after skilled platform operation, accounted for 27%. The application of big data technology to music informatics teaching has some practical significance for teachers to be able to teach music easily and quickly.

## KEYWORDS

Music informatization; University music teaching; Informatization platform; Music teaching system; Informatization teaching

## 1. INTRODUCTION

With the deepening of quality education, general education awareness, and the promulgation and implementation of the Ministry of Education to strengthen literature arts education in public colleges and universities, music education in Chinese colleges and universities has been strengthened [1]. In this context, the development direction of college music education management has now entered a new stage, and college music education has advanced to the goal of scientific and standardized management [2-3]. Music teachers in the traditional sense of teaching mode, most of them go through the personal face-to-face form of teaching, the traditional teaching mode exists in a single way, the content of the lack of change [4].

Digital music education in China began in the 1980s and 1990s, during which various music informatization platforms emerged, which can be broadly classified into the following categories: composition informatization, score printing informatization, timbre editing informatization, automatic accompaniment software, and music education software [5]. Various types of informatization are applied to music teaching, although there are various forms of software, but due to the lack of relevant teaching software, when explaining basic pentatonic music theory knowledge, teachers often teach with the help of professional composition writing software, which often lacks convenience and relevance in teaching use because it is for the professional composition field with many pre-settings and complex operation procedures [6-7]. In accordance with the teaching requirements and training objectives, thus providing a deeper

understanding of music teaching at all levels in order to establish a more effective information platform for music teaching, improve the quality of teaching, and train personnel to ensure the development of all aspects of higher education.

It is evident that the informatization of music teaching at home and abroad has become a trend and has been developed considerably [8]. Within this trend, the informatization of music teaching is also becoming more and more mature. Moreover, as information technology continues to develop, it is necessary and meaningful to explore the informatization of platforms that are more convenient and applicable to music teaching.

## 2. FUNCTIONAL DESIGN OF MUSIC TEACHING INFORMATION PLATFORM

### 2.1. MUSIC TEACHING INFORMATION PLATFORM SYSTEM FUNCTIONAL MODULE DESIGN

In order to effectively manage and use multimedia network teaching resources and establish a scientific and reasonable music teaching mode, the system is divided into 5 functional modules based on the analysis of teachers' demand for music teaching information platform by big data technology, and the functional modules of music teaching information platform system are designed as shown in Table 1. Users with different roles have different permissions in each functional module. Student users only have the permission to view announcements in announcement management, while teacher users also have the permission to edit and publish announcements, and system administrators can view, publish and delete announcements. Each role has different permissions and functions for meeting the requirements of each role for the system.

**Table 1.** Music Teaching Information Platform System Module

	System modules	Function
<b>Music teaching information platform system</b>	System user management	User registration and login
	Bulletin Management	Posting and amending announcements
	Resource Management	Multimedia video teaching
		Question Bank Management
		Exercise exercises
		Online Examinations
	Teaching Management	Assignment Release
		Results Search
		Assignment Correction
	Course Management	Lesson Plans
		Classroom Management
		Student Management

### 2.2. INTRODUCTION OF FUNCTIONAL MODULES OF MUSIC TEACHING INFORMATION PLATFORM

This music teaching information platform is built based on big data technology. In order to achieve convenient interactive operation and easy and convenient functional features, the platform is divided into three major parts: UI module, data management module and dynamic display business logic module, which are independent of each other and interact with each other. Independence means that the three modules can be programmed independently in terms of implementation, and then each module communicates with each other through interfaces and functions. This can achieve a clear division of labor, interface design and display

changes do not require changes in the background data to adapt, to maintain the stability of the background data structure module and reduce the burden of developers. In this way, it can achieve the purpose of displaying different interfaces with the same set of data structure.

(1) Among them, i.e., the user interface module is responsible for user input interaction feedback, including mouse click, menu selection, input and other operations.

(2) The role of the data management module is to store and process relevant data, which defines the data model, describes the data to be stored and the method of processing data, and it is the core part of the whole platform implementation.

(3) Dynamic display business module is to realize the foreground display part of this music teaching platform, it is responsible for displaying the content added by users, responding to the actions operated, being the feedback for teachers to interact with the platform, and being the functional basis for teachers to show the teaching contents to students.

The above three modules not only represent the main system functions of this music teaching platform, but also reflect the core development idea of this platform, that is, each module is carried out independently, and the communication between modules is carried out through the interface method, so as to efficiently and correctly respond to the user's operation results and help teachers can carry out teaching work such as music composition more conveniently and quickly.

### 3. ANALYSIS OF MUSIC TEACHING INFORMATION PLATFORM

#### 3.1. ANALYSIS OF THE MOBILITY OF MUSIC TEACHING INFORMATION PLATFORM

To understand whether the music teaching platform helps music class teachers to teach easily and quickly in music teaching, the evaluation of teachers who use the music teaching platform was analyzed based on big data technology. The analysis of the mobility of music teaching information platform is shown in Figure 1. The specific content evaluation is divided into three levels: I, II and III. I evaluation, "easy and quick to operate" accounts for 63%, and teachers think that the use of the platform is conducive to music teaching using a variety of music teaching, II evaluation, "somewhat difficult to operate" accounts for 27%. 27%, but it improved after familiarizing with the operation of the system, and 10% of "very complicated to operate" in the evaluation of level III.

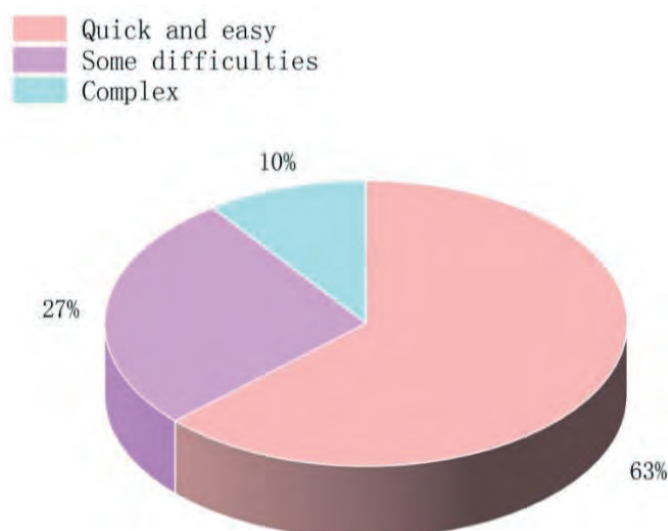


Figure 1. Analysis of the mobility of music teaching tools

#### 3.2. ANALYSIS OF THE TEACHING DIMENSION OF MUSIC TEACHING INFORMATION PLATFORM

In order to explore whether the music teaching informatization platform has music scenario in the music teaching dimension, whether the teaching contents are designed with the characteristics of the teaching objects in mind, and whether the teaching methods are diverse, which makes the course content rich and interesting and can enhance students' learning interests. Through big data analysis of teachers' and students' evaluation of the music teaching informatization platform, the teaching dimensions of the music teaching informatization platform were analyzed as shown in Table 2. The results show that the music teaching informatization platform was given a high level evaluation, accounting for 86.3%, a medium level evaluation, accounting for 7.8%, and a low level evaluation, accounting for 5.9%. The analysis results show that the music teaching information platform teaching can make students have a deeper feeling about the knowledge they learn, thus enhancing their musical sensibility and facilitating the consolidation of music knowledge points.

**Table 2.** Evaluation analysis of music teaching dimensions on the music teaching information platform

Teaching dimension	Indicators	Advanced	Intermediate	Low level
	Teaching the New Curriculum	Introductory musical situations Set richly	The musical context of the teaching content Single context	Musical contexts without music teaching content
	Teaching methods	Facilitate learning analysis using multiple A variety of teaching methods are used to develop music teaching that is innovative and ensures Students' attention to learning	The content of the teaching has changed, but for the most part of it is still the same, without Innovation	Instructional design that is not conducive to independent innovation
	After School Extensions	Facilitates the expansion of music teaching content A large number of pieces in the same genre, appropriate for students' learning and inspiring	Useful for expanding the content of music teaching with individual pieces of the same genre, inspiring	Not helpful for teaching music content to expand the same type of music
	Number of people evaluated	86.3%	7.8%	5.9%

#### 4. CONCLUSION

With the advancement of technology and the change of teaching mode, music teaching mode has also undergone great changes. The traditional single teaching mode has been changed, and big data technology has been expanded more and more popularly in information-based music teaching, playing a significant role in music classroom teaching. The platform has been balanced between convenience and professionalism and teaching freedom, and teachers can teach without the help of professional composition writing software with many pre-set and complicated operation procedures, breaking through professionalism and allowing the existence of unusual combinations of notes. It provides more possibilities for teaching demonstrations, and the more convenient and versatile management system is helpful to help music teachers in teaching management.

The development platform combined with future functions will be better improved, and after rigorous testing, we hope that it will eventually be applied to music classroom teaching and play its proper role to make a role and assistance for music classroom teaching.

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# EXPLORING THE EFFECTIVE PATH OF CULTIVATING ENGLISH INTERCULTURAL COMMUNICATION SKILLS OF COLLEGE STUDENTS

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## ABSTRACT

This paper constructs a basic framework for the cultivation of English intercultural communication competence among college students in terms of cognitive ability, emotional ability and behavioral ability of contemporary Chinese college students, and explores an effective path for the cultivation of English intercultural communication competence among college students. The study showed that students' willingness to communicate intercultural increased by 20%, their ability to acquire intercultural communication knowledge increased by 24.1%, students' cognitive ability of intercultural communication increased by 16.5%, students' affective ability increased by 20.1%, and students' behavioral ability increased by 26.1% after increasing intercultural communication experience for English teaching. It can be seen that increasing English teaching of intercultural communication is an effective way to improve English intercultural communication ability of college students.

## KEYWORDS

Intercultural communication competence; Competence development; English for college students; Intercultural communication; Communicative knowledge

## 1. INTRODUCTION

Intercultural communication competence is the ability to communicate between native and foreign language speakers, i.e., to understand the culture and ideas of both parties through communication [1-2]. Intercultural communication competence is an international communication competence, which is a major new requirement for university teaching nowadays [3]. English has become an international language, and the development of students' intercultural communication skills can be enhanced through English learning [4-5]. However, in China's teaching, due to the influence of exam-oriented education, the teaching of English is only focused on coping with exams, especially in universities.

In order to develop English intercultural communication skills among university students, it is required that teachers use university English as a tool for developing students' intercultural communication skills [6]. First of all, the corresponding cultural teaching should be carried out, i.e., the students should be trained in Western knowledge skills and Western consciousness, and the students' knowledge of Western values, customs, norms, etc. should be strengthened so that the corresponding teaching can be carried out, and then a comprehensive communication training should be carried out, i.e., the communication skills of the students

should be promoted so that the intercultural communication skills of the students can be cultivated [7-8]. Through this series of processes, students' intercultural communication skills can be strengthened through a step-by-step approach to achieve English teaching as a way to cultivate international talents who are more in line with the needs of society and accelerate the development of the country.

## **2. ENGLISH INTERCULTURAL COMMUNICATION SKILLS OF COLLEGE STUDENTS**

### **2.1. BASIC FRAMEWORK OF ENGLISH INTERCULTURAL COMMUNICATION SKILLS FOR COLLEGE STUDENTS**

#### **2.1.1. COGNITIVE ABILITY**

Cognitive skills specifically include the understanding of cultural knowledge as well as linguistic knowledge. In English intercultural communication, language is an important condition to ensure smooth communication. Learning language knowledge is a prerequisite for improving language ability, and only with solid language knowledge can communicators truly understand each other's meanings. English intercultural communication is not only to improve language ability, but also to be good at exploring the deep cultural connotation behind the language forms. Cultural knowledge can be divided into general cultural knowledge and special cultural knowledge. General cultural knowledge is good for students to understand the communication environment and culture, to improve their sensitivity to cross-cultural phenomena, and to understand the mental structure, values and behavior of the communicative objects in the language environment of cross-cultural communication.

#### **2.1.2. EMOTIONAL COMPETENCE**

Emotional competence consists of communicative purpose, communicative attitude, and cultural empathy. The communicative purpose refers to the intention of the communicator to actively participate in and conform to the cultural communication style of the object in a specific cultural communication environment. Communicative attitude refers to the communicator's true attitude toward the object's cultural environment and his or her own cultural identity, which is a key element of affective competence. Based on the basic theory of cultural empathy, teachers should focus on the development of students' own cultural empathy thinking and ability to avoid social barriers such as racial prejudice or cultural impositions in the process of communication. At the same time, based on the equality between different national cultures, teachers should follow the principle of moderation when cultivating students' cultural empathy and actively respond to the multicultural background to achieve the purpose of intercultural communication.

#### **2.1.3. BEHAVIORAL CAPACITY**

Behavioral competence mainly includes thinking, linguistic, adaptive, non-verbal, expressive and strategic communication skills in the process of intercultural communication. The adaptive ability, expressive ability and thinking ability of the communicator are the key parts of intercultural communication ability. The intercultural communication consciousness of the communicative subject determines its adaptability, and only with excellent intercultural expression ability can the intercultural adaptability be improved effectively.

## **2.2. CURRENT SITUATION OF UNIVERSITY ENGLISH EDUCATION**

### **2.2.1. TRADITIONAL TEACHING METHODS ARE NOT INNOVATIVE ENOUGH**

Even though China has entered the stage of teaching reform, many teachers still teach in the traditional and dull way, which makes English teaching boring and tedious. Moreover, the principle of "people-oriented" is not reflected in the teaching of English in college. In the

teaching process, the teacher often speaks on the stage and the students take notes off the stage, without giving the students the opportunity to think, so that the teaching only stays on the instillation of basic knowledge, and the whole teaching process cannot achieve the teaching goal.

### **2.2.2. TEACHING FOCUS DEVIATES FROM THE GOAL OF ENGLISH TEACHING**

In the process of teaching English in college, many teachers focus on teaching English grammar and vocabulary just to help students cope with the final exam. However, in order to cultivate more talents to meet the development of society, university teaching should gradually move away from the traditional teaching in junior and senior high schools to an open, thinking-based teaching mode. Only in this way can we develop students' imagination, promote students to learn to think independently, and cultivate students' ability of cross-cultural communication. Therefore, in the current university English teaching, many teachers have deviated from the focus of English teaching, so that students' intercultural communication skills are not cultivated.

### **2.2.3. THE QUALITY OF TEACHERS IS NOT HIGH**

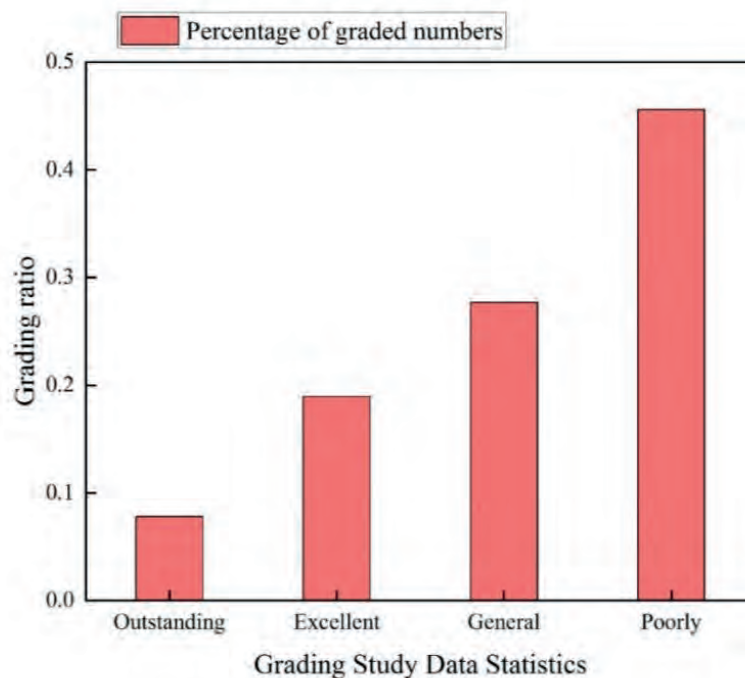
In addition to the influence of the teachers' traditional teaching mode, there is another important factor - the limited quality of university English teachers. In many universities, the quality of English teachers is not high, their knowledge of English language is limited, and their understanding of English-related contents is not thorough. If the quality of the teachers is only that, how can they produce students with good intercultural communication skills? Therefore, in the teaching of English on weekdays, schools can hire some foreign teachers to teach students, which can increase students' simple communication with foreign friends and strengthen students' cultivation of intercultural communication skills.

## **3. RESEARCH ANALYSIS AND CULTIVATION PATH OF ENGLISH INTERCULTURAL COMMUNICATION ABILITY OF COLLEGE STUDENTS**

### **3.1. RESEARCH ON INTERCULTURAL COMMUNICATION AMONG COLLEGE STUDENTS IN HIGHER EDUCATION**

In order to investigate what is the average level of intercultural communication competence of college students, a study was set up to address this issue based on four dimensions of intercultural communication competence development: language and sociolinguistics, discourse and strategy, knowledge and skills, and attitude and awareness. The intercultural communication situation of college students participating in the study was graded, with Grade A being excellent intercultural communication ability, Grade B being good intercultural communication ability, Grade C being average intercultural communication ability, and Grade D being poor intercultural communication ability, and the results of the grading are shown in Figure 1. The data of this study show that: very few college students have strong intercultural communication ability A grade accounted for 7.79%, not many college students have good intercultural communication ability B grade accounted for 18.95%, the majority of college students have average intercultural communication ability C grade accounted for 27.68%, and poor intercultural communication ability D grade accounted for 45.58%.

Research shows that the overall level of Chinese college students' intercultural communication ability is low, mainly in terms of weak language ability, average or poor communication strategies and skills, limited intercultural knowledge, low desire for active communication, and weak intercultural communication awareness.



**Figure 1.** Statistics on intercultural communication

## **3.2. STRATEGIES FOR DEVELOPING INTERCULTURAL COMMUNICATION SKILLS OF COLLEGE STUDENTS**

### **3.2.1. INCREASING CROSS-CULTURAL KNOWLEDGE INPUT IN ENGLISH LANGUAGE TEACHING**

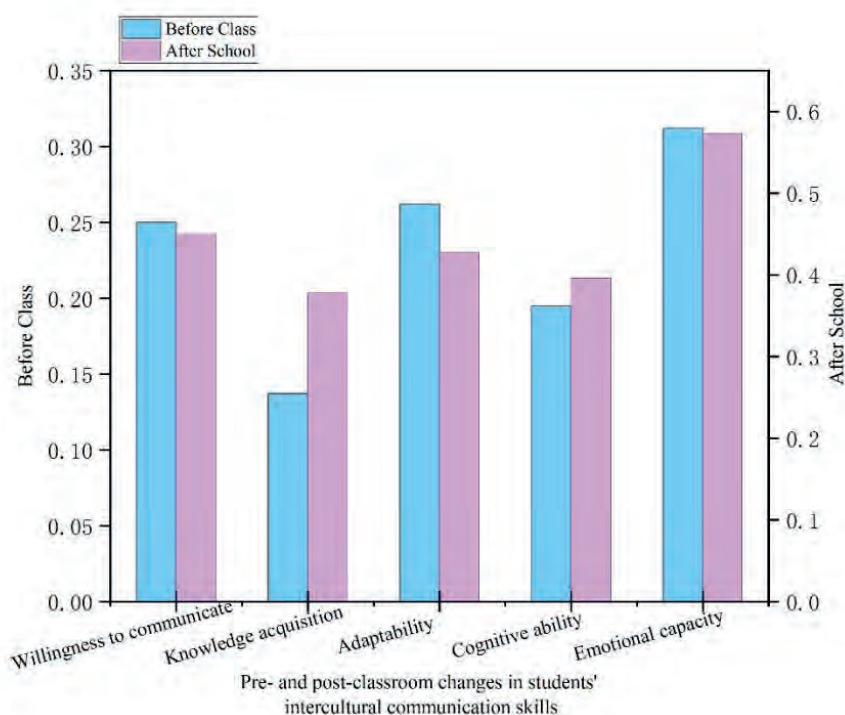
The use of language in communication is closely related to the culture of the communicator, i.e., language is a communicative symbol system based on culture, so cultural differences can lead to a series of communication barriers. This requires teachers to strengthen the teaching of culture in addition to the teaching of language itself in the process of teaching English. If language teaching and culture teaching are organically combined, appropriate penetration of foreign history and culture not only enhances students' learning initiative and enthusiasm, but also strengthens students' mastery of some foreign cultural knowledge, and enriches the level of language teaching, and also effectively improves the teaching effect and application practice effect of language teaching. In addition, an appropriate course on intercultural knowledge is conducive to further strengthening the broadening of students' intercultural knowledge and the cultivation of their thinking skills.

### **3.2.2. INCREASING CROSS-CULTURAL COMMUNICATIVE EXPERIENCES FOR ENGLISH LANGUAGE TEACHING**

To investigate whether adding intercultural communication experiences to English language teaching can improve college students' intercultural communication skills, the changes in intercultural communication of college students in English classes with added intercultural communication experiences, before and after class, are shown in Figure 2.

The data from the study showed that students' willingness to communicate intercultural increased by 20%, their ability to acquire intercultural communication knowledge increased by 24.1%, students' cognitive ability to communicate intercultural increased by 16.5%, students' affective ability increased by 20.1%, and students' behavioral ability increased by 26.1% after the course placement study. Compared to the pre-course study, the English classrooms that experienced increased intercultural communication experiences were enriched in terms of

students' intercultural communication experiences, and students were able to use intercultural communication concept vocabulary more frequently and appropriately to express themselves, as well as answer questions from a more professional and objective perspective, thus increasing intercultural communication experiences for English language teaching resulted in some enhancement of students' intercultural communication skills.



**Figure 2.** Changes in students participating in English intercultural communication

#### 4. CONCLUSION

With the further expansion of China's opening to the outside world, the value of English education has become clearer and clearer, and the cultivation of students' ability to use English in practice should be an important goal of English teaching at this stage. The ultimate goal of university English teaching is to cultivate students' ability to use foreign languages and thus to equip them with the ability of cross-cultural communication. English teaching is not only a process of teaching language, but also a way to cultivate the communicative ability of college students and improve the ability of our college students to compete internationally. In this way, we can achieve our teaching goals, fundamentally improve students' English intercultural communication skills, master this international language, understand other countries' culture, improve students' communicative ability, change the current situation of students' aversion to learning English, help students develop themselves, and improve their English literacy in an all-round way, so that we can really cultivate higher-level international talents for society.

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# A STUDY ON THE INTEGRATION STRATEGY OF CHINESE CULTURAL MANAGEMENT AND FRONTIER CASTING COMMUNITY CONSCIOUSNESS IN THE INTERNET ERA

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## ABSTRACT

This paper is designed to explore the integration strategy of Chinese cultural management and frontier casting community consciousness in the Internet era. Using the thesis database as the search domain, a visual analysis of mainstream media's dissemination of community consciousness was conducted through the CiteSpace literature quantitative research method. The data show that the relevant research literature experienced two peak growth points until 2020, one is in 2018 with 78 articles, an increase of 30 articles year-on-year. The second is 2020, which saw an increase of more than 100 research papers to 182. This change is all related to the major events of the frontier casting community. Therefore, the news media in the Internet era has an important mission and responsibility to bear in the dissemination of community consciousness.

## KEYWORDS

Chinese cultural management; Mainstream media; Frontier casting; Community consciousness communication; Visual analysis

## 1. INTRODUCTION

In the Internet era, it is necessary to better play the role of mainstream media in communication, influence and guidance, and actively spread the awareness of frontier casting community. Casting a firm sense of community in frontier ethnic areas frontier casting is one of the core contents of ethnic work in frontier ethnic areas in the new era and the key to cracking the frontier ethnic problems [1-2]. Further expanding the in-depth research on casting a firm sense of community on the frontier in frontier ethnic areas provides a new perspective and space for exploration [3-4]. Casting a firm sense of community at the frontiers of ethnic areas in frontier regions requires both policy guidance and strong institutional support [5]. The system itself has the distinctive features of "global, fundamental, and long-term", and can play a powerful function of shaping, regulating, and regulating people's behavior, which has an irreplaceable role in promoting the social and economic development of frontier ethnic areas [6-7]. In the new era, frontier ethnic areas cast a firm sense of frontier casting community, and the issue of casting a firm sense of frontier casting community is incorporated into the institutional construction for interactive and holistic examination [8]. To explore the intrinsic fit between frontier casting community consciousness and institutional construction, to further enhance the sense of institutional access and happiness of people of all ethnic groups in frontier ethnic areas, and to gather majestic institutional strength for the realization of the Chinese dream of great rejuvenation of the Chinese nation.



## **2. STATUS OF RESEARCH ON FORGING A SENSE OF COMMUNITY AT THE FRONTIER**

### **2.1. COMMUNITY IDEOLOGY BUILDING CHALLENGES**

#### **2.1.1. THE SPECIFICITY OF MAINSTREAM IDEOLOGICAL IDENTITY SUBJECTS**

A comprehensive grasp of the subject of identity is a logical prerequisite and basic condition for promoting identity. “The subject is the practitioner, the knower or the actor of any objectivity activity itself.” The knower, practitioner and actor who identify with the mainstream ideology is the main body of mainstream ideological identity. The main body of mainstream ideological identity in the border ethnic areas is the people of all ethnic groups, the different basis of life practices of the people of all ethnic groups and the specificity that accompanies it is the prerequisite that must be taken into account to promote mainstream ideological identity, the specificity of multi-ethnic people’s own qualities, people’s values and religious belief activities, etc. Based on the specificity of the identity of the main body, to promote mainstream ideological identity in order to specific analysis of specific problems.

#### **2.1.2. MULTI-ETHNIC COMPLEXITY AND DIFFERENCES**

China is a unified multi-ethnic country, and multi-ethnicity and diversity are important features of the main body of Chinese society. In the border ethnic areas, this feature is more typical and significant. Multiple ethnic minority groups, cross-border ethnic groups, Han Chinese, and within a single ethnic group, there are different branches, different languages and customs; therefore, the subjects in border areas have ethnic differences and complexity. Therefore, how to respect the differences of each ethnic group while leading the construction of each ethnic group with the mainstream ideology as the ideology, promoting the activities of each ethnic group within an orderly scope, and constructing a border ethnic region with security and development is an issue to which the mainstream ideological identity pays attention.

#### **2.1.3. PLURALITY AND INSTABILITY OF VALUES**

Pluralism in the values of various ethnic subjects. With the increasing globalization and informatization and networking, the channels of communication between internal and external communities have been increasing. Coupled with the differences in the conditions of ethnic cultures, religious beliefs, social structures, economic status and other aspects of the people of various ethnic groups, the composition of the border heterogeneity of the situation is derived. In terms of values, the changes in economic and social life bring about changes in people’s values, and tradition and modernity intermingle to present a pluralistic and heterogeneous picture. Western forces always operate from the multi-ethnic areas of China’s frontiers, carrying Western cultural values with them in their economic and trade exchanges, distorting, discrediting and attacking socialist ideology, attempting to occupy people’s minds in the ideological sphere and realizing the “peaceful evolution”.

And in fact, shared concepts and culture play a fundamental role in advancing the stability and development of all ethnic groups in frontier ethnic areas. We seek positive and two-way identification with ethnic concepts and mainstream values, and then form a high level of common identity, and actively construct inclusive mainstream ideological contents, such as the great rejuvenation of the Chinese nation and the forging of a sense of community at the frontier.

## **2.2. BORDER GOVERNANCE IS THE REGIONAL GOVERNANCE OF THE SOVEREIGN STATE OF THE CHINESE NATION**

### **2.2.1. THE PRINCIPLE OF SOVEREIGNTY AND TERRITORIAL BOUNDARIES**

The designation of marginal parts of the state as “frontiers” as special areas for governance has a long history in the process of human state governance. The transformation of state form and the innovation of governance system have made the traditional frontier “alien people”, empowered by the identity system of “nation” and “nationals”, manifest the sovereign state’s People’s identity. Whether it is the “equality of all the people of the Republic of China” and “the sovereignty of the Republic of China belongs to all the people” established at the beginning of the Republic of China or the “people-centered” national value system and system established by the People’s Republic of China, the “people-centered” national system and the “people-centered” national system have been established. “The value system, system and action system of the country. In this process of national reconstruction and social reshaping of the Chinese nation, the national territorial characteristics and national sovereignty attributes given to the frontier also further highlight and strengthen the characteristics of the frontier community between the people of all ethnic groups in the frontier and the residents of the mainland.

### **2.2.2. THE COUNTRY AS A WHOLE AND THE FRONTIER EDGE**

The governance of the frontier in the process of nation-state construction and modernization embodies the integrity of national sovereignty and the regional nature of frontier governance. For a country with a long tradition of governance like China, the frontier is given a distinctive sovereign state core, not as a break with tradition, but as an absorption, adaptation and innovation of frontier governance in historical times. This national governance system, when projected onto the frontier regions, is reflected in the general governance issues based on the national identity of frontier residents and the unique connotation of promoting the rapid development of frontier ethnic regions through differential governance. In the concrete practice of frontier governance, although there are sometimes tensions between the two, the protection of the rights and interests of frontier residents and the adjustment of inter-ethnic relations are incorporated into the framework of the construction of a frontier community and regulated by the overall national identity.

## **3. INTERNET-BASED ERA OF FRONTIER CASTING COMMUNITY AWARENESS**

### **3.1. ANALYSIS OF THE INFLUENCE OF MAINSTREAM MEDIA ON THE SENSE OF COMMUNITY**

In *Imagined Communities: The Origins and Dispersal of Nationalism*, American scholar Benedict Anderson views the interplay of capitalism, print technology, and human linguistic predestination as the necessary conditions for the formation of imagined communities. This viewpoint provides insight into the critical role played by the news media in the dissemination of a sense of community. The mainstream media has an important mission and responsibility in constructing, shaping, and disseminating the sense of community forged on the frontier.

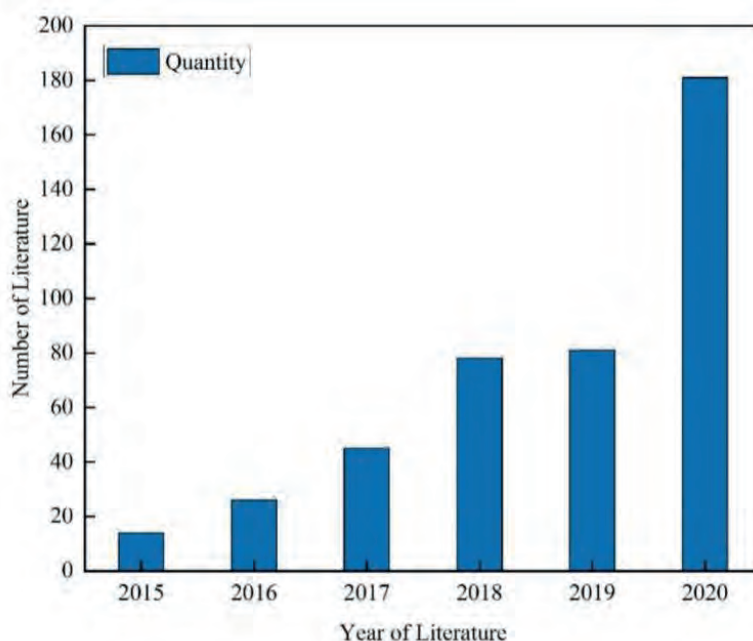
### **3.2. ANALYSIS OF MAINSTREAM MEDIA’S COMMUNICATION OF COMMUNITY CONSCIOUSNESS**

This paper uses the thesis database as the search domain and visualizes the analysis through the CiteSpace literature quantitative research method. It focuses on the current situation, hot areas, shortcomings and limitations of the dissemination of community consciousness by border casting and future research paths. The analysis of community consciousness dissemination by mainstream media is shown in Figure 1. Newspaper literature on the dissemination of community consciousness in frontier casting has been on an upward

trend.

The relevant research literature has experienced two peak growth points before 2020, one being 78 articles in 2018, an increase of 30 articles year-on-year. This is in line with the Party's 19th National Congress report, which clearly proposed "casting a firm sense of community at the border". Secondly, in 2020, more than 100 research papers were added, reaching 182. In 2019, General Secretary Xi Jinping emphasized the importance of casting a firm sense of community along the border at the National Conference on National Unity and Progress.

It can be said that the dissemination on casting a firm sense of community on the frontier casting has further deepened, and relevant research has grown in a spurt.



**Figure 1.** Distribution of research literature on sense of community, 2015-2020

### 3.3. KEYWORD ANALYSIS OF MAINSTREAM MEDIA COMMUNITY AWARENESS COMMUNICATION

Keywords are the focal words that objectively describe the main contents of the literature. Through the key words of the literature, we can effectively recognize the main research contents of the literature, and then get a glimpse of the current situation and trend of the research on the sense of community forged on the frontier in Chinese academia. The descriptive statistics of the key words of the newspaper literature on the sense of community forged on the frontier through CiteSpace software are shown in Table 1. In this paper, keywords are used as the analysis element, the time cut-off value is set to 1, and the threshold value is set to 40. 51 nodes are formed after the program is run, and a keyword co-occurrence network is finally formed. The keyword co-occurrence of each node can be used to analyze the hotspots of research literature on the sense of community forged in the frontier in the press over the past five years according to its frequency and network density.

**Table 1.** High-frequency keywords for the study of community awareness, 2017-2022

Serial number	Keywords	Frequency
1	Ethnic Work	146
2	Ethnic Interaction	79
3	Diversity in One	108
4	Ethnic Policy	76
5	Multi-ethnic State	127

#### 4. CONCLUSION

Enhancing mainstream ideological identity is an important element in the governance and effective development of border ethnic areas. Under the combined influence of geopolitical factors, ethnic factors, cultural factors, etc., the special locational characteristics in terms of cultural and social environment and living environment, the infiltration of Western ideology, the compulsion of separatist forces, etc., all profoundly affect the values and ways of thinking of the people of all ethnic groups, and bring certain influence to the mainstream socialist ideological identity of the ethnic groups in the border areas.

China's frontier ethnic regions are the fringes of the national frontier and an important window to the outside world to demonstrate the vitality and vigor of scientific socialism. The security and stability of the frontier has traditionally been the vane of national security. The cornerstone of security in frontier regions is mainstream ideological security, where people of all ethnic groups identify with the core socialist values and with the values in the system and governance practices. Converted into practice, it helps build a secure, stable and prosperous frontier in the interaction of policy dynamics, solidly promotes common progress and common prosperity, and works together to realize the dream of rejuvenation of the Chinese nation. Increasing the identification with the mainstream ideology of socialism with Chinese characteristics is an important cornerstone for adhering to and developing socialism with Chinese characteristics.

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## RESEARCH AND EFFECTIVENESS ANALYSIS OF ZHUANG MOMIE AROMATHERAPY APPLIED TO ETHNOBOTANY

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## ABSTRACT

In this paper, to study the main effective components of Zhuang Memie aromatherapy perfumed medicine bags, the volatiles of the leaves and branches of Zhuang Memie were examined, and a total of eight substances with  $\geq 90\%$  match were obtained. In terms of content, the vast majority of volatiles from the branches and leaves of *Cyperus rotundus* were olefins, with a relative content of 65%, as well as ketones 15%, alcohols 11%, and aldehydes 9%. The largest number of olefins was found in the volatiles. In a word, the wide range of aromatic plants available, the rational development of Chinese medicine aromatherapy and the comprehensive utilization of aromatic plant resources actively carried out will surely lead to a better development of society.

## KEY WORDS

Zhuang Memie incense bag; Chinese medicine aromatherapy; Aromatic plants; Aromatic substances; Human psychology

## 1. INTRODUCTION

Aromatic plants are a class of plants that can emit fragrance, and in nature there are many species and wide distribution, and the source of aromatic odor varies from plant to plant, and their aromatic odor comes from different kinds of aromatic substances [1-2]. Memie is an intangible cultural heritage of the autonomous region, and is an auspicious ornament unique to the Zhuang people in the upper reaches of the Baise Right River region. It is made of a variety of natural herbs such as mugwort, calamus, and atracylodes, with auspicious patterns of cotton cloth, and sewn into an incense bag shaped like a small person stretching out his limbs to hold a ball.

With the gradual advancement of modern scientific research, the psychological regulation of the human body by aromatic substances has been gradually discovered. Aromatic substances enter the human body and regulate physiological and psychological states in various ways [3]. The research and application of plant aromatic substances have become a hot research topic in recent years, including plant essential oils and aromatherapy, which have a wide range of prospects in relieving depression and anxiety and supporting medical treatment [4-5]. With the in-depth study of plant metabolites, a variety of plant volatile substances have been discovered and applied [6]. Studies have proved that the aromatic substances in some plants have positive effects on the regulation of human psychological state [7]. The fast-paced modern life increases people's competitive pressure, which easily leads to negative emotions such as anxiety and irritability, and even leads to psychological diseases, which can be regulated by natural plant aromatic substances [8]. Aromatic substances are secondary products produced by the transformation of aromatic plants themselves and are widely distributed among the roots, stems or flowers, fruits, and seeds of plants. Various classes of aromatic substances such as terpenoids, alcohols, phenols, ketones, and esters can be obtained using methods such as water distillation and leaching with volatile solvents. Terpenoids account for the largest proportion of aromatic substances, including monoterpenes and sesquiterpenes. Alcohols are the second largest component of aromatic substances. Phenols are more active and have bactericidal ability.

## **2. TRADITIONAL CHINESE MEDICINE AROMATHERAPY**

### **2.1. CONCEPT AND ORIGIN OF AROMATHERAPY IN CHINESE MEDICINE**

#### **2.1.1. THEORETICAL RESEARCH ON AROMATHERAPY IN CHINESE MEDICINE**

Aromatherapy, as the name implies, is a natural therapy that uses aromatic drugs or essential oils to enter the body through breathing, massage, and oral intake to regulate the body and mind, relieve stress, and prevent, alleviate, or treat certain diseases in the human body, often as a complementary therapy.

Traditional Chinese medicine aromatherapy is an important part of Chinese medicine, which is based on the holistic view of Chinese traditional medicine and theoretical basis of Chinese traditional medicine pharmacology. Through various ways of medicine, aromatic drugs with disease prevention and treatment efficacy are delivered to the body, so that the efficacy of the drugs can be effectively exerted in the body to achieve effective disease prevention and treatment. At present, Chinese medicine aromatherapy has formed a more systematic, perfect and mature theoretical system. The volatile oil components in aromatic drugs have excitatory or sedative effects on animals. The excitatory effects can improve alertness, enhance mood, reduce drowsiness, and improve or eliminate mental fatigue, while the sedative effects are mainly in hypnotic and tranquilizing.

#### **2.1.2. TCM THEORY OF AROMATHERAPY INHALATION**

Based on the theory of traditional Chinese medicine and the medicinal theory of the four qi, five tastes, elevation and sinking of Chinese herbs, and the attribution of meridians, the theory of Chinese medicine in aromatic inhalation therapy is discussed as follows. Since ancient times, Chinese medicine has taken the four qi and five tastes, lift and sink as the basis for identifying the medicinal properties. The qi of Chinese medicine is divided into four qi: cold, hot, warm and cool. The taste of Chinese medicine is divided into five tastes: acid, bitter, sweet, pungent and salty. Taste and qi are perceived by the senses of taste and smell respectively, so they explain the effects of drugs from different perspectives.

Nasal drug delivery has the following advantages:

(1) The nasal mucosa has a large surface area and is rich in blood vessels, so the drug takes effect quickly after administration.

(2) Compared with oral administration, nasal administration avoids degradation in gastrointestinal digestive juices and hepatic first pass effect.

(3) It can play local therapeutic effect as well as systemic therapeutic effect through nasal mucosa absorption into body circulation.

(4) The operation method is simple, with little side effects and high patient acceptance. Therefore, inhalation drug delivery can be used as an intervention method to replace oral and injectable drug delivery.

## **2.2. AROMATIC PLANTS AND AROMATHERAPY**

### **2.2.1. AROMATIC PLANTS**

Aromatic plants are a class of plants that contain high levels of aromatic substances that can be used therapeutically, as well as being widely utilized as aromatics. The aromatic properties of plants were discovered by Shennong more than 5,000 years ago, and in ancient Greek and Roman times, it was believed that spreading fragrance in bathrooms was beneficial to health. The ancients also made lilacs and other incense pouches from Zhuang Mu X and used chrysanthemum scented pillows to prevent disease. Aromatherapy has also encountered



distortions, misunderstandings and misrepresentations, but even in the cold winter, the vitality of spring is brewing in the dark, and the aromatic charm of aromatherapy itself cannot be hidden.

### **2.2.2. AROMATIC PLANT RESOURCES**

Aromatic plants are a group of plants that share common properties with medicinal plants. At present, there is no unified classification system for aromatic plants, which are usually classified by aromatic parts and so on.

(1) Floral fragrance plants. Petals can emit a refreshing, fragrant fragrance, can spread through their own plants, such as Yunnan smiles, moon, Yunnan knotted incense, etc..

(2) Fruity plants. Plants with oil glands on the fruit skin that can emit fruit fragrance. Most of the plants in this category are edible and have good taste, such as lemon, orange, pineapple, etc.

(3) Leaf fragrance plants. Most of the plant leaves have oil glands, which can emit refreshing fragrance after light rubbing, such as pepper grass, verbena, two-sided needle, sansho pepper, etc.

(4) Rhizome plants. This type of plants mainly from the plant's branches, rhizomes and other places to emit fragrance, can be used in seasonings, furniture, such as ginger, sweet pine, sandalwood, etc..

Among them, the main aromatic plants commonly used in Zhuang Moxu incense pouch is incense crown cypress.

## **3. IDENTIFICATION AND ANALYSIS OF AROMATIC PLANT VOLATILES**

### **3.1. DETECTION OF VOLATILE COMPONENTS OF CEDAR**

#### **3.1.1. EXPERIMENTAL APPARATUS AND METHODS**

Experimental instrument: Gas chromatograph-mass spectrometer, Agilent 7890A-5975C

Experimental method: Automatic thermal desorption-gas chromatography/mass spectrometry (ATD-GC/MS)

#### **3.1.2. INSTRUMENT OPERATING CONDITIONS**

Thermal desorption conditions are carrier gas (constant flow mode) flow rate: 1.0 mL/min.

Sample tube temperature (primary thermal desorption temperature): 250°C, heating for 10min, cold trap temperature during primary thermal desorption, -10°C.

Thermal desorption mode: import shunt, general dry blowing, time 3min.

Desorption flow rate: 10.00mL/min, inlet shunt flow rate: 0mL/min, outlet shunt flow rate: 10.00mL/min.

GC working conditions: Chromatographic column: DB-624MS (60m × 0.32mm × 1.8µm).

Programmed temperature rise: 40°C hold for 3min, rise to 250°C with 6°C /min, hold for 3min, then rise to 270°C, hold for 5min.

MS operating conditions: ionization mode, EI, electron energy 70 Ev. scan range: 29-350 amu. interface temperature: 250°C, ion source temperature: 230°C; quadrupole temperature: 150°C.

### **3.2. ANALYSIS OF VOLATILE CONSTITUENTS OF CEDAR**

The analysis of the volatile components of the branches and leaves of *Cyperus rotundus* is

shown in Table 1. The volatiles of the branches and leaves of *Cyperus rotundus* were examined, and a total of eight substances with  $\geq 90\%$  match were obtained. In terms of content, the vast majority of the volatiles from the branches and leaves of *Cyperus rotundus* were olefins, with a relative content of 65%, as well as ketones 15%, alcohols 11%, and aldehydes 9%. In terms of species, the most olefins were found in the volatiles.

**Table 1.** Volatile matter composition of the branches and leaves of *Cyperus rotundus*

Serial number	Retention time	Relative content	Match	Name
1	11.03	31.3%	97	$\beta$ -Laurene
2	12.31	7.4%	96	$\beta$ -Watercressene
3	28.21	11.2%	94	D-Limonene
4	28.94	15.1%	97	Terpinolene
5	25.67	6.8%	92	2-Nonanone
6	24.19	3.2%	93	Lateralinone
7	17.45	11%	94	Citronellol
8	27.28	9%	02	Sphagnum

#### 4. CONCLUSION

Smelling aromatic plants for a period of time has a certain effect on human physiology and psychology, according to the statistical analysis of human physical and mental health related indicators. Smelling cedar can make people calm and enter a state of relaxation, and the longer the time, the better the effect may be, and long time sniffing is more likely to make men relax. In addition, smelling cedar can reduce tension, anger, panic and depression, and improve self-esteem.

According to the experimental results, aromatic plants can interfere with the physical and mental health of human body through olfactory organs, and the effects of volatiles on human body can be different for different aromatic plant species, different sniffing time and different genders. Under the guidance of TCM theory, the clinical study was conducted by combining traditional Chinese medicine aromatherapy with conventional therapy and traditional Chinese medicine aromatherapy to clarify the feasibility and effectiveness of its clinical application and to provide a reference basis for improving the quality of clinical care and expanding the clinical application methods of combined Chinese and Western medicine nursing techniques.

#### 5. FUNDING

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# THE USE OF IOT TECHNOLOGY IN SPONGE CITY COMBINED WITH LANDSCAPE CONSTRUCTION

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## ABSTRACT

This paper explores the sponge city landscape construction based on Internet of Things (IoT) technology, and establishes an online monitoring system for sponge cities through IoT technology. Where the sensing layer is based on RS485 serial port connection with sensors, remote reading of rainfall, water level, flow and other parameters, and with the help of GPRS wireless communication module to transmit the data to the remote server side. It realizes the functions of sensor signal acquisition, conversion and remote monitoring. Following the principle of sponge city construction, it protects, restores and improves the natural ecology, raises the flood retention and drainage capacity, makes up for the defects of hard municipal engineering, and achieves the construction goal of alleviating urban flooding.

## KEYWORDS

Sponge city; Urban landscape construction; Online monitoring system; Urban flooding; Ecological environment

## **1. INTRODUCTION**

In 2012, China proposed the “Sponge City Agenda” to address the challenges of urban flooding and water pollution caused by urbanization and population growth [1]. Sponge cities, as an ecosystem-based approach integrated with urban planning to address urban water and environmental problems caused by extreme weather events such as storms, are well suited for urban construction in China [2-3]. However, since there is uncertainty in sponge city design and construction because of rainfall, determining the capture rate of annual precipitation and appropriate rainfall thresholds is the key to building sponge cities and also requires analysis of sponge city funding, which is likely to lead to failure in sponge city construction if these key points cannot be grasped [4-5]. Using IoT applied to the study of sponge city construction, the main difficulties including vulnerability and danger are analyzed, the economic and natural benefits are fully estimated, and further studies identify various opportunities for building sponge urban landscapes [6-7]. With the advancement of IoT-based water informatics, hydrological data are becoming more and more abundant. As a result, more and more algorithms and methods relying on deep learning are being introduced for flood forecasting, monitoring and analyzing the water information of cities through IoT technology [8]. To better adapt to environmental changes and respond to natural disasters, to improve the quality of urban ecological environment and to build sustainable ecosystems.

## **2. ANALYSIS OF THE CURRENT SITUATION OF SPONGE CITY CONSTRUCTION IN CHINA**

### **2.1. SPONGE CITY LANDSCAPE PLANNING AND DESIGN**

Sponge city construction needs certain urban landscape planning and design theories to guide rainwater landscape design. In the background of sponge city construction, the research associated with it in the theoretical system of landscape planning and design still needs to be perfected, and there is also the phenomenon of aesthetic lack of landscape design in sponge city construction projects around the world, so it is necessary to combine the theory of urban landscape planning and design with the reality of sponge city construction in China for research, and explore the humanized design suitable for China's national conditions.

The theory of landscape planning and design has an important guiding significance for the development of landscape design work. Based on the relevant theories of sponge city and urban park landscape planning and design, and with the goal of improving the quality of urban landscape in the process of sponge city construction, it adds a certain complement to the usual methods of urban park landscape planning and design, and extends the intersection between different disciplines. The research of this topic will lay a certain foundation for the development of similar topics in the future and has certain theoretical significance.

### **2.2. SPONGE CITY CONSTRUCTION PRINCIPLES**

In the construction of sponge cities, we should coordinate planning and consider all aspects and factors to promote and facilitate the effective development of sponge cities, specifically through the following ways to achieve the construction and development of sponge cities:

- (1) Protect the original urban ecosystem

In the process of sponge city construction and development to take protective measures for various urban ecosystems, for example, for urban rivers, lakes, wetlands, ponds and other ecological resources to provide sufficient water connotation, while for woodlands, grasslands, wetlands and other ecological resources, in the process of urban development and construction is not damaged.

- (2) Ecological restoration

In the process of urban development, a large number of water bodies and natural resources are destroyed. And in the process of sponge city construction must be aimed at this part of the ecology, through science and technology to repair and restore it, and gradually realize the unity of the ecological environment.

(3) Low-impact development

In the process of urban development and construction, the carrying capacity of urban ecology must be considered, urban development intensity and urban development progress must be reasonably controlled, and sufficient ecological land must be retained in urban development according to urban land planning to further control and reduce the impervious area of the city and improve the protection of the original urban ecosystem.

(4) In the construction of sponge city, we should follow the principle of adapting to local conditions

According to the current situation and characteristics of urban water resources system, the legal objectives of planning should be reasonably determined, and various facilities such as sunken green areas, grass planting ditches and rainwater wetlands should be effectively used to improve the effect of sponge city construction.

**2.3. THE WAY TO BUILD A SPONGE CITY**

**2.3.1. PERMEABLE PAVING MATERIALS**

Building outdoor ground, roads, squares and parking lots are very easy to become water-collecting areas, we should use modern technology to promote permeable paving materials vigorously and change the traditional hardening method in order to infiltrate rainwater to recharge groundwater and recycle rainwater. The data from the analysis study on the function of outdoor permeable paving materials for buildings through IOT monitoring is shown in Table 1. Through the construction of bioretention ponds, infiltration wells, infiltration trenches, sand filters and the use of permeable pavements, rainfall runoff from impervious surfaces is filtered, transmitted and infiltrated to achieve the treatment of surface runoff pollutants and groundwater recharge, alleviating a series of urban and ecological problems caused by the increase in impervious surface area.

**Table 1.** Functional study of outdoor permeable paving materials

Name	Reduced flooding capacity	Flood protection capacity
Permeable tile paving	34%	64.2%
Permeable asphalt paving	43.9%	27.4%
Permeable concrete paving	27.6%	24.6%
Crushed material paving	76.9%	43.2%

**2.3.2. SOFT LANDSCAPE PATHWAYS**

According to the local climate and soil environment, plant more shrubs and trees suitable for water storage. Transforming the traditional irrigation mode, turning active irrigation into passive irrigation mode, collecting the rainwater accumulated in the season of sufficient precipitation to realize the local water extraction for plants; for plants to be able to absorb water automatically in the period of no rainfall, providing continuous and sufficient irrigation for plants, reducing human irrigation and enhancing the cycle of ecological sustainability construction. The main ways to strengthen urban greening include improving urban green permeable network by building more urban wetland parks, country parks, small green areas, small parks and other urban green areas according to local conditions, and strengthening rainwater ecological management mainly through the use of plants, gravel, sand and other natural

elements.

### 3. ONLINE MONITORING RESEARCH OF SPONGE CITY BASED ON INTERNET OF THINGS

#### 3.1. ONLINE MONITORING ELEMENT STUDY

##### 3.1.1. BASIC ELEMENT MONITORING

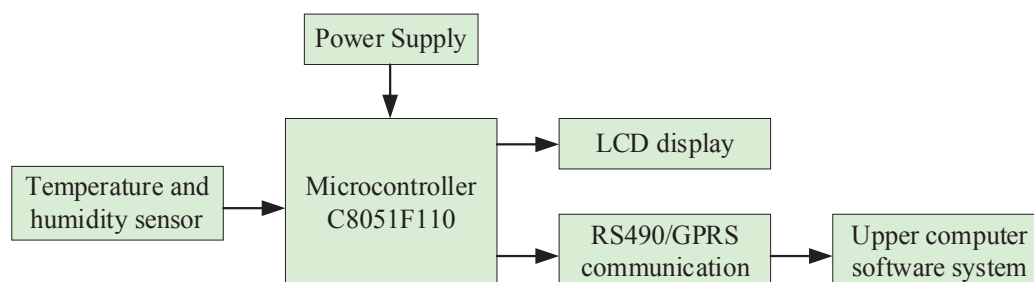
The rainfall data synchronized with the water level flow monitoring is the basis for supporting the analysis of the effectiveness of sponge city facilities and the assessment and evaluation basis for runoff control and surface source pollution control. Because of the random nature of rainfall, combined with the principle of distribution, every 2km<sup>2</sup> set a rainfall station, and take redundant settings, rainfall online monitoring in different areas, testing the rainfall runoff in different areas and different sub-bedding surface; at the same time monitoring the temperature in different areas, provide accurate temperature data, support the sponge city heat island effect mitigation effectiveness analysis and assessment, combined with the principle of distribution, temperature measurement points in accordance with every 3km<sup>2</sup> set a temperature monitoring station in the area outside the perimeter of the appropriate amount of 1. The temperature monitoring station is set up in every 3km<sup>2</sup>, and 1~3 stations are arranged in appropriate amount around the area.

##### 3.1.2. SOURCE, PROCESS AND END ELEMENT MONITORING

The study builds a “source-process-end” online monitoring system, through monitoring the flow and water quality of the project’s drainage outfalls, as the source calculation basis for the total annual runoff control rate, urban surface source pollution control rate and other indicators, while the ecological detention facilities, grass planting ditches, green roofs, rain gardens and other LID low-impact development to achieve source monitoring, according to the rainwater collection process and the flow of the nodes of the pipe network process element monitoring, combined with the collection process of rainfall runoff, water quantity and quality monitoring of rivers, flood-prone waterlogging points to achieve the final assessment.

#### 3.2. IOT SENSING TECHNOLOGY ENGINEERING APPLICATIONS

According to the sponge city project needs and the actual situation to choose the appropriate temperature and humidity sensor, rainfall sensor, ultrasonic level meter and flow sensor and other high-precision sponge city online monitoring system data ingestion necessary for intelligent monitoring equipment, based on the Internet of things sponge city online monitoring system architecture. The perception layer is based on RS485 serial port connection with sensors, remote reading of rainfall, water level, flow rate and other parameters, and with the help of GPRS wireless communication module to transmit data to the remote server side. The intelligent decision layer mainly includes the environmental monitoring server side and the remote control server side. This project integrates intelligent sensors, acquisition and control modules and communication modules into an intelligent sensing unit. The intelligent sensing unit has good portability, as shown in Figure 1, and can realize the functions of sensor signal acquisition, conversion and remote monitoring.



**Figure 1.** Acquisition communication module

#### **4. CONCLUSION**

In this paper, in order to explore the application of IOT technology in sponge city combined with landscape construction, the current situation of sponge city in China and the construction path of sponge city are studied, and the research of online monitoring application of sponge city based on IOT is established. All-round dynamic grasp of sponge city monitoring facilities and equipment operating conditions and project construction control, operation and maintenance process, while providing dynamic and continuous data support and decision-making basis for quantitative assessment of sponge city construction effects.

The construction of ecological landscape is to adhere to the principles of site-specific, gradual, ecological and sustainable development, combining natural ecology and artificial construction closely, and proposing a scientific and reasonable ecological recyclable model. Urban ecological landscape is not simply greening planting and surface decoration of urban image, but as an ecosystem that undertakes a number of important functions such as urban ecological environmental protection, recycling and reuse of natural resources and inheriting urban humanities and history. It is necessary to take the sponge city as the goal and adhere to the principle of reshaping the urban ecological landscape. In response to the ecological problems that have emerged in the city, it is necessary to actively face them and not to escape from them, giving priority to ecological protection, water reuse, people-oriented and improvement of human living environment as the starting point of ecological landscape construction.

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# STUDY OF VISUALIZATION DIGITAL TECHNOLOGY IN LANDSCAPE DESIGN SCHEME EXPRESSION SYSTEM

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## ABSTRACT

This paper studies the visualization digital technology in landscape design scheme expression system and analyzes the advantages of visualization digital technology in landscape information analysis link. The visualization digital technology is introduced into the landscape system to construct 3D landscape visualization model. Focusing on the study of landscape visualization design methods for design and construction integration, the landscape design process of the park is summarized as data collection, landscape information analysis, scheme design and construction building. Suitable visualization techniques are combined with site design using interactive 3D technology. Visualization tools can in turn bring different landscape feelings to explore the possibility of visual landscape features and strengthen the spatial design knowledge system of landscape architecture.

## KEYWORDS

Spatial design; Landscape design; 3D landscape; Information analysis; Visualization model

## 1. INTRODUCTION

Landscape design is a comprehensive art, and it is developing on an unprecedented scale and magnitude [1]. Since the 20th century, public landscape art has emerged as a social necessity, and the demand for landscape is becoming more widespread, and the demand for natural landscape design is increasing. Among them, the green dimension has gained the highest preference. The green dimension, including water features, trees, plants, and shrubs, influenced the preference for landscape design [2-3]. Landscape as a continuous process moves forward and is created based on historical accumulation [4]. Designers map landscape spaces by hand and through modern technology, enabling landscape architects to describe, understand, and interpret the spatial visual characteristics of the landscape. This helps to strengthen the body of knowledge of spatial design in landscape architecture through the measurement and visualization of concepts common to the field and by exploring the possibilities of spatial-visual landscape features that were not previously possible [5]. Landscape as a comprehensive art, in design performance mainly in the form of static media, such as one-dimensional textual symbols, two-dimensional graphic images, three-dimensional model sand table, etc., can not go to dynamic display of the changes inherent in the landscape itself, the professional expansion of landscape design is becoming more and more space, and the traditional qualitative design will certainly be transformed to quantitative design [6-8]. In the face of the development of digital information technology, landscape design should be solidly innovative, and designers should keep pace with the times, constantly update their personal knowledge of the industry and technical skills, and present

people with high-quality landscape spaces that are more adapted to the requirements of the times on the basis of comprehensive use of visualization technology.

## **2. THE CURRENT SITUATION OF LANDSCAPE DESIGN DEVELOPMENT AND THE PROBLEMS FACED**

### **2.1. THE DEVELOPMENT STATUS OF LANDSCAPE DESIGN**

#### **2.1.1. PENETRATION OF CULTURAL CONCEPTS**

Artists in the 19th century, wisely perceived the unity of time and space. Due to the development of science and technology, people's concept of time and space has changed a lot, which is reflected in the landscape, that is, people began to pursue the quick-growing landscape. With the gradual disappearance of people's concept of time and the expansion of the concept of space, people began to have more and more control over space. But the establishment of a large number of repetitive landscapes led to an era of static, efficient and uninnovative landscapes. With the increasing deterioration of the environment and the gradual depletion of resources, we began to pursue an ecological, sustainable and more scientific landscape.

#### **2.1.2. LANDSCAPE DESIGN PROCESS AND PERFORMANCE**

In the pre-design, designers seldom do holistic assessment, lack of grasp of the overall environmental conditions, the use of the current state of the design only focuses on the rationality of the internal structure and layout, rarely consider the impact on the design process and on the environment after completion, lack of science. Landscape design process itself is a multidisciplinary cooperation process, planning involves a wide range of fields, including ecology, botany, computer technology, etc. Visualization construction needs more cooperation of new technologies, visualization digital technology introduced into the landscape system has good application prospects. Visual digital technology itself is the product of multidisciplinary combination, and only multidisciplinary cooperation with each other can bring its advantages to the best.

## **2.2. TRANSFORMATION OF LANDSCAPE DESIGN EXPRESSION**

The development of technology continues to provide new media for design performance, design media through "one-dimensional language and text - two-dimensional drawings - three-dimensional models - multi-dimensional display", "static - dynamic" development process. Multi-dimensional display", "static - dynamic" development process. These expressions have their own advantages and limitations, so they should be used together to complement each other's strengths and weaknesses and optimize the expression.

In the actual design process, landscape architects often depict ideas on paper, constantly compare, modify and improve them, thus stimulating the development of thinking and finally completing the whole program. Drawing expressions include plans, elevations, sections and perspective views. The limitation of the graphical expression is that the expression of the scheme needs to choose a specific perspective for refinement and cannot fully express the essence.

## **2.3. THE INEVITABILITY OF DEVELOPING VISUALIZED LANDSCAPES**

With the development of computer technology, visualization digital technology provides new opportunities for the development of landscape discipline, injects new expansion space, and brings certain guidance and help for scientific landscape design. Landscape elements have the characteristics of spatial and temporal change and uncertainty, which leads to the unique complexity of dynamic management of landscape information, spatial analysis and

real-time decision-making. Landscape visualization has the characteristics of immersion, interactivity, intelligence and high information intensity, which lay a solid foundation for further improving the scientificity and feasibility of the scheme. Visualization digital technology has important practical applications in landscape planning and design, real-time management, and program expression. Using visual digital technology, the optimal expression of landscape design schemes can be realized.

### 3. VISUALIZATION TECHNOLOGY IN CAMPUS LANDSCAPE DESIGN

#### 3.1. LANDSCAPE DESIGN OF THE PARK

With the development of visual digital technology, the functions provided by visual digital technology are widely applied to the process of landscape design. Most traditional landscape design methods rely on the designer's personal experience and subjective judgment, but the development of digital technology allows one to analyze data can understand the more core property characteristics of things and discover the objective connections between things. The landscape design of the park should pay attention to both technical support and the guidance of theoretical methods. Digital technology can be both a technical means in design and can bring about a change in design thinking and methods. The full process of landscape visualization design should generally include five links: data collection, statistical analysis, scheme simulation, digital construction and performance measurement and control. The research in this paper focuses on the study of landscape visualization design methods for design and construction integration. The landscape design process of the park is summarized into four links: data collection, landscape information analysis, scheme design and construction building, and the process of landscape design is shown in Figure 1.

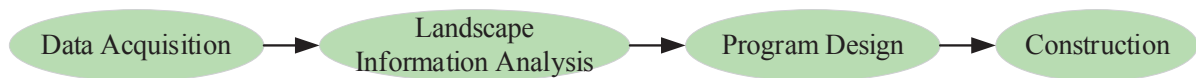


Figure 1. Flow chart of landscape park design

#### 3.2. ADVANTAGES OF VISUALIZATION TECHNOLOGY IN THE ANALYSIS OF LANDSCAPE INFORMATION

Data collection is an important prerequisite and basic step of post-industrial landscape design in the context of visualization, and is the initial stage of landscape visualization design. The main task of this stage is to obtain the data information needed to carry out post-industrial landscape design in an all-round way, and to prepare the data information for the subsequent work of design.

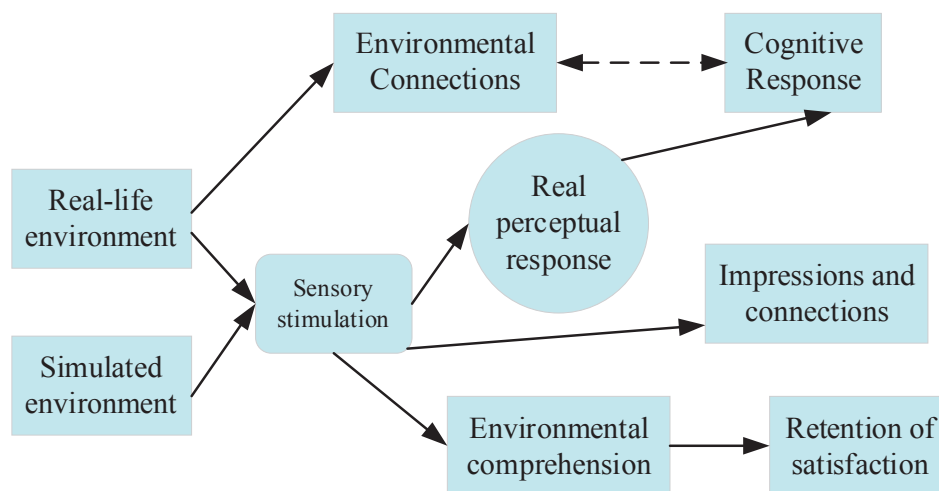
With the continuous development of hardware and software technology, the channels of data acquisition have been broadened and the types of data available have become more and more diverse. Under the current conditions of lack of big data storage and open environment in China, it is also a practical need to study the means of landscape design under the background of big visualization by seeking reasonable new technology tools and designing reasonable analysis methods to view and analyze the industrial space facing the transformation and development. The basic design data in the visualization era can be obtained through a combination of new visualization channels and traditional methods, which can save a lot of time and energy and better ensure the comprehensiveness and accuracy of the data.

### 3.3. RESEARCH ON THE INTEGRATION OF LANDSCAPE DESIGN AND VISUALIZATION TECHNOLOGY

#### 3.3.1. VISUALIZATION MODEL STUDY

The simulation of the virtual environment combined with the real environment will leave strong sensory stimulation for the human body to improve people's cognitive ability and deepen their comprehension of the environment. The impact of the environment on people's perception is shown in Figure 2. Although digital reforms have led to the continuous development of techniques and tools used to create landscape visualizations, these results are still only simple impressions of the landscape (quick imaging). These stylized landscapes are useful for communicating information about changes in the landscape, but they do not reflect the way people experience the real world.

In recent years, the demand for higher fidelity visualization and simulation has led to the emergence of a combination of specialized computer hardware and computer technology dedicated to providing real-time graphical environments. This allows designers to create more complex interactive 3D landscape models, ultimately allowing people to choose their preferred perspective to observe and wander through the virtual landscape. These provide a broader and deeper exploration of the spatial nature of future design. So, the main question is how to optimally use these interactive 3D technologies to translate appropriate visualization techniques combined with site design into examples that better support landscape design and communication. In order to answer this question, it is necessary to understand the integration of visualization techniques with landscape, how complex procedures support the landscape design process, and how visualization tools can give a different landscape experience from the preliminary design to the detailed design stage.



**Figure 2.** The influence of the environment on people's perceptions

#### 3.3.2. VISUALIZATION COMBINED WITH LANDSCAPE MODELING

The term 3D visualization is defined as a simulation that uses real-time 3D images to represent a visual form of a landscape area, allowing the user to control the view position to freely view and explore the topography of all areas. The ideal 3D visualization model is a real-time 3D landscape model that can be constructed when given design instructions, so it is important that we know how to incorporate these technical tools into landscape design theory. The use of interactive 3D visualization techniques in the design process makes it easier to design visual 3D models. A flexible 3D model allows the design to modify the 3D landscape model. Landscape design consultation has always been supported by visualization techniques such as: plan, section, aerial view, rendering, etc. In interactive 3D landscape

visualization models people can control the visualization themselves, such as combining multi-sensory stimuli to create an immersive feeling and walking freely through the model.

Building a 3D landscape visualization model requires three basic elements, a 3D model of the area, software that can display this model in real time and can process it, and a computer that can run the software efficiently. There are more and more software packages available or computer engines that allow real-time 3D model transformation and increasingly inexpensive computer hardware, but the main difficulty remains in building 3D visual landscape models. When a 3D model is to be created, enough data needs to be collected to build the model to the level of detail required.

#### **4. CONCLUSION**

In this paper, we analyze the transformation history of landscape design expression thinking and find that visualization in different ways always runs through the scope of wind turbine garden design expression, and in order to meet the requirements of higher fidelity visualization and simulation, a 3D visualized landscape design model is constructed.

Landscape art is a living three-dimensional art, landscape design is a close combination of aesthetics and technology, science and environment, from nature and above nature. In the past landscape design, the proportion of artificial and experience is too large, making the landscape design has a high subjectivity, lack of unified standards, it is also difficult to convince the decision makers, its scientific nature needs to be improved. The emergence of visualization technology has improved this situation and provided a strong guarantee for the progress of the landscape business. Landscape itself is an industry that requires the perfect integration of art and science. Contemporary landscape has changed from beauty design to practical design, and the combination of technology and art of sustainable design is its inevitable trend. If we simply rely on the appearance of the gorgeous or the use of engineering technology, not only tarnish people's aesthetics but also lose the value of the landscape itself. Therefore, the landscape information model needs to integrate the beautiful environmental expression with the real accuracy of engineering technology, and what kind of quantified form of beauty exists in the model construction, in order to provide a better way for landscape design and provide a strong help to meet the needs of contemporary people for landscape design.

#### **FUNDING**

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## ABSTRACT

This paper addresses the basic requirements for the management of commercial properties being developed today. A three-level schema structure of outer, conceptual and inner schema is provided for the database system. The real estate management system is constructed and tested for its performance using a computer, and the system performance is tested using LoadRunner 8.0. The test result is that the average response time of the system does not exceed 2 seconds, and when adding users to the number of concurrent users is 200, the response time of the system still does not exceed 3.5 seconds, and the analysis shows that its systemic performance meets the standard. The real estate sales management system has promoted the activity and development of the real estate market and played a role in promoting real estate sales management.

## KEYWORDS

Real estate market; Real estate management; Database technology; Data storage; System performance testing

## 1. INTRODUCTION

Nowadays, the rapid development of the Internet information industry, along with the rapid changes in computer technology and science, automated processing technology has penetrated into various fields and played an irreplaceable role [1]. Informationization, standardization and specialization of real estate industry management have become an inevitable trend in the development of the times [2-3]. The real estate industry has the following significant features, a higher degree of risk, is a larger amount of data, and is a complex industrial chain [4]. For real estate companies, the key to management is to build a standardized workflow based on their actual situation and make appropriate adjustments based on actual needs, which means that it is significant to standardize the management of business management and build an automated information system [5-6]. Relying on this system, it can be closely integrated with the general environment in which modern management is located, and promote the progress and development of building real estate management towards more standardization and standardization [7-8].

## 2. COMPUTER-BASED REAL ESTATE MANAGEMENT SYSTEM

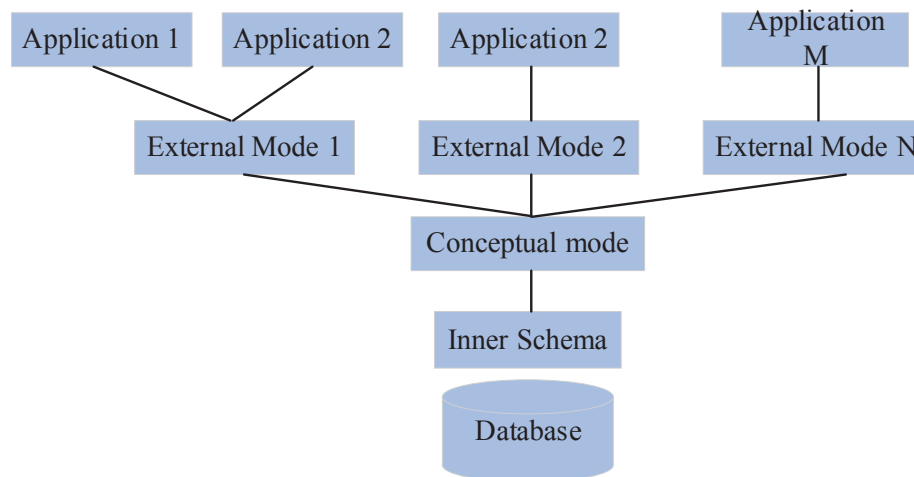
### 2.1. MANAGEMENT SYSTEM DESIGN

#### 2.1.1. DATABASE DESIGN

In the construction process of real estate information system, it is necessary to make a virtual construction of the actual real estate structure, including the scene and the size of the



building model, so it is necessary to make a comprehensive information collection of the real estate data information. In the process of design and implementation, it is required that each part should be organically combined, and the hierarchy and functional structure should be distinguished, so that users can access data, organize data and store data quickly and conveniently, and the database system provides a three-level schema structure of external schema, conceptual schema and internal schema, and the three-level schema structure of the database system is shown in Figure 1.



**Figure 1.** Three-level schema structure of the database system

### 2.1.2. SYSTEM FUNCTIONAL MODULE DESIGN

The real estate information system establishes the whole three-dimensional scene through the collection and collation of the basic geographic information data of the planning of the property, and realizes the browsing of the three-dimensional scene of the community from all angles through the human-computer interaction interface, which allows users to move and rotate the scene from front to back, up and down, left and right, through tools such as mouse, keyboard and joystick. Users can roam and walk in the district, browse the surrounding environment of the district and the surrounding schools, hospitals and other public infrastructure. Users can output dynamic video based on any customized roaming route. For large scale planning projects in real estate, the system can export existing plans as video files to produce multimedia materials for a certain degree of publicity, allowing the public to truly understand the project's expectations. In addition, the video output can also be used to create multimedia promotional videos for external publicity, etc.

## 2.2. SYSTEM CONSTRUCTION KEY TECHNOLOGIES

### 2.2.1. DATA STORAGE INTEGRATION BASED ON SPATIAL DATABASE TECHNOLOGY

One of the main features of today's GIS technology application is the use of relational database to manage spatial data. In terms of storage mechanism, there is no essential difference between spatial data and non-spatial data, so it is fully possible to integrate spatial data and non-spatial data to achieve storage integration, so as to realize the overall management of data in the system. In the process of implementation, the spatial database technology is mostly based on relational database for the extension of spatial data management, so that the storage method of relational database can be directly used to store spatial data, and through the association of key segments, to achieve both spatial data and non-spatial data can be stored in the same physical table.

The spatial database system has a huge amount of data covering earth surface information,

atmospheric confidence and geology as well as various complex information, and can mark the attributes of the operational database, establish complex spatial data models, store relational data using topological relationships, and can contain a large number of graphic images, figures, text and other various information to achieve efficient storage and fast and accurate access. There is a wide application space for other databases, and the concurrency is extremely controllable. Therefore, GIS application is currently an important measure in real estate systems.

### 2.2.2. LARGE BINARY OBJECT (BLOB) BASED MANAGEMENT OF HIERARCHICAL SUBFAMILY DIAGRAMS

An important object of property management is the house, how the house is landed on the GIS platform and how to store it effectively is a problem that needs to be solved first.

In the real estate management information system, houses are managed in the form of a building table, which is landed in the GIS platform by associating the latitude and longitude of buildings, and each housing unit exists in a building table, and each cell in the building table stores the property subdivision plan of the house, the mound plan, and the related housing properties. Figure 2 shows the storage process of the subdivision plan in the database. Each floor plan is stored directly in the graphics field of the floor table, which is a BLOB field that stores the complete graphic file of the split-level house plan. This BLOB field contains detailed graphic information of each stratum and subfamily. When using it, just find the floor (building) through the mound, and then index the strata floor plan and the subfamily floor plan respectively through the floor.

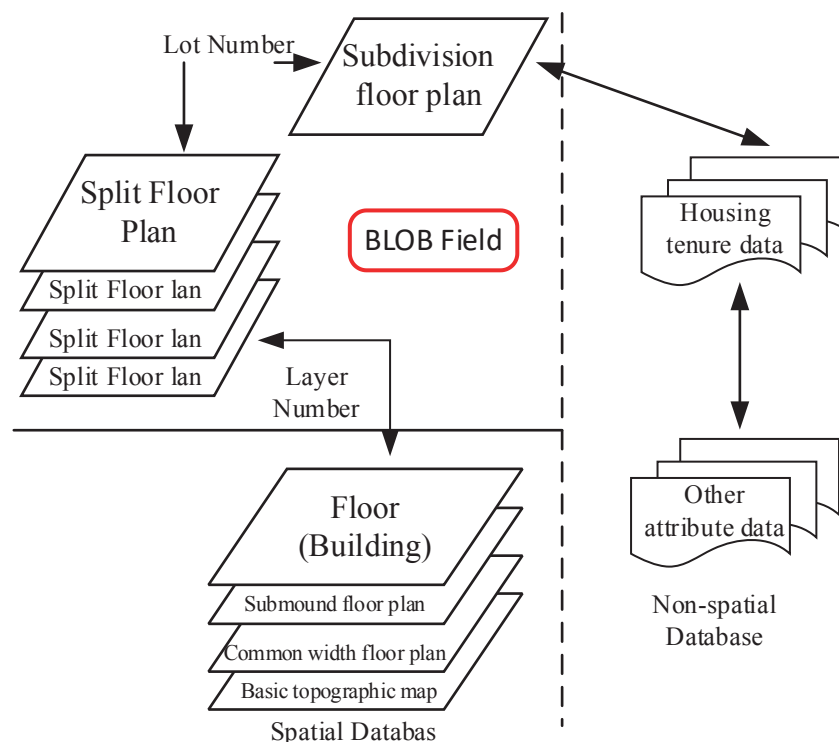


Figure 2. Storage of subdivision diagrams in the database

## 3. ANALYZE THE EFFECTIVENESS OF COMPUTER APPLICATION IN REAL ESTATE MANAGEMENT SYSTEM

### 3.1. FINANCIAL MANAGEMENT FUNCTION TESTING

The core function of the financial management system is to handle basic financial information. The smooth use of the financial management function is divided into four parts,

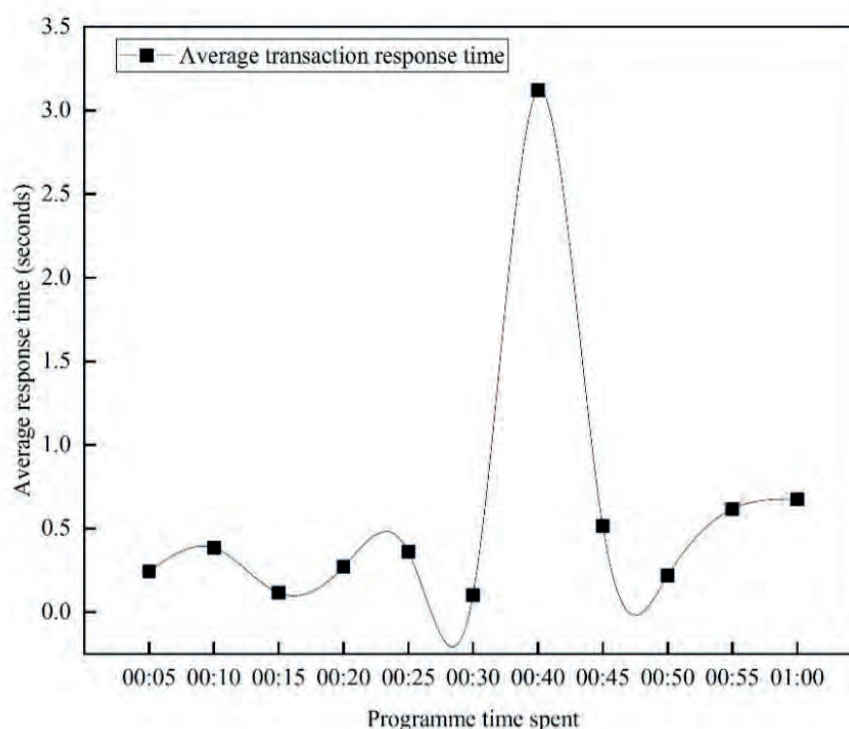
namely deposit management, prepayment down payment, installment payment and sales commission management. The financial management module is mainly for financial information modification as a test case. In this test, the test process is that the system administrator enters the financial management system, opens the financial management page, successfully enters the information that needs to be modified, and saves it to return. The system administrator can successfully complete the content of the test process, successfully enter the financial management page, make single-point corrections, enter in the financial management interface, and automatically enter the financial management interface after successful modification. The actual result matches with the expected result and the test passes.

### 3.2. PERFORMANCE TESTING AND RESULT ANALYSIS

When performing system performance tests, the main purpose is to simultaneously perform simulation tests on the user software and specific tests on system response, processing speed, etc.

Under normal conditions, system performance testing is mainly concerned with the compression load threshold when the system crashes under high load conditions. Existing testing methods cannot be used for specific tests. Test procedures need to be reprogrammed. If user terminals are sent due to many user requests, the risk of errors and bugs increases. Therefore, the user terminals in this paper are chosen for transmission.

The system performance test was conducted using LoadRunner 8.0, a testing tool, and the stress test for the number of users was conducted using the simulation method, setting the user access line to 200 and accessing the system at the same time, and the test results are shown in Figure 3. After testing the system, it is found that the system response time does not exceed 2 seconds, and when increasing the number of users to 200 concurrent users, the system response time still does not exceed 3.5 seconds, and the indicators of the system meet the requirements of the interval, and the system works normally under a high intensity load, and the analysis shows that its systemic performance meets the standards.



**Figure 3.** Concurrent 200 user response time

#### 4. CONCLUSION

Currently, the continuous development of information technology databases, software and other technologies combined with real estate development provides a more comprehensive strategy for businesses. Analyzed the management system research process, the main management system software for a comprehensive analysis of user needs, the construction of a comprehensive analysis, while the different functions as well as the implementation. The data in the property management system is characterized by a large volume of data, frequent data changes and temporal and spatial type cavities. The introduction of computer technology into property management is a breakthrough in the traditional property management approach, which promotes the standardization and efficiency of real estate management, overcomes the shortcomings of focusing only on attribute information and ignoring graphic information in the past, and advances the modern real estate management model to deeper development. The comprehensive collection, collation, updating and improvement of property graphic data and attribute data, the establishment of unified data specification and the implementation of unified standards, thus establishing a more complete and open database, realizing data sharing and integration, and realizing dynamic management of the system. Uniform management of the real estate industry to avoid duplicate registration entries and improve the efficiency and motivation of grassroots staff. Promote the application and development of deep informationization in the real estate industry, and better reflect the function and nature of government services for the society. The real estate management system will become a new open system with comprehensive management, convenient inquiry and various forms of output to better provide comprehensive, efficient and accurate information services for the real estate administration and better management and decision-making.

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# RESEARCH ON ECOTOURISM DEVELOPMENT MODEL AND MARKETING STRATEGY IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper proposes the use of big data for accurate targeting and the construction of an ecotourism marketing model, starting from the current situation of ecotourism. It also uses new media to expand product promotion and publicity and Internet information technology tools to improve consumer experience and achieve the integration of culture and tourism, and other strategic suggestions to generate a modern new tourism model. The results of the experiment show that the total weighted score of 2.75 for the tourism marketing strategy factor is greater than the average score of 2.5. Therefore, the Internet mindset and innovative marketing model should be relied upon in order to achieve sustainable development of ecotourism.

## KEYWORDS

ecotourism; marketing model; big data; precision targeting; weighted score

## 1. INTRODUCTION

With the advent of the new century, ecotourism, a new form of tourism that focuses on the harmony between people and nature, is developing rapidly around the world, gradually evolving into the mainstream of tourism in the new century [1-3]. Ecotourism is an open ecological and economic system, a tourism that respects, learns from and preserves nature and culture [4-5]. Ecotourism is an active means of environmental protection, and the construction of ecological civilisation is an important support for the development of ecotourism [6]. The wave of internet development has made mobile phone mobile clients the most important source of information channels for people to access, either through mobile phone booking or computer browsing, influencing the marketing model of ecotourism today [7]. Consumers can pick and choose places to visit according to their preferences, stay informed and plan their travel routes rationally. Operators can post the most popular places to visit, update their itineraries, etc.

Ecotourism has become a hot spot in the global tourism industry. The literature [8] examines how the marketing strategies of tourism providers can induce tourists to engage in different levels of adventure through fear appeal and conservation motivation. Literature [9] explored the use of social media in destination marketing by different age groups, particularly in the context of sustainable tourism. The literature [10] proposes a framework to validate the relationship between tangible and intangible measures of destination marketing and finds that destination attractiveness, service quality and destination image have a significant impact on marketing efforts in semi-rural tourism destinations. The above literature proposes a poor network infrastructure for ecotourism development, a lack of integrated marketing concepts for new media, and too single marketing tools.

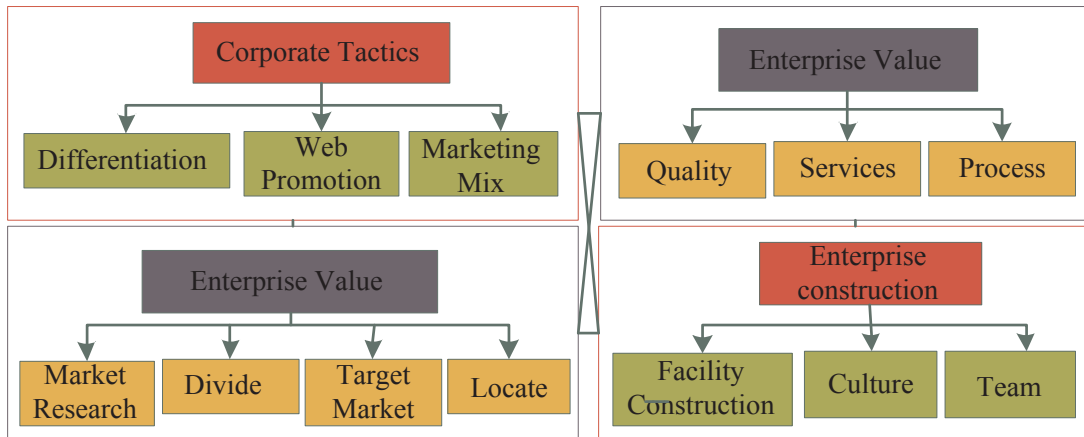
Therefore, this paper constructs a marketing model for ecotourism, analyses the current situation of ecotourism development, constructs a marketing mix design based on the concept of "ecological experience", and proposes specific marketing strategies. The results show that the total weighted score of tourism marketing strategy factors is 2.75. In the context of big data, the use of the internet to develop interactive, experiential and entertaining tourism marketing activities is of great importance to the development of the regional tourism economy.

## **2. BIG DATA AND ECOTOURISM DEVELOPMENT MARKETING**

### **2.1 ECOTOURISM MARKETING MODEL**

Ecotourism marketing is based on tourism marketing and is a green marketing approach to tourism that reflects the idea of sustainable development and the concept of social marketing. It requires individuals in the tourism economy to pay attention to the protection of the environment and resources in all aspects of production and management, to pay attention to the protection of the ecological environment in marketing, to build a unique competitive advantage, to actively use good marketing methods to market themselves, to create and find opportunities to be recognised and accepted by the market, and to achieve their goals by constantly meeting the needs of various tourists. As can be seen from Figure 1, ecotourism marketing is not only a specific part of the effective integration of ecotourism products and their markets, but also a central part of managing ecotourism. The main objectives of marketing ecotourism are to spread the concept and impact of ecotourism widely, to attract large numbers of ecotourists to the area and to get them to buy as much of the product as possible. To attract a large number of potential tourists to the region and to attract a large number of visitors. Analysis of the region's source markets and active development of specific potential markets and related tourism products. Segment and

analyse the characteristics of the target market according to the respective tourism products and develop targeted marketing plans, etc.



**Figure 1** Ecotourism marketing model

## 2.2 THE MACRO ENVIRONMENT OF ECOTOURISM MARKETING

"Ecotourism" is a key project that can combine sustainable development with economic development, as it caters for people who value environmental protection. The relevant authorities have developed a series of policies to promote the rapid development of ecotourism, indicating the direction, objectives and strategic layout of the ecotourism industry. It has been determined that ecotourism will be developed into a strong economic growth point. In traditional tourism marketing, the object is simply the tourism product, and it is sufficient for the marketing activity to inform the audience of what the specific product is. In contrast, ecotourism marketing is not only about marketing ecotourism products, but also about marketing the concept of ecotourism, so that all audiences can gain knowledge of environmental protection and the scientific concept of ecotourism through various marketing tools.

## 2.3 SPECIFIC INITIATIVES FOR THE DEVELOPMENT OF ECOTOURISM

Big data has changed the state of human existence and development. Ecotourism in the context of big data is a kind of intelligent tourism, through the accurate data analysis of big data, the target customer groups of enterprises can be effectively known, so as to carry out precise positioning and obtain higher revenue in this way. Through big data, the dynamic information and changing trends of various tourist areas, tourist attractions, tourist routes and different enterprises can be comprehensively grasped, which can enhance the systematic grasp and macro-control ability of tourism management agencies and governments. With the use of big data, enterprises engaged in the tourism industry can precisely find the tourist base and can accurately obtain comprehensive information on the interests, tastes, hobbies, personalities and needs

of tourists, and accordingly form the corresponding industrial policies, enterprise planning, product types and service methods, etc.

### **3. Ecotourism marketing strategies in the context of big data**

#### **3.1 PRECISE TARGETING OF CUSTOMERS**

At a time when data and intelligence have become popular hotspots, for ecotourism to make a breakthrough, operators need to use information technology to advance the marketisation process. For example, using customer relationship management systems, the regional characteristics and personality traits of target customers can be analysed based on customer information in databases such as their historical purchase records, which can then be used to pinpoint target customers, segment the market and ultimately find the target customer base on a large scale. Modern travel consumers make extensive use of social media, particularly in the search for information and decision making about destinations. It can be seen that the use of social media for target customer pinpointing is scientific and necessary for the precise marketing of ecotourism.

#### **3.2 PRECISION MARKETING PROGRAMME RECOMMENDATIONS**

With the application of big data technology to analyse the personal preferences, consumption habits and shopping needs of tourism consumers, operators can recommend matching tourism products to tourism consumers based on their different trajectory preferences. At the same time, when a tourist's trajectory desire is detected towards tourism activities, offline tourism activities in their vicinity can be recommended to them.

#### **3.2 ACCURATE FEEDBACK ON TRAVEL**

Accurate feedback on tourism is also particularly important after the implementation of big data precision marketing programmes. Accurate feedback on tourism can contribute greatly to the quality of the destination. Accurate feedback data is relatively standardised and easy to collate, allowing for the effective formation of a data warehouse and the mining of richer, more diverse information based on scientific algorithms. In terms of accurate marketing, information such as the quality of tourism resource structure and configuration can be obtained through accurate tourism feedback, and the corresponding tourism resources and facilities can be improved accordingly to provide better quality tourism products to customers.

### **4. ANALYSIS OF ECOTOURISM MARKETING STRATEGIES**

This paper constructs a quadratic model of ecotourism marketing to summarise the development and marketing strategies of ecotourism and to provide a basis for determining the relationship between them. The internal evaluation matrix is introduced



into the study of ecotourism marketing strategies, and the weights and scores of each information are obtained using a scoring method with a range of 1-5, with weights accurate to two decimal places. Analysis of Table 1 shows that the total weighted score for the eco-tourism marketing strategy factor is 2.75, which is greater than the average score of 2.5. Therefore, the government should invest more in the ecotourism market, help tourism companies with publicity and invest funds in promotional activities to promote the rapid development of tourism. An important factor in the development of ecotourism is the promotion of tourism products. Relevant departments should start from multiple angles, strengthen research on relevant ecotourism products, and motivate other companies to develop new types of products.

**Table 1** Ecotourism marketing strategy scores

	Marketing key internal factors	Weights	Rating	Weighted score
Advantages	Convenient transportation	0.3	5	0.9
	Rich tourism resources	0.2	4	0.4
	Pleasant ecological environment	0.25	4	0.25
	High priority for tourism by local governments	0.3	5	0.7
Total		1.0		2.75

## 5. CONCLUSION

This paper proposes that ecotourism precision marketing in the context of big data will be a more economical and accurate marketing tool. Through a variety of ways from a number of social media sites automatically collect, analyze and integrate various forms of tourism activity data, using relevant data mining techniques to predict the various consumer hi-numbers, travel preferences of users. The results of the experiment show that the total weighted score of 2.75 for the internal environmental factors of ecotourism marketing is greater than the average score of 2.5. Therefore, the value and significance of developing ecotourism is multifaceted; it not only creates considerable economic value, but also realises the social value of environmental and ecological protection, enabling harmonious economic and social development and contributing to a harmonious relationship between humans and nature, and between humans and society.

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# IMPROVEMENT AND INNOVATIVE MEASURES FOR THE EDUCATION MANAGEMENT SYSTEM OF UNIVERSITIES IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper first constructs a big data education management model, uploads course resources to an interactive online teaching platform, and in for classroom teaching or after-class student self-study. It also analyzes the impact of big data in the educational work of colleges and universities, and puts forward reasonable measures for the improvement and innovation of college education management system. The results show that in the index innovation evaluation of the university education management system based on big data technology, the first-level index of self-management ability can reach 14. Therefore, by combining the essence of education management and exploring the impact brought by big data technology on the university education management system, it can help promote the modernization of the university education management work.

## KEYWORDS

big data; education management; indicator innovation; innovation response; management capacity

## 1. INTRODUCTION

The application of big data resources and technical means in the process of university education management has a certain value [1-3]. This includes, continuously collecting, storing, transmitting, applying and mining the intrinsic value of data and information related to education management in the government, enterprises and university education reality, and then providing the basis for education management innovation [4-5]. Secondly, the application means to analyse education management trends, disadvantages and advantages, so that it can clarify the direction of education management change, find the right pivot point, scientifically deploy resources required for education management innovation and support universities to carry out education management work [6-7]. Big data technology can quickly respond to changes in the

content of education management in universities, acquire data, management information and other tasks in a reasonable time frame, and quickly collate the educational information that is constantly generated.

Colleges and universities need to base their education and teaching management on information data. The literature [8] emphasises the importance of ideological and political theory classes in higher education and proposes a specific method for classroom supervision through intelligent identification of student status, which effectively solves the problems in the management of ideological and political theory classes in higher education. The literature [9] discusses a web-based examination management system with strong multi-factor authentication and authorisation features to detect impersonation and prevent cheating. The system has been successfully used to organise several semesters of online examinations. A joint project was undertaken in the literature [10] to develop a new process for internal quality management focusing on student competencies. The process raises awareness of the quality of study programmes and encourages discussion between students, teachers and academic staff, enhancing the competency profile of research projects. This project is driven by the "teaching to learning" approach in the European higher education sector. The educational management systems proposed in the above literature lack flexibility, diversity and adaptability and are difficult to centralise.

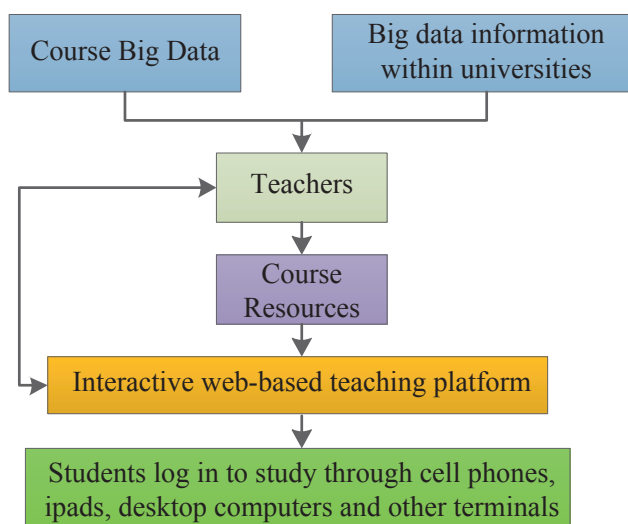
Therefore, by constructing a model of education management, this paper firstly analyses the influencing factors in the education management of universities, and secondly discusses the measures related to using big data to innovate the management system from the aspects of "formulating information preservation standard", "optimizing teaching mode", "cultivating practical talents and expanding data management team". This paper discusses the measures of using big data to innovate the management system in terms of "developing information preservation standards", "optimizing teaching mode", "cultivating practical talents and expanding data management team" and "innovating education management system improvement strategies". This paper evaluates the index innovation of university education management system and considers the system, management and management team.

## **2. THE IMPACT OF BIG DATA ON EDUCATION MANAGEMENT SYSTEMS**

### **2.1 BIG DATA EDUCATION MANAGEMENT MODEL**

In the era of Big Data, teachers can accurately analyse various teaching issues by collecting educational data in a fast, timely and massive manner without changing their original teaching habits, and can change their teaching strategies in the first instance to make the teaching process more efficient and relevant. Students can use the information revealed by the big data to learn on their own, check the gaps and

implement self-management. The education management model constructed in this paper is shown in Figure 1. Teachers prepare course resources according to the professional talent cultivation plan formulated by the university, which include: course standards, teaching plans, overall course design, course unit design, electronic lesson plans, case libraries, test banks, etc., and upload all these course resources to the interactive online teaching platform for classroom teaching or after-class student self-learning. With rich types of big data, it can collect and store and use information resources in different categories from the perspectives of university faculty management, teaching and research management, assessment management, etc. On the other hand, the data categories are flexibly set according to the innovative needs of university education management to ensure that the data information is real and available, real-time and efficient, and as an important resource for university education management to help it carry out specific activities, making it more developmental, relevant and effective.



**Figure 1** Big data education management model

## 2.2 APPLICATION CHARACTERISTICS OF BIG DATA

The value of big data is closely related to its scale, depth, breadth and size. Because of the large capacity of information resources and the dynamic expansion process, big data can comprehensively and systematically integrate information related to university education management, so that universities can analyse it in time, find the direction of education management innovation and give support to its education reform. Big data is integrated together on the basis of information systems to form valuable data clusters, so its circulation, collection and analysis efficiency is better than the human-based form of comprehensive information utilisation. It will improve the rate of information flow in the educational management system of universities, eliminate management delays and

support the timely resolution of complex and sudden management problems, so that the innovation path can be unimpeded and effective.

### **2.3 APPLICATION OF BIG DATA TECHNOLOGY**

In the context of big data, the easy dissemination of and access to information provides new directions for innovation among university teachers. For the process of implementing educational management in universities, the relevant working methods currently established can only be considered professional if all the results are scientifically sound, reliable and complete. For the management phase of the results, it is important to anticipate and analyse the professionalism and standards of work that will be achieved over time, and the management system established can only be considered scientific and effective if it is determined that the final results achieved are identical to the work standards set.

## **3. INNOVATION OF UNIVERSITY EDUCATION MANAGEMENT SYSTEM IN THE CONTEXT OF BIG DATA**

### **3.1 STRENGTHENING EDUCATION MANAGEMENT TEAMS IN UNIVERSITIES**

Big data brings opportunities for education and helps to improve the effectiveness of management work. However, it is still under active exploration, and universities do not yet have a complete system that works effectively, which requires exploration under the system of innovation in the management of university education under big data. From the current composition, the proportion of staff with information management background is relatively small, which requires the management department to absorb professionals with information management background into it on the one hand. On the other hand, it is necessary to strengthen the training of information literacy of the existing staff and enhance the ability of the education management workforce to carry out various business tasks.

### **3.2 STRENGTHENING THE HARDWARE AND SOFTWARE INFRASTRUCTURE OF UNIVERSITY EDUCATION MANAGEMENT**

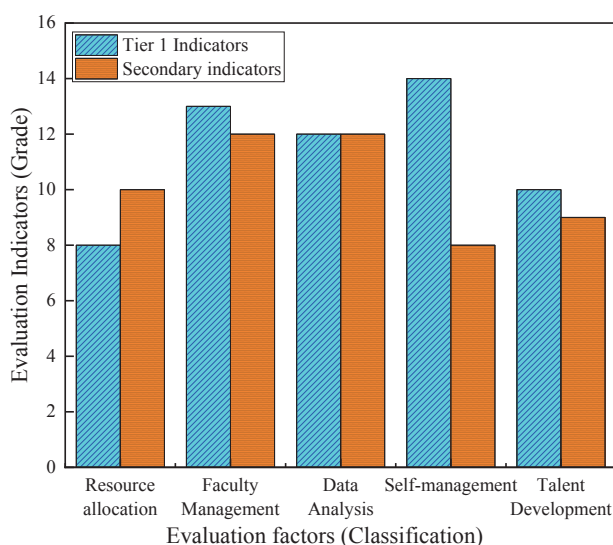
A standard-compliant infrastructure is a material prerequisite for the enhancement of education work under big data. Some universities have initially realised the hardware and software foundation for digital campus, which provides the basis for carrying out education management work under big data. On this basis, universities should adopt stable, advanced and secure technologies to promote convenient data transmission, and should have a certain degree of foresight in equipment and wiring, while the capacity and convenience of data can be promoted.

### **3.3 DEVELOP A BIG DATA MANAGEMENT MINDSET TO OPTIMISE TEACHING AND LEARNING MODELS**

The teaching and learning process should be dynamically analysed for students' interests and targeted educational management. At the same time, the teaching of the course has been optimised in the sense that, although it is open-ended, the learning resources are concentrated and students have limited access to them and their use. The teaching model is optimised so that teachers can upload the knowledge students need to master to the internet, allowing students to focus on understanding the course knowledge and broaden their knowledge in accordance with the networked model. Universities are vigorously introducing hybrid concepts in the innovation of teaching models, including an online + offline structure, where online teachers give students 80% of what they need to learn and deepen their impressions of knowledge points.

#### 4. ANALYSIS OF THE INNOVATION OF EDUCATION MANAGEMENT SYSTEM IN HIGHER EDUCATION

This paper constructs a model of education management system based on big data technology, and integrates big data technology into the education management of universities. The actual evaluation factors are calculated with weighting coefficients, and the indicators are 1-14. The evaluation results can be seen in Figure 2, which shows that the primary indicator of self-management ability in the evaluation of indicator innovation reaches 14, followed by teacher management ability reaching 13. The secondary indicator of self-management ability is the lowest, reaching only 8 points. In summary, the application of technology and data resources to the management system innovation process can strengthen the university's faculty and improve the overall quality of human resources. In this regard, the introduction of big data systems, equipment, software and other necessary conditions, the implementation of data analysis results in the areas of "school-based" textbook development, pedagogical reform, school-government-enterprise cooperation, teaching evaluation and other areas, to help transform university teaching management.



## Figure 2 Innovation index system

### 5. CONCLUSION

This paper proposes to strengthen the education management system in the context of big data, and to innovate in three aspects: team building, hardware and software infrastructure, and optimising the teaching model. The results show that the index innovation evaluation of the education management system of universities, in which the first-level index of self-management ability reached 14. Therefore, in the management system of the new era, it is necessary to scientifically obtain, summarise and process the management information within the school, improve the working ability and moral standard of teachers, and improve the quality and effectiveness of management.

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# RESEARCH ON THE CHANGE OF HIGHER VOCATIONAL EDUCATION PERSONNEL TRAINING MODE IN THE ERA OF BIG DATA

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## ABSTRACT

This paper constructs the framework of big data talent training mode and elaborates a new talent training idea. It puts forward the innovative ways to clarify cultivation objectives, take market demand as the guide and deepen the reform of teaching mode. It is able to cultivate practical technical talents and set up professional curriculum system scientifically to promote the development of talents in higher vocational education. The experiment results show that there will be more than 10 million students enrolled in higher vocational education in China in 2022. It shows that the concept of big data should be introduced into higher vocational education, based on competency analysis, to update the goal of talent cultivation and adjust the professional settings, so as to truly achieve the ultimate goal of talent cultivation.

## KEYWORDS

big data; talent training; market demand; innovative ways; curriculum system

## 1. INTRODUCTION

Vocational education management has a key role in helping students to improve their learning ability, to train more talents with excellent skills for society, to promote industrial development and to drive the progress of society [1-3]. Its aim is to cultivate new types of skilled talents for the purpose of socialist modernisation. "Taking service as the purpose, taking employment as the guide and following the road of combining industry, university and research" is the basic orientation and the way to go for the talent cultivation strategy of modern higher vocational education. Using big data technology in it, improving teaching management methods, effectively strengthening education efficiency and making efforts to cultivate excellent skilled talents for society [4-6]. The change of talent training mode in higher vocational education is the demand of the times in response to the changes in the world of work. From "Internet+" to "artificial

intelligence", various new technologies based on digitalisation and information technology are rapidly penetrating into all corners of the human world.

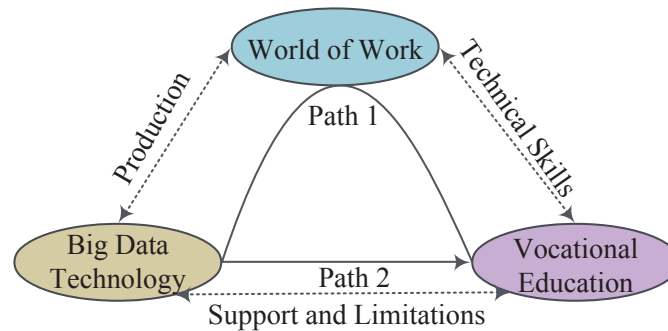
The talent development model is an exploratory practice on the path of higher vocational education talent development. The literature [7] points out that teachers face constraints such as lack of curriculum guidelines, knowledge and time, resulting in possible biases in their teaching methods when developing students with sporting talents. The literature [8] suggests that despite talent development being at the forefront of research in sport, female athletes are still underrepresented in sport. To close this skills gap, there is a need to improve coaching practices and support at the amateur level of cricket. The literature [9] presents two theories, the work adjustment theory and the larger model of talent development, while also highlighting the effect of 'brain drain'. The changes to the talent development model proposed in the above literature lack a philosophy, are not clearly targeted and do not adapt to changing needs.

Therefore, this paper constructs a framework for talent cultivation mode and explores how the talent cultivation mode of higher vocational education should be changed in the era of big data. It discusses a scientific and systematic mode of cultivating skilled and innovative talents, and gradually improves the effectiveness of cultivating skilled and innovative talents through the innovation of educational philosophy, innovative strategies of management mode, analysis of competence of talent cultivation programmes, reform of teaching methods and enrichment of teaching contents. The study finds that big data not only provides more support by putting forward new requirements for changes in the training model, but also as a technical tool.

## **2. HIGHER VOCATIONAL EDUCATION IN THE ERA OF BIG DATA**

### **2.1 TALENT DEVELOPMENT MODEL FRAMEWORK**

Big data technology has always been an important force influencing education, especially the unique type of attributes of higher vocational education, which makes the impact of big data technology on higher vocational education has more paths [10]. The change of higher vocational education talent cultivation model acts in different ways on the objectives, processes and subjects of vocational education talent cultivation, etc. The framework of the talent training model is shown in Figure 1 below, which shows that the development of education as a whole must be in line with social development. Cultivating talents is the purpose of higher education, and the structure of cultivating talents must be the same as the structure of talent development, because the whole economic and social development demand for talents is multi-type, multi-level and multi-faceted. Only in this way can higher education develop better.



**Figure 1** Big data talent training model framework

## 2.2 TALENT DEVELOPMENT IDEAS

The reform of the higher vocational education model should take the development of the current social situation as a reference for programme development, and should be more student-oriented, after all, the purpose of the reform is to cultivate talents and add bricks to their future development. There are two main sources of data for big data in higher vocational institutions. The first is the information data obtained by students independently, the quality of these data varies and it is difficult for schools to control them. The second is the information provided by the school to students, which in theory should be safe and secure, and for which the school must ensure that the quality of the information is maintained to ensure that students learn and live in a good environment. However, from the point of view of students' own access to information, it is difficult for schools to make the security of students' access to information secure. But schools still have to take the necessary measures. The educational reform work in higher vocational institutions should therefore focus on student education, and on the basis of mastering the laws of teaching, further enhance students' ability to distinguish information and reduce the impact of undesirable information on students from the source.

## 2.3 PROMOTING THE DEVELOPMENT OF HIGHER VOCATIONAL EDUCATION MANAGEMENT

The application of big data in higher vocational education promotes the transformation of traditional education methods in vocational institutions and the use of big data to propose scientific and reasonable strategies. In its application, institutions are required to seize opportunities in the general environment of the market, to draw on advanced management methods in line with international standards, and to better offer the technical professional courses needed in the market. In the process of construction, rational planning, listening to different opinions, building big data associated with students, and promoting the improvement of students in professional skills.

### **3. INNOVATIVE CHANGES IN THE TALENT CULTIVATION MODEL OF HIGHER VOCATIONAL EDUCATION**

#### **3.1 CLARIFY TRAINING OBJECTIVES**

As the economic system becomes more sophisticated, vocational jobs change frequently. This calls for the need to combine specific teaching realities with clear training objectives to cultivate the practical talents needed by society. At the same time, the difference between higher vocational training and general higher education and secondary education is that skilled personnel should constantly update their knowledge and have a strong capacity for self-development and problem-solving. The emphasis is on the improvement of vocational knowledge and skills, so as to have a strong ability to master new equipment and technology. In short, the setting of talent training objectives should highlight the characteristics of advanced, vocational and technical.

#### **3.2 GUIDED BY MARKET DEMAND**

Higher vocational institutions should adjust the professional curriculum system in the light of the current situation of society and cultivate students' innovation. They should aim at the job market, and in the process of optimising the setting of majors, they should especially highlight the characteristics of vocationalism. Starting from the characteristics of higher vocational institutions, focus on the special economy of the region, so as to build specialties. At the same time, investigate the social demand and the actual employment of graduates, etc., and then adjust the setting of professional curriculum system in time. In addition, it is necessary to deal with the issue of broad and narrow professional calibre. Cultivate students' love, dedication, persistence, commitment and firm professional beliefs, and cultivate high professional ethics and innovative professional spirit.

#### **3.3 DEEPENING THE REFORM OF THE TEACHING MODEL**

The content of higher vocational education should highlight the theoretical and comprehensive nature and the systematic nature of knowledge. With the development of higher vocational education, the traditional teaching form is single and does not meet the diversified needs of students in the new era. Therefore, it is necessary to actively innovate and build a new mode of talent cultivation that focuses on skill cultivation, has relevance, gives full play to students' individuality and makes full use of social resources. In teaching practice, students should be the centre of attention and fully mobilise their enthusiasm. In terms of teaching methods, multimedia etc. should be fully utilised; in terms of teaching evaluation, an equal and scientific evaluation system focusing on the enhancement of abilities should be established. In addition to theoretical learning, students need to practice and enhance their hands-on skills. Arrangements can be made for students to take part in internships in society in their final year after

two years of schooling. After the innovative talent model, a realistic talent training programme is developed between schools and enterprises and applied to the whole process of talent training, thus improving the overall quality of higher vocational students

#### 4. ANALYSIS OF THE CHANGE OF TALENT CULTIVATION MODEL IN HIGHER VOCATIONAL EDUCATION

This paper constructs a framework of talent cultivation model based on the background of big data, and brings big data technology into the study of the change of talent cultivation model of higher vocational education, so as to cultivate excellent skilled talents for the society. The results of analyzing the current scale of higher vocational education talent cultivation in Figure 2 show that the current scale of higher vocational education system is among the top in the world, with about 13,300 vocational institutions and 30 million students. From 2006 to 2013, the growth rate was high, and from 2013 it began to slow down, but the number of students in general is increasing. It can be concluded that the scale benefits of higher vocational education have been formed, for talent training, should use big data technology, timely transformation, to promote change and innovation.

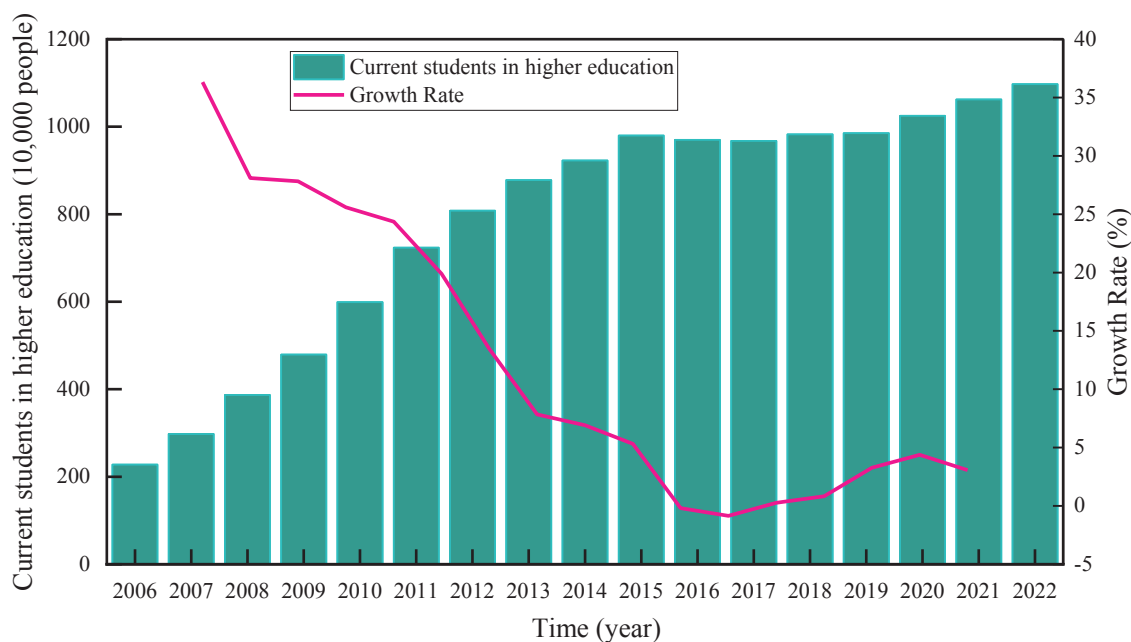


Figure 2 Scale of talents in higher vocational education

#### 5. CONCLUSION

This paper points out that higher vocational education pays more attention to the use of practical resources and practical projects in the cultivation of skilled and innovative talents. Through the rational use of projects and bases and other resources, the innovative literacy and skills of students can be improved. The experimental results

show that there are up to 10 million students in higher vocational education in China in the era of big data. Therefore. The effectiveness of talent cultivation can be enhanced by promoting the innovation of management mode, the innovation of education concept, the increase of teaching reform, the concern of quality and literacy, the expansion of practical training resources and the enrichment of teaching contents. Cultivating skillful and innovative talents with comprehensive quality to serve the industry and enterprises is a necessary path for the adaptive development of higher vocational institutions.

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**RESEARCH ON THE INNOVATION AND DEVELOPMENT OF UNIVERSITY  
PHYSICAL EDUCATION TEACHING MODE IN THE CONTEXT OF BIG DATA**

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**ABSTRACT**

This paper analyzes the development trend of big data according to the current situation of the application of big data technology in the process of physical education in colleges and universities, combined with the content of physical education classroom teaching, and proposes three innovative development models, including open network resource platform, intelligent carrier teacher-student interaction, and the adoption of a diversified evaluation system. The results show that the physical education teaching model is evaluated by indicators, of which the teaching effect indicator score is 13. Therefore, by combining the information collected by big data for comprehensive analysis, the optimization of personalized teaching of resource allocation is done, which in turn will lead to better development and enhancement.

## **KEYWORDS**

big data; university physical education; network resources; intelligent carrier; teacher-student interaction

## **1. INTRODUCTION**

As an important part of college education, physical education in colleges and universities has a positive impact on the physical and mental health of college students [1-4]. With the help of sports, colleges and universities nowadays focus on cultivating students' sportsmanship, exercising their physical fitness and promoting quality education [5-7]. With the development of a series of high-tech for education, it brings more opportunities and challenges for the innovation of physical education teaching mode. Big data technology, as one of the rapidly developing high technologies nowadays, is widely used in various industries.

Physical education is an integral and important part of teaching and learning. The literature [8] provided information on the impact of physical education on children's weight, cognitive and non-cognitive achievement. Physical education class time was found to have essentially no effect on weight and human capital outcomes for US primary schools students. The literature [9] analysed the relationship between physical education class time requirements and physical activity among high school students in various states. The results of this study help to support the role that physical education state requirements play in increasing the ability of youth to meet the recommended amount of daily physical activity. The literature [10] suggests that one of the core goals of school sport is to improve the physical literacy of young people in order to develop their ability, confidence and desire to be physically active throughout their lives. The aim is to examine selected physical education-centred indicators of physical literacy. The concepts of physical education presented in the above literature are too old-fashioned, with vague and non-student-centred teaching objectives.

Therefore, this paper begins with a conceptual overview related to the connotations of big data and goes on to point out the challenges facing the physical education classroom. On this basis, it points out the ways to develop the physical education classroom in colleges and universities. The application of technologies related to big data can lead to richer teaching content and effective improvement. This paper discusses the current situation and resource allocation of the innovation and development of university physical education teaching in the context of big data through the analysis of the index evaluation of the teaching mode, in order to provide some theoretical reference for the innovation and development of university physical education teaching.

## **2. THE ROLE OF BIG DATA IN THE PROMOTION OF PHYSICAL EDUCATION IN HIGHER EDUCATION**

### **2.1 DIGITISATION OF TEACHING CONTENT CARRIERS**

The teaching and widespread use of big data and its facilities has greatly enhanced the performance of university physical education and its innovative reforms. Firstly, the content of sports culture is digitalised. The history of sports development, sports culture carriers, the history of the development of various sports and sports equipment and other public sports culture is used as content. The digitisation of electronic teaching materials and other related resources can effectively avoid the perishable nature of paper-based text, photo and picture storage, and achieve effective and durable preservation as well as simple and efficient resource integration, etc. Secondly, the digital construction of various sports skills and movement practices. Big data in the construction of innovative teaching content can effectively overcome the limitations of paper pictures, with digital audio-visual comprehensive recording and exhibition functions to fully demonstrate the practical, performance, process and other characteristics of sports itself. For example, the use of digital technology to record the performance process of outstanding successors in various martial arts disciplines and clips of exciting movements during a certain event can be used directly as teaching resources for skills and movements.

## **2.2 TEACHING CLASSROOM CONTEXTUAL NETWORKING**

The realisation and popularisation of modern teaching with information, intelligence and networking has led to revolutionary improvements. Firstly, the teaching classroom webcast is innovative. Both in the traditional stadium classroom teaching, but also open up intelligent classrooms. The creation of online classroom 'classrooms' supported by the internet is one of the most operational and replicable practices. This means that students working on the same project can enter the same teaching 'room' and receive teaching from the relevant teacher, and interact with the teacher and other students online. Secondly, there is the innovation of interactivity in the teaching classroom. This means that teachers can interact with each other at a particular time, with the support of social software. As this approach is limited by the strength of the network signal, the number of people involved in the activity and the functionality of the facilities held by the students, the teaching is dominated by the explanation of a certain skill action or the demonstration of a complete sport action.

## **2.3 BIG DATA FOR TEACHING EVALUATION**

As universities have a team of professionals who develop and use big data, the direct integration of big data into university physical education to carry out relevant teaching evaluations is an effective initiative to help teaching and improve performance. Firstly, big data performance modelling is used to analyse students' physical education performance. After physical education teachers have entered various student performance data into some modelling software, they directly analyse students' performance in various sports. This can be used to analyse individual and common learning problems for the PE department or subject group to conduct more targeted research, by providing an individual understanding of students' learning and quantitative performance in various sports, as well as a class-wide or even school-wide comparison of students' learning as a whole. Secondly, Big Data fitness modelling and analysis software is used to evaluate students' physical fitness. Based on the data collected by teachers in their daily teaching, testing and assessment, the modelling software can be used to accurately analyse students' fitness levels in order to accurately capture their

fitness status in terms of speed, endurance, explosive power, cardiorespiratory fitness, pulse rate, flexibility and acuity. This will enable the students to understand the relationship between their physical fitness status and their related skills, and to actively explore innovations that will directly contribute to the physical fitness of students.

### **3. INNOVATIVE REFORM OF UNIVERSITY PHYSICAL EDUCATION TEACHING IN THE CONTEXT OF BIG DATA**

#### **3.1 OPEN TEACHING ON THE WEB RESOURCE PLATFORM**

The application of big data to achieve more open network teaching practices, universities should establish open sharing platforms for public resources and apply them. Students can browse resource websites and conduct targeted learning activities on their own, using the physical education teaching resources of professional sports training institutions, sports research institutions, universities and national education-related administrative departments, and national sports-related administrative departments as content. In the actual teaching process, students enter the resource site and watch videos in a certain area, learn and are required to complete the learning tasks according to the criteria, and the site assesses the learning according to the students' learning situation.

#### **3.2 INTELLIGENT VEHICLES FOR TEACHER-STUDENT INTERACTIVE TEACHING**

With mobile smart devices as the carrier platform, teachers and students can conduct more effective and direct teaching activities. For example, when using web technology, students can use messages or consultations to ask questions about problems they face in the learning process, and teachers can provide timely answers. The teacher can also provide timely guidance to students on irregularities in their training activities through online videos and praise students who perform well. In addition, teachers and students can work together to improve specific aspects of the teaching process.

### 3.3 ADOPT A DIVERSIFIED EVALUATION SYSTEM

The assessment of the quality of student learning is primarily an assessment of the quality of student movement. Students' movement in the final assessment is more mechanical, for example basketball assessment is evaluated by the number of balls shot and tennis by the number of strokes. Therefore, the evaluation system needs to be reformed, with teachers using students' physical and special qualities as two parts of the assessment. In addition, a comprehensive assessment of daily learning attitudes and the quality of training should be carried out to improve students' motivation and to strengthen the assessment of theoretical knowledge.

### 4. ANALYSIS OF THE INNOVATIVE DEVELOPMENT OF PHYSICAL EDUCATION MODE IN COLLEGES AND UNIVERSITIES

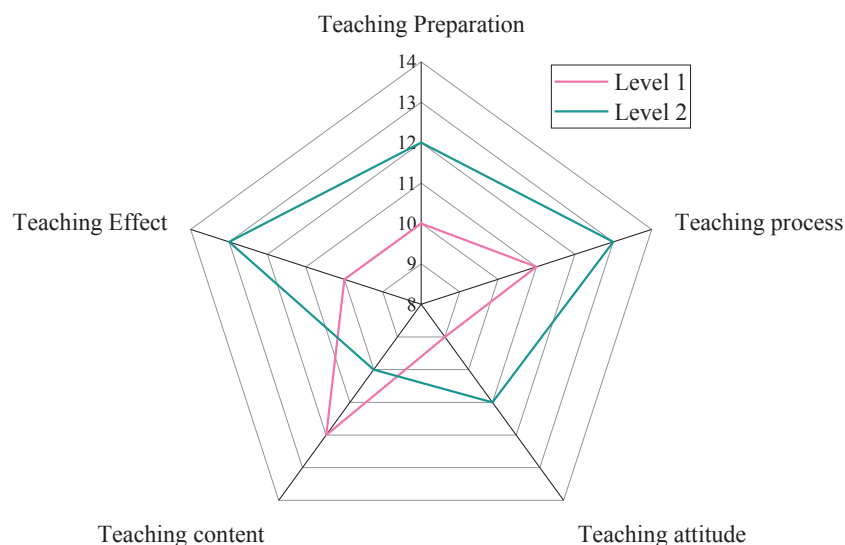
This paper analyses the innovative development of university sport in the context of big data, with the aim of strengthening the concept of continuous progress in education between teachers and students, applying modern sociological, pedagogical, physical education and mathematical theories to each condition and its associated aspects. The evaluation of the indicators was carried out through big data techniques. The results of the judgement are shown in Table 1. The mean of all indicators exceeds 4, the coefficient of variation is less than 0.25, and the evaluation results are consistent.

**Table 1:** The importance of secondary indicators of physical education evaluation

Indicators	Average number	Standard deviation	Coefficient of variation
Teaching Preparation	4.10	0.80	0.30
Teaching process	4.85	0.54	0.10
Teaching attitude	4.54	0.61	0.11
Teaching content	4.72	0.55	0.20
Teaching Effect	4.75	0.51	0.12

The indicators were thus subjected to weighting coefficients, and Figure 1 shows the results of the coefficients obtained for the innovation development indicators. It can be

clearly seen that the weight coefficient of teaching content in the primary evaluation index is the highest, reaching 12 points, and the score of teaching effect in the secondary evaluation index is the highest, at 13 points, at this time the weight coefficient can reflect the degree of the index better. To sum up, it has broken through the disadvantages of traditional physical education which was limited by time and space, and has broadened the depth and breadth.



**Figure 1:** Innovation development index coefficient

## 5. CONCLUSION

This paper proposes that big data has a catalytic effect on university physical education, which can digitize the teaching content carrier, network the teaching classroom situation and evaluate big data. Accordingly, a platform for the innovation and development of university physical education teaching under the big data facility software is constructed. The results showed that the index evaluation of the physical education teaching model resulted in the highest score of 13 for teaching effectiveness in the secondary evaluation index. Therefore, the proposed innovation pathway can achieve more comprehensive and stable protection for various sports programmes, and can better support the development of more diversified resource integration, and make good data exploration and support for each programme to play a leading and diversified function.

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# RESEARCH ON THE PATH OF EDUCATION OF MUSIC MAJORS IN UNIVERSITIES IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper designs a model of how to educate music majors in higher education, by carrying big data information, maximizing effective information density and improving skill knowledge. The ability to retrieve information about oneself, develop a multi-level and diverse curriculum of characteristics, and thus educate students efficiently. The results show that less than 11% of students are fully able to identify short and pentatonic scores, and only 16% are able to complete classical music appreciation independently. The frequency of perceived music education methods was slightly higher in the lower grades ( $m=4.56, sd=0.77$ ) than in the upper grades ( $m=4.40, sd=0.85$ ). This indicates that in the field of music and arts education, big data is leading the innovation of a new generation of music and arts education teaching concepts, thus meeting the needs of music professional teaching and facilitating the realisation of the concept of 'lifelong education'.

## KEYWORDS

university music; parenting styles; information density; skills knowledge; retrieving information

## 1. INTRODUCTION

With the rapid development of big data technology, school education is undergoing a comprehensive systemic change, which brings both unprecedented opportunities and great challenges, and has an important impact on the future development of school education [1-2]. Universities should deeply understand the impact of "big data + education" on the quality of music education, give full play to the optimisation and integration of big data, and flexibly and diversively penetrate big data technology into all aspects of education [3-6].

Big data education is personalized learning and open learning, which can effectively solve the current problems of split teaching inside and outside the classroom, lack of teacher-student teaching interaction and low student learning motivation in music professional education in universities. Literature [7] shows that the types and contents of music teaching evaluation are being updated and changed, and teaching quality evaluation plays an important role in the development of music teaching and influences the quality of educational evaluation. The literature [8] shows that the use of pedagogical techniques and modern educational tools is one of the important criteria for the modernisation of education. Modern teaching implies participation in music teaching, which brings dynamism to traditional teaching. The literature [9] constructs a music classroom support teaching system supported by intelligent speech recognition technology in order to improve the effectiveness and informatization of music classroom teaching. To sum up, the new mechanism of talent training is unable to find the real crux of the problem and crack the problem, making it difficult to achieve the healthy development of music professional education.

Based on this, this paper designs a model for the way music majors are educated in universities in the context of big data. Firstly, through the influence of big data on the education and teaching mode, the information is stored to improve the density of effective information. Secondly, it fully improves the knowledge and information of skills, systematizes and scientifically cultivates talent goals, and innovates the training of music majors. Finally, through experiments, the model has proved that it can serve the purpose of enriching the form of aesthetic education in schools, improving students' comprehensive literacy and promoting their career choice and lifelong development.

## **2. TEACHING MODELS IN THE CONTEXT OF BIG DATA**

For the impact of big data on the education and teaching mode, big data is characterized by its own large information carrying capacity, easy information retrieval, diverse information modes and strong sharing [10]. It provides great convenience for education and teaching information sharing, and is also a huge development opportunity for the talent training mode. The traditional education model is taking advantage of the rapid development of information technology to innovate and enrich itself, and will certainly be given good opportunities for development.

### **2.1 EXPLORING THE CHARACTERISTICS OF BIG DATA**

Big data has the characteristics of greater data storage, higher timeliness of news messages, more variety of data, higher information density but less effective information [11]. Applying the information storage model with such characteristics to the cultivation of talents in real universities requires teachers to use various ways to maximise the density of effective information. It also requires teachers to improve their own ability to

retrieve information, increase the amount of preparation for lessons and take the initiative to search for information that is useful for students' own development. The advent of the big data era does provide new ways to personalise talent training, more options for information technology and valuable development opportunities for innovative talent training models by fully improving the knowledge and information of skills.

## **2.2 THE CURRENT STATE OF MUSIC EDUCATION IN HIGHER EDUCATION**

In order to make the training of music professionals more systematic and scientific, universities must develop plans and related talent training objectives, which require a training model that responds to current trends, meets practical needs, is tailored to the needs of the students, and constantly broadens and extends the horizons of learning. It is important to have a clear plan and not to aim too high or too low, so as to avoid the absence of a plan at a certain stage of the training process.

## **2.3 INNOVATIVE APPROACHES TO MUSIC EDUCATION IN HIGHER EDUCATION**

Colleges and universities must cultivate talents in line with the characteristics of the big data era, which has multi-level and diversified demand for talents. Colleges and universities can set up more slots in the admissions process, enrolling students at different levels and training them in different tiers. The study of music and arts should not only focus on learning professional knowledge and skills, but cultural subjects are also necessary as a foundation. The diversity of talent requirements is showing us clearly that the art of music has to be based on correct and healthy concepts and ideas.

## **3. BUILDING A MODEL FOR THE WAY MUSIC MAJORS ARE EDUCATED IN HIGHER EDUCATION**

In the big data environment, students are more in pursuit of some modern values and self-development. Only by establishing and adhering to a student-centred philosophy of education can we gain the recognition of students in teaching and management, as well as their support and cooperation. It is important to establish a variety of forms of teaching courses through new media network technology to enhance students' overall musical literacy. Teachers should guide students to establish good professionalism in conducting music major courses. By building a model of the way music majors are educated in colleges and universities, music teachers can purposefully guide students to give play to their rich imagination, and those various fantasies in a thousand variations will be transformed from people's subconscious to their consciousness, and students' potential creativity will be better developed.

#### 4. ANALYSIS OF THE EFFECTIVENESS OF MUSIC PROFESSIONAL EDUCATION

With the implementation of quality education, aesthetic education has been highly valued, prompting music education to gain rapid development, with significant improvements in terms of teachers and student quality. In this paper, a model of the way music majors are educated in colleges and universities is designed in the context of big data, and experimental analysis of basic music literacy and music perception education is conducted for music majors in colleges and universities.

##### 4.1 ANALYSIS OF BASIC MUSIC LITERACY IN HIGHER EDUCATION

In this paper, an experimental analysis of the basic music literacy of 300 students of higher music majors was conducted, and the analysis is shown in Table 1. 12% of the students could fully identify the simple score, 11% could fully identify the pentatonic score, only 14% could play musical instruments, only 16% could independently complete the appreciation of classical music, 38% could sing folk songs, and 65% could distinguish between American and folk songs. This shows that students' music literacy is relatively low, and it is urgent to improve the effect of music education in universities and cultivate high-level applied talents.

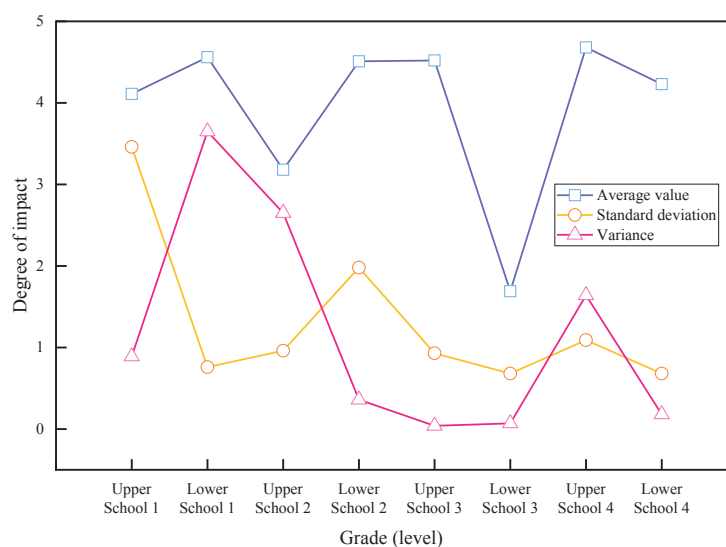
**Table 1** Survey of Basic Music Literacy of College Students

Content	Completely Capable	Number of People	Partial Energy	Number of People	Cannot	Number of People
Identifying a Simplified Spectrum	36	15	168	48	116	49
Identify the Staff Spectrum	27	11	162	47	127	43
Discriminative Singing	149	68	105	36	45	15
Singing Folk Songs	73	38	113	41	91	36
Play a Musical Instrument	39	11	86	34	157	57

##### 4.2 ANALYSIS OF STUDENTS' MUSIC PERCEPTION EDUCATION

Differences in school levels significantly affect students' perceptions of the frequency of educational approaches used in music education. Differences between school levels had a significant impact on the frequency of perceived educational approaches used by students when it came to everyday music education. The analysis of students' perceptual music education is shown in Figure 1. grade level differences significantly influenced the frequency of students' perceptual music education methods in the music curriculum. The frequency of perceived linguistic, visual, practical, research, interactive and emotional educational methods was significantly higher in the lower grades of the

upper school than in the upper grades ( $p < 0.05$ ). The frequency of perceiving music education methods was slightly higher in lower grades ( $m = 4.56, sd = 0.77$ ) than in higher grades ( $m = 4.40, sd = 0.85$ ). This indicates that the frequency of using various educational methods perceived by students in higher education decreases significantly with the increase of students' grades. Music and art colleges should follow the development of the current trend, constantly innovate the talent training mode, and develop a more scientific and complete talent training plan to truly cultivate the music and art talents needed by the times.



**Figure 1** Perceived educational methods of students due to grade differences

## 5. CONCLUSION

This paper presents an active research on the ways and means of nurturing music majors in colleges and universities in the context of big data. In the course of the study, a model of the way in which music majors are educated in colleges and universities is designed, and the results are analysed to verify the practical application effect. The results show that less than 11% of students can fully recognise simple and pentatonic scores, and only 14% can play musical instruments. The frequency of perceived music education approaches was slightly higher in the lower grades ( $m = 4.56, sd = 0.77$ ) than in the upper grades ( $m = 4.40, sd = 0.85$ ). This indicates that music education is fully integrated with the professional characteristics of students in higher education to accelerate music education in higher education and truly reflect the value of music education.

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# A STUDY ON THE DEVELOPMENT OF THE INTEGRATION OF SMART SPORTS AND TRADITIONAL SPORTS TEACHING MODELS IN UNIVERSITIES FROM THE PERSPECTIVE OF DEEP LEARNING

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## ABSTRACT

This study makes use of intelligent learning resources to develop a comprehensive teaching scheme that combines the efforts of teachers and students. By combining the benefits of both conventional and intelligent physical education, we may execute integrated physical education in accordance with the circumstances of a given classroom, and integrate traditional physical education and intelligent physical education into each other's development to build a new college physical education SCT teaching mode. According to the SCT teaching model results, the experimental group's average performance was 67.42, which is considerably better than the control group's average performance, which was 51.27. The experimental group's average performance is 75.28, which is much better than the control group's average performance of 60.15. This demonstrates that there is a substantial difference between the experimental group's and the control group's learning performance, and that the experimental group's pupils' learning performance has been significantly enhanced. The experimental group was successful in enhancing the standard of physical education at colleges and universities, ensuring that students exercised for the recommended amount of time and intensity, and improving their physical fitness.

## KEYWORDS

Smart learning; teacher activities; traditional sport; smart sport; integration development; SCT teaching model

## 1. INTRODUCTION

Big data, artificial intelligence, 5G, and other new generation information technologies are all developing quickly. The age of scientific and technical innovation and growth of change already affects the future of education and teaching in schools.



[1-2]. With the integration of physical education into "wisdom" means, physical education is characterized by "informatization" and "wisdom", and the development pattern of physical education has also undergone a new change - smart physical education [3]. Smart physical education is not a simple addition of modern information technology and physical education, but a deep integration of modern information technology in all aspects of physical education, making fundamental changes [4-5]. Smart physical education is characterised by a technological teaching platform, a highly open teaching environment and a high degree of sharing of teaching resources, and students' learning will be task-oriented in a smart teaching classroom [6]. The teacher becomes the leader of students' learning and makes efficient use of classroom time to improve the efficiency of teaching and learning [7]. Smart physical education takes the development of the current era as the background, and uses various modern information technologies as the carrier to further its thorough integration with physical education, in order to advance physical education development and reform [8].

The qualities of teaching physical education courses are combined with pertinent research on smart classroom instruction in this study., and designs and completes the SCT model unique to university physical education teaching based on seven elements: theoretical foundation, realisation conditions, teaching objectives, teaching process, teaching evaluation, teaching feedback and informationization of the whole teaching process. Following is a summary of the benefits and drawbacks of smart physical education against standard physical education methods, and the strengths and weaknesses of each are taken into account, in order to combine smart physical education with traditional physical education to develop a new model of smart physical education that is more successful and based on science in colleges and institutions.

## **2. SMART PHYSICAL EDUCATION**

### **2.1 SMART PE TEACHING OBJECTIVES**

Teaching objectives are precise predictions of the changes that will take place in pupils and the specific learning results that will be attained as a result of teaching activities. The overall direction of the teaching process is greatly influenced by the teaching objectives. The attainment of teaching objectives should always be the focus of teaching and learning activities, which can be guided by the objectives. In order to optimize classroom instruction based on the real requirements of the students, the teaching goals of a smart classroom should be in line with the training goals.

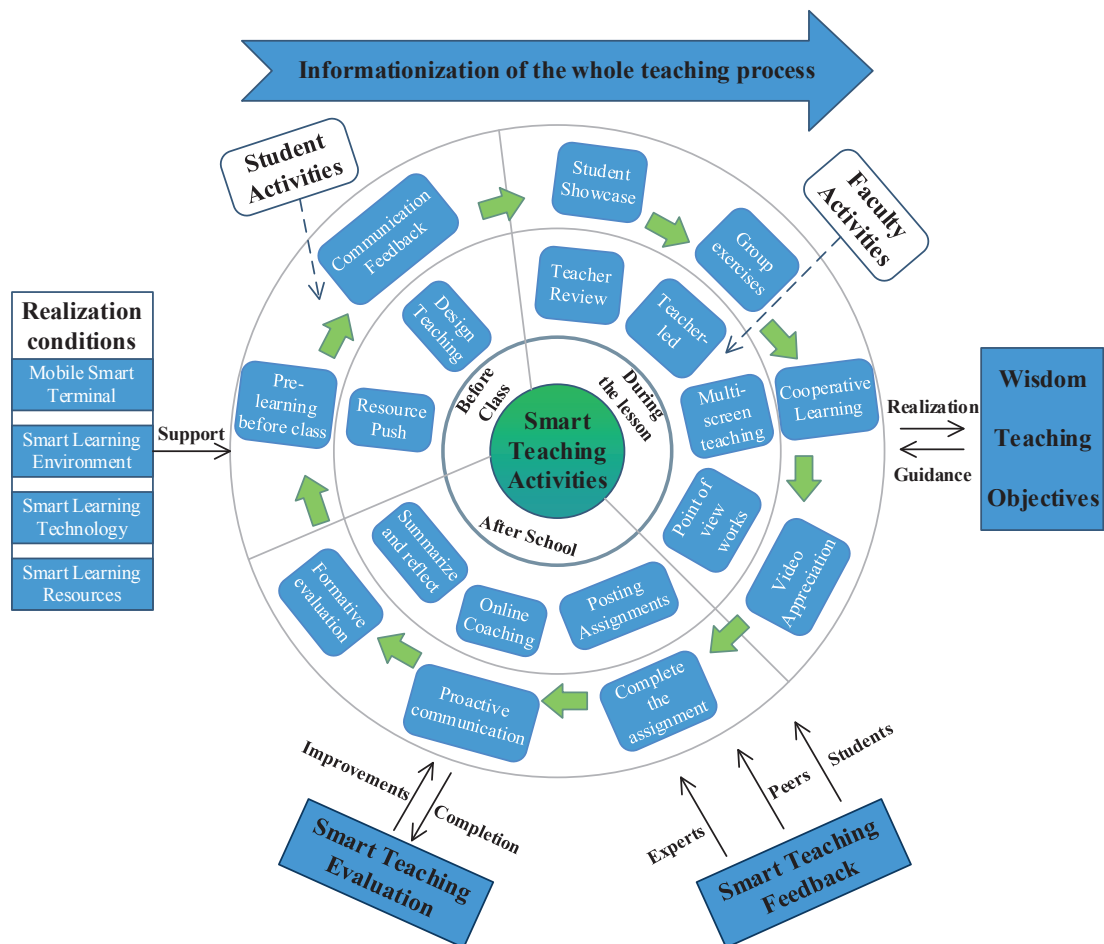
The Sport SCT approach focuses on increasing students' capacity for learning and their comfort with using online learning materials. By asking students specific questions, enabling them to research the answers, and finally combining their knowledge structure to accomplish tasks and achieve creativity, teachers may foster creative learning and

the ability to create. Establish healthy exercise routines and become an expert in one or more scientific exercise areas. Enlightening pupils' minds and fostering their intellectual development are the ultimate goals.

## 2.2 SMART TEACHING PROCESS

The main focus of this chapter is the process design of instructional activities for smart classrooms. The exercises are made to cater for learners' unique variations, increase the variety of instruction, and help pupils learn more effectively.

Before, during, and after class are all aspects of the study's smart classroom teaching activities. A full teaching system that includes both instructor activities and student activities is realized with the help of a smart learning environment and smart learning materials, Under the guidance of the instructor, students complete learning activities and teaching evaluations on their own, fostering positive thinking and innovation while also meeting the objectives of smart teaching. The particular material is displayed in Figure 1.



**Figure 1** The design of SCT model and its process in college sports

### **2.2.1 PRE-COURSE RESOURCE PUSH WITH DATA FEEDBACK**

In the era of big data, teachers release teaching videos to students through the online teaching platform, and students use the preview video resources to initially imitate the actions they have learnt and provide feedback to the teacher on any problems they encounter in the learning process through the use of questions. The platform processes student learning data and presents it to the teacher in the form of visual charts and graphs. The teacher uses the students' pre-study and feedback information to prepare the lesson, changing the status quo of teachers teaching according to their experience and achieving a truly 'people-oriented and student-focused' approach.

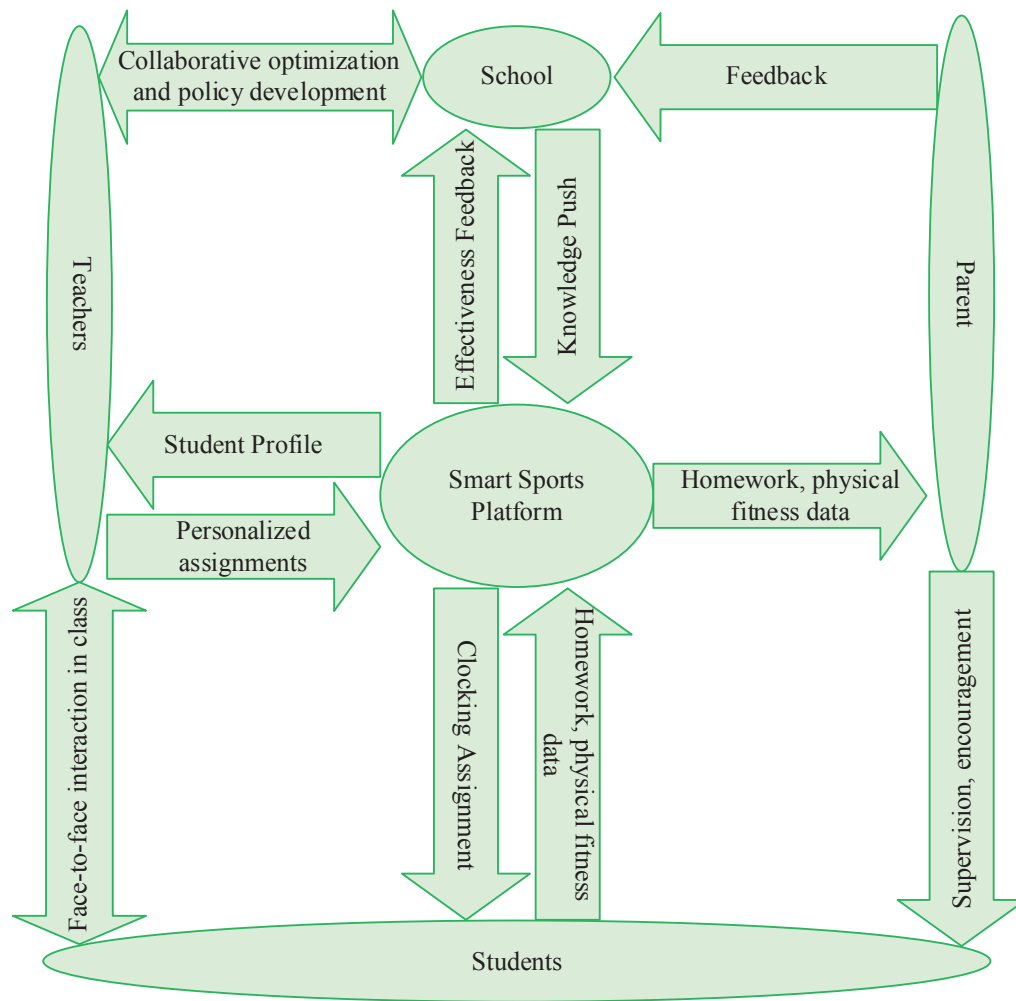
### **2.2.2 IN-CLASS TEACHER-STUDENT INTERACTION AND MULTI-SCREEN TEACHING**

The teacher's explanations and demonstrations, as well as the students' imitation and practice, take center stage in the conventional classroom. In the classroom, the instructor takes charge and the pupils are viewed as obedient knowledge storage devices. Students lack initiative and are less motivated to study since there is a lack of connection and communication between professors and students. In the PE classroom, firstly, students are of varying levels of physical education, with some students being able to grasp the skills quickly, while others with poor coordination take a long time to master the movements, and teachers are not able to focus on all students in the class.

## **3. BUILDING A MODEL FOR INTERFACING SMART SPORT AND TRADITIONAL PHYSICAL EDUCATION**

### **3.1 BUILDING AN INTEGRATED SMART SPORTS PLATFORM**

The incorporation of smart sports platforms is an interactive method for integrating resources and disseminating information, allowing information accessors to establish relationships both online and off-line through a network platform, and the platform can also carry out business cooperation and provide diversified services to the community. Smart wearables, which are portable electronics incorporated into a user's clothes or accessories or worn directly on the body, are the most widely used IoT application in sports. Figure 2 depicts the integration of traditional physical education with smart sport in higher education.



**Figure 2** New college physical education smart teaching model

### 3.2 PUSH EXERCISE PUNCH CARD PROGRAMME

Through active interaction between the platform, policies, services, and data, the smart sports platform is evolving toward informationalization, functionalization, and personalization to support the creation and execution of pertinent work and policies. Different exercise suggestions are made and different exercise programmes and plans are developed according to students' different physical conditions and pursuits, so that students can choose their punch card items and actively punch their cards against their physical conditions and target pursuits. To assist students in exercising and tracking their time scientifically, promote accurate and safe instructional videos that cover techniques for building core strength, building cardiorespiratory endurance, building limb strength, and treating sports injuries to particular body parts.

### **3.3 IMPLEMENTING "ONLINE AND OFFLINE" INTEGRATED PHYSICAL EDUCATION**

A two-pronged strategy using both online and offline components to maximize the instructional value of university athletics. The students' heart rate will be monitored throughout the class to ensure that the intensity of exercise is reasonably grasped and face-to-face teaching is carried out safely. The whole process uses the sports bracelet to present the classroom effect in a real and intuitive way, and to complete the offline teaching scientifically and effectively. At the end of the class, students send in a comparison video of themselves and the content of the platform to complete the assignment. The video comparison makes it easier for students to identify their own shortcomings and helps to improve their self-confidence and self-learning ability.

### **4. CONCLUSION**

In this paper, the advantages and disadvantages of smart PE teaching and traditional PE teaching were sorted out, so that traditional PE teaching and smart PE teaching could be integrated with each other and a new, more scientific and effective smart PE teaching model in universities could be built. After using the SCT model, the experimental group's average performance for movement skills was 67.42, which was noticeably better than the control group's average performance of 51.27. The experimental group performed both movement choreography and formation choreography on average at a level of 75.28, which was considerably higher than the control group's performance level of 60.15. The learning performance of the experimental group's pupils significantly improved over that of the control group, and there was a significant difference between the two groups' learning outcomes. It demonstrates that, in comparison to the conventional teaching method, the Smart Sports and conventional sports integration teaching method (SCT) models have a wealth of learning materials and more defined learning objectives, more convenient learning methods, more frequent teacher-student interaction, more varied teaching methods, and higher learning interest, participation and learning efficiency.

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# RESEARCH ON THE APPLICATION OF E-HEALTH TECHNOLOGY IN HEALTH MANAGEMENT IN THE INFORMATION AGE

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## ABSTRACT

There is a lack of standardisation and standardisation of health management services in China. In this paper, the analysis and mining of medical examination data under the electronic health technology in the information age can lead to the health differences of different regions and populations, and use this to build a personalized and regional health assessment model. The correlation coefficients of the other four dimensions are all greater than 0.5 and  $p < 0.01$ , except for the correlation coefficient of barrier cognition, which is slightly less than 0.5. The application of health management model by electronic health technology in the information era has improved the efficiency of community health services and enhanced the health care awareness of the group.

## KEYWORDS

health management; demand awareness; information age; health disparities; service efficiency; health awareness

## 1. INTRODUCTION

Health management is the process of managing health resources throughout the life cycle [1-2]. A more complete definition of health management is the whole process of monitoring, analysing and evaluating the health status and health risk factors of individuals or groups in a comprehensive manner, providing health advice and guidance, and intervening and managing health risk factors, oriented to the health needs of people with different health conditions [3]. Health management as an emerging health service concept and service approach [4-5]. It has a great role in solving the current problems of controlling medical costs, chronic diseases and ageing

in China, meeting the demand for high-quality health services and building a healthy China [6]. Relying on the development of health management technology in the age of information technology can break the restrictions of time and space for users, and also cultivate patients' self-management awareness [7-8].

In this paper, the application of electronic health technology in health management in the age of information technology is used to provide more effective and better personalised health management.

## **2. APPLICATIONS FOR HEALTH MANAGEMENT**

Health management is the process of providing comprehensive services such as physical health monitoring, health risk assessment, disease prevention, rehabilitation care, mental health intervention and health promotion to individuals or groups through various means and methods. Through the assessment of physical health, mental health and lifestyle, we can grasp our own health status and formulate personalised health management plans. Based on the results of the health assessment, appropriate health interventions are developed for the individual's health problems, including guidance and support in diet, exercise and psychological counselling. The individual's health status is monitored and tracked, health problems and disease risks are identified in a timely manner, and appropriate measures are taken to intervene and treat them. The aim of health management is to improve people's health awareness and health literacy, prevent the occurrence and development of diseases, maintain physical health and psychological well-being and improve the quality of life.

### **2.1 CURRENT STATUS OF HEALTH MANAGEMENT**

At present, health management has become a hot topic of global concern, but there is a lack of standardisation and standardisation of health management services in China. The popularity of health management services is not yet high, mainly because people do not have a deep enough understanding of health management services and lack awareness of the demand for health management services. The professionalism of management services is still relatively low, and the professional competence and service level of service providers need to be further improved. The price of health management services is too high. The current prices of health management services are high and unaffordable for the general population.

### **2.2 TRADITIONAL HEALTH MANAGEMENT**

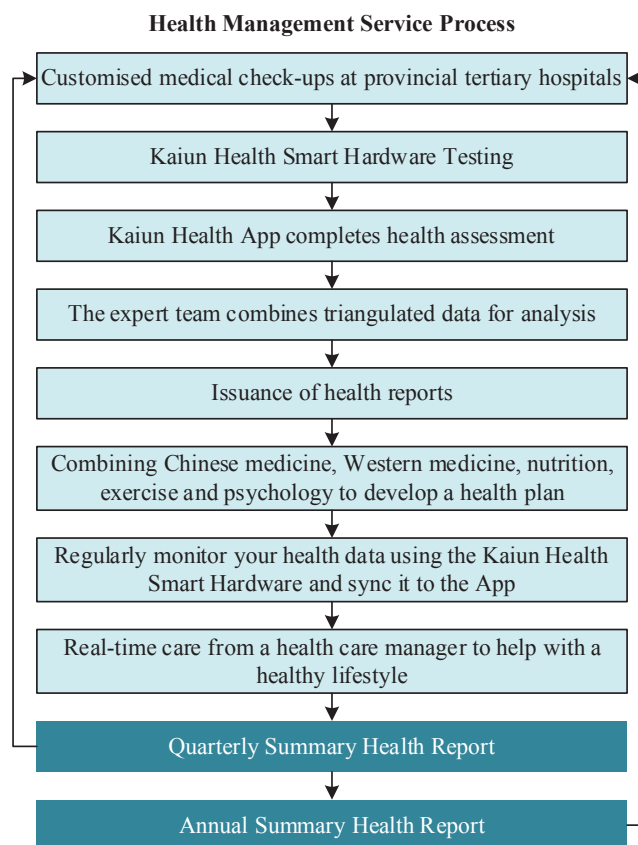
The traditional health management model is a one-to-one health management service, but in terms of data collection, it requires a health manager to visit your home to take measurements or communicate with you by phone to collect data. The cost of travel is also factored into the labour cost if the measurements are taken at home.



During the management process, records related to guided examinations, consultations, follow-up visits, guidance programmes, etc. need to be provided in paper form. The large amount of paper and USB sticks to keep electronic files are prone to loss and leakage. The number of people managed by health managers is limited. According to relevant statistics, the number of people served by health managers is limited for high-end VIP services.

### 2.3 HEALTH MANAGEMENT PROCESS

With the development of technologies such as the Internet of Things, sensing and Bluetooth, new intelligent testing devices have emerged on the market to achieve the collection of various physiological data from the human body. The various hardware devices developed so far, body fat meter, blood pressure meter, blood glucose meter, smart bracelet, blood lipid meter, etc., are comprehensive and accurate measurements, greatly reducing labour costs and time costs, simple operation methods, customers can measure directly at home, and can synchronise testing data directly to the mobile APP, eliminating the tedious manual recording, historical data cloud storage, permanent backup. The mobile phone APP is also used to complete the initial screening of chronic diseases, assessment and grading and communication between doctors and patients as shown in Figure 1.



**Figure 1** Flow of health management services

## 2.4 VALIDITY ANALYSIS OF HEALTH MANAGEMENT BELIEF CONTENT

The correlation coefficients of the five dimensions of the Health Beliefs Scale and the total scale were in the range of 0.296-0.731, as shown in Table 1, with the exception of the correlation coefficient of disorder perception, which was slightly less than 0.5. The correlation coefficients of the other four dimensions were all greater than 0.5, and  $p < 0.01$ , indicating that all five dimensions were correlated with the total health beliefs scale.

**Table 1** Belief scales for the dimensions of health

Dimension	Correlation coefficient of the summary table
Susceptibility Cognition	0.584
Severity cognition	0.675
Effectiveness perception	0.731
Impairment perception	0.296
Benefit perception	0.715

## 3. INFORMATICS EHEALTH TECHNOLOGY AND HEALTH MANAGEMENT

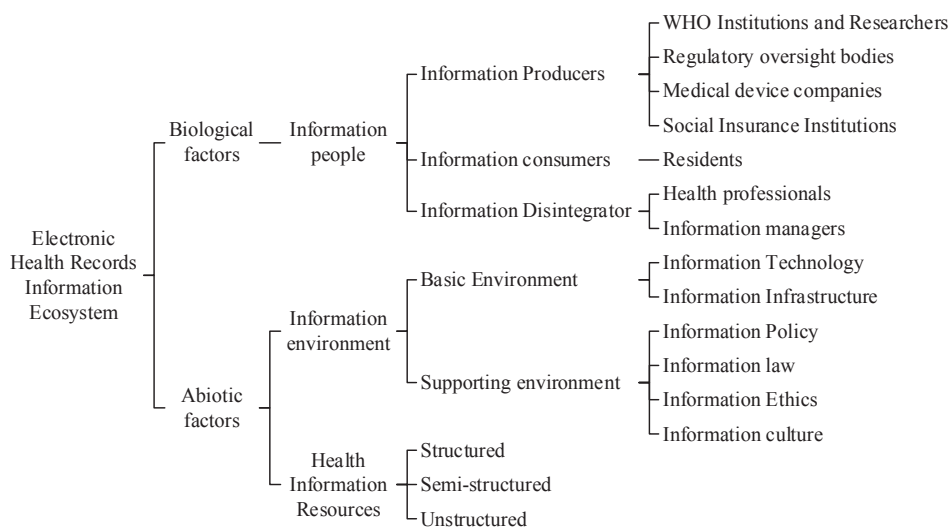
With the rapid improvement in the performance of mobile devices and the extensive coverage of wireless networks, as well as the development of wearable devices and technology and the widespread promotion of mobile applications, mobile communication technology, Internet technology and health services are gradually moving towards convergence, and Health IoT has come into being. Health IOT is a product of the integration of mobile, internet and health services, and is a new extension of e-health and telemedicine. Health IOT devices consisting of biosensors are the basic devices for obtaining individual health information and are the source of health management data collection. Health IOT devices can be divided into health collection terminals, health application terminals, composite health terminals and intelligent health terminals. Health IOT devices worn by individuals or implanted in the body are able to collect important vital signs signals from the body. ECG tests from traditional ECG machines can achieve signal collection at the user's end in a home-based manner; as well as the monitoring of respiratory rate done with capacitive sensors, continuous monitoring of blood pressure with wearable devices and the monitoring of vital signs parameters using cameras. This information is sent through technical processing to the health management back office service centre, where a professional health manager provides services, thus enabling remote sensing of vital signs conditions and implementation of health management. Users can also access individual health information, health assessment, health advice, exercise status, health tracking and chronic disease management through IOT devices at any time, anywhere and on the go.

### 3.1 STUDY ON THE APPLICATION OF INFORMATION-BASED E-HEALTH TECHNOLOGY IN HEALTH MANAGEMENT

Through the analysis and mining of medical examination data under the information technology of electronic health, the health differences of different regions and populations can be derived and used to build personalised and regionalised health assessment models and to formulate scientific methods of disease prevention and treatment as well as prognostic standards. The cloud health monitoring and early warning system based on IoT technology monitors the environmental parameters around the human body, vital signs parameters, movement status, video and other information in real time through intelligent sensors, and the monitoring centre stores, analyses and processes the collected information accordingly, and uses network technology to upload the data to the cloud server for cloud storage, management and sharing, which facilitates the health management organisation to remotely manage and This allows health management agencies to manage individuals remotely and provide advice and guidance. The big data framework of the health service remote system based on the collection and analysis of vital signs provides real-time data transfer analysis and real-time health care services, and uses an open standards platform to ensure interoperability between data and different devices.

### 3.2 COMPONENTS OF AN INFORMATION ECOSYSTEM FOR INFORMATIVE E-HEALTH TECHNOLOGY RECORDS

Similar to an information ecosystem, an electronic health record information ecosystem is an organic whole composed of information people, information environment and health information resources within the information ecology of a certain region. The specific components and structure are shown in Figure 2.



**Figure 2** Structural composition of the information ecosystem of the eHealth

#### 4. CONCLUSION

With the rapid development of the information technology industry, the application of information technology electronic health technology to health management is the general trend, compared with traditional health management, information technology electronic health management mode has the advantages of convenience, high efficiency, intelligence and popularity, the application and promotion of information technology electronic health management requires the organic unification of policy, scientific research, funding and medical treatment, the effect of management cannot be separated from the government-led, community health care, medical institutions, technology research and development institutions, universities, insurance institutions and other multi-party collaboration, so as to achieve a comprehensive, whole process, whole staff, whole cycle of health management.

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# A STUDY ON THE IMPACT OF ONLINE AND OFFLINE HYBRID PHYSICAL EDUCATION TEACHING MODEL INNOVATION ON ALLEVIATING STUDENTS' PSYCHOLOGICAL STRESS

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## **ABSTRACT**

With the promotion of quality education and new curriculum reform, college physical education also needs to actively change teaching philosophy and teaching methods, promote the effective integration of online and offline teaching with the help of information technology, realize the reasonable allocation of high-quality physical education resources, promote the improvement of physical education classroom teaching quality and teaching efficiency, and realize the smooth change of college physical education so that students can really strengthen their physical exercise and improve their psychological. This paper utilizes online and offline hybrid teaching. This paper uses the advantages of online and offline hybrid teaching mode to create a more diversified learning environment for students. It can relieve students' psychological stress and build students' healthy body and mind. Finally, the chi-square test shows that there is a significant difference between the psychological stress level of college students in the three groups of exercise time, and the level of difference reaches the level of  $P < 0.01$ , which indicates that the level of academic psychological stress is effectively reduced through physical exercise. The study of this paper is conducive to promoting the development of students' physical and mental health and improving their comprehensive literacy.

## **KEYWORDS**

Blended learning; Healthy mind and body; Information technology; Effective integration; Physical education resources; Cardinality test

## **1 INTRODUCTION**

Stress is defined as a state of physiological and psychological stress that results when life circumstances do not meet one's needs and one's learning and experiences do not match the demands of real life [1-2]. Stress is thought to be the cause of many physical and mental illnesses. Therefore, reducing or controlling stress is an important element in maintaining physical and mental health [3-4]. College students are faced with studies, exams, employment, heavy academic burdens, long study hours, and high levels of mental stress [5]. In some schools' students have shown many negative emotions, such as anxiety, depression, low self-esteem, boredom, abandonment of school, and even suicide [6]. In recent years, the prevalence of psychological abnormalities among college students has been on the rise [7]. Therefore, the issue of mental health education and intervention for college students has attracted widespread attention from all walks of life [8].

In this article, exercise has been shown to be an effective and positive means of promoting students' mental health and regulating their emotions. The psychological health-promoting effects of exercise have been confirmed by many studies. However, it is difficult to conduct experimental research on this topic in a classroom setting and the conditions are not easy to control. The aim of this study was to compare the emotional well-being and psychological stress of students who exercised regularly with those who did not. The study was designed to demonstrate the effects of sports on psychological stress in college students.

## **2. ONLINE AND OFFLINE PHYSICAL EDUCATION TEACHING**

### **2.1 ONLINE AND OFFLINE SPORTS TEACHING MODEL**

In the new era, information technology in education has taken on a more important historical mission and has also had a strong impact on traditional sports, pushing university sports to change and innovate, finding new sports models, promoting further integration of classroom teaching and information technology, and exploring effective measures to practice the integration of online and offline teaching models.

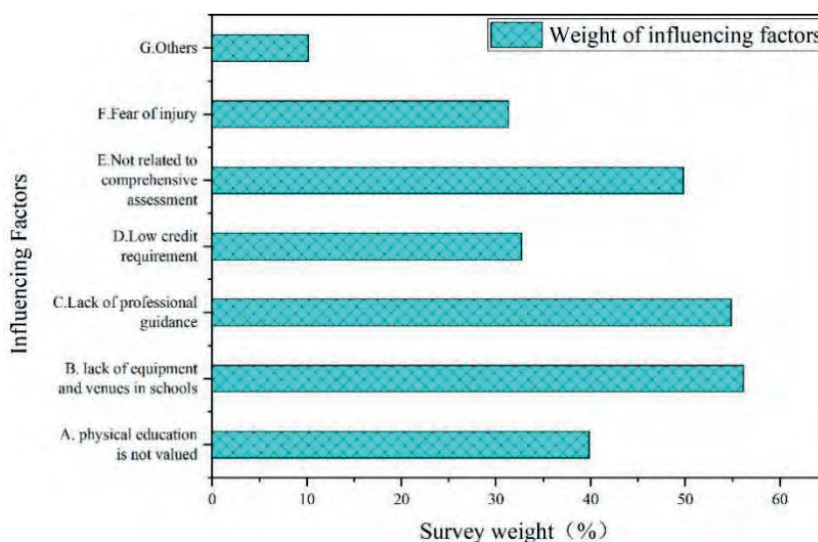
The subject of physical education has certain special characteristics, in addition to mastering theoretical knowledge of physical education, it is more dependent on "physical participation" and "practical practice". Therefore, in the post-epidemic era, the key to improving the quality of physical education is to explore the connotation and value of the hybrid teaching mode of "online + offline" and to find a reasonable path to achieve it.

## 2.2 THE NEED FOR BLENDED LEARNING IN PE

With the promotion of science and technology, more and more people are concerned about online education. Universities have transferred physical education teaching from traditional offline teaching to online education platforms, allowing students to obtain quality learning resources through the Internet, but only online education is unable to meet today's teaching needs, the new hybrid teaching can not only allow students to improve their theoretical knowledge, but also get practical exercises and teacher's guidance, the hybrid teaching mode provides a new path for physical education teaching reform.

### 2.2.1 THE CURRENT STATE OF DEVELOPMENT OF ONLINE AND OFFLINE HYBRID PE TEACHING MODELS

Students' demand for physical education courses tends to be more personalised, informative and comprehensive. With the introduction of the new teaching model, although students have more opportunities to learn the basic theoretical knowledge of physical education, teachers still use the traditional skills testing method to test the learning effect, which does not reduce the pressure of students' class work and does not cause students to pay enough attention to physical education classes. There are more factors that affect students' participation in physical education and exercise as shown in Figure 1:



**Figure 1** Proportion of factors affecting students' participation in physical activity

### 2.2.2 INTEGRATING ONLINE AND OFFLINE HYBRID PHYSICAL EDUCATION TEACHING RESOURCES

Traditional offline teaching resources mainly include sports venues, equipment and equipment, physical education teachers, physical education teaching materials and sports items, etc. They need to be taught at a fixed time and place, and students can



master sports skills on the spot. Online teaching resources include network resources, intelligent equipment, digital courseware, etc. There are no fixed requirements for venues and time, and teaching resources are abundant and can be freely chosen according to their own situation. The use of hybrid teaching ideas, the integration of online and offline, enhances the flexibility of physical education and is conducive to stimulating students' enthusiasm for sports, increasing teachers' motivation and creating a good atmosphere for 'teaching' and 'learning'.

### **2.2.3 TEACHING MODEL IN PRACTICE**

Teachers can pre-record micro-lesson videos based on the specific content of the online teaching and find relevant teaching resources on the internet and push these resources to students through the learning platform for them to preview. In the process of finding in teaching resources, teachers should focus on the dissection of the four movements in this combination in the teaching resources, providing students with slow motion breakdown videos to guide them in observing the movement structure and key movements, and allowing them to watch with questions. In the offline teaching process, teachers can use group work, group learning and tiered teaching to create an environment for students to practice and compete, so that students can develop a spirit of solidarity, enterprise and challenge, so that each student can see their own progress through their own efforts, develop their psychological resistance to stress, improve their confidence in sport and lay a good foundation for more difficult sports movement training in the future.

### **2.3 BUILDING A PSYCHOLOGICALLY ADAPTIVE HYBRID PHYSICAL EDUCATION MODEL**

Blended teaching breaks the old traditional teaching mode and gradually forms a new mode of delivery. It requires students' independent learning ability extremely high, and students have a psychological adaptation process to the new teaching mode, which is not only a change of teaching style, but also means the reconstruction of teacher-student relationship. Therefore, teachers should adjust the way they teach physical education by adding some content about easing students' psychological aspects or by creating a relaxing and pleasant atmosphere. Physical exercise itself can play a role in reducing stress, cultivating a strong will, regulating emotions, etc. Therefore, teachers can promote students' physical exercise through cloud supervision, and give students as much humanistic care as possible in the classroom, by enhancing the interactivity of the classroom in order to achieve the exchange of emotions between teachers and students, which can effectively relieve students' psychological stress.

### 3 . RESEARCH ANALYSIS OF HYBRID ONLINE AND OFFLINE HYBRID

#### PHYSICAL EDUCATION

##### 3.1 STUDENT SPORTS AND EXERCISE STATISTICS

According to the questionnaire survey on students' participation in exercise activities conducted before the experimental grouping. The students were divided into regular exercise group and no exercise group, and statistical analysis was conducted on the distribution of sports participation items, the time of each exercise and the frequency of weekly exercise of the students in the regular exercise group, and the results are shown in Table 1.

The results of the survey on students' sports participation show that the number of students who engage in regular exercise during college is low, with less than 50% of both males and females. In the group of regular sports, there were more boys than girls. Boys mainly played basketball and football, while girls played sports, and the distribution of sports activities was more dispersed. The "other" sports in the sports column in Table 1 include swimming, badminton, physical dance, aerobics and volleyball. As the number of participants in these sports is scattered, they are grouped together as "other". As shown in Table 1, the distribution of sports and exercise for boys was significantly more concentrated than that for girls. There was a significant difference between boys and girls in terms of time spent per exercise session and frequency of exercise per week. The significance level of the differences reached  $P<0.01$  and  $P<0.05$  respectively.

**Table 1** Statistics on the degree of students' sports and exercise participation

	Number of people in the program					Time/minute	Frequency/time
	Basketball	Soccer	Running	Roller Skating	Other		
Male	43	23	9	5	3	48.22±21.34	3.15±1.02
Female	12	0	18	19	29	33.34±30.21	2.99±2.46

##### 3.2 THE EFFECT OF TIME SPENT EXERCISING ON PSYCHOLOGICAL STRESS

In this study, students' exercise time was divided into three levels of 30 minutes, 30-60 minutes and more than 1 hour in the questionnaire, and the exercise time was compared with their psychological stress level as shown in Table 2. The chi-square test showed that. There was a significant difference between the psychological stress levels of the students in the three exercise time groups, with the level of difference reaching the  $P<0.01$  level. In total, 62.43% of the subjects in the male and female exercise groups exercised for 30-60 minutes per session. Among the students in this exercise period,

81 of them had low levels of psychological stress, accounting for 76.91% of the total number of students with low levels of psychological stress. Only one student was too stressed out. Among the students who exercised for 30 minutes, 20.63% of them were at a low level of psychological stress, while 4 were at an excessive level of psychological stress. In the group of more than 1 hour, 12 students were at a low level of psychological stress, while 8 students were at an excessive level of psychological stress. In this study, 62.43% of the students who exercised regularly chose this time, indicating that most of the students' exercise behaviour was reasonable. At the same time, 30 minutes of exercise seems to be superior to more than one hour of exercise.

**Table 2** Statistical table of exercise time and psychological stress level of college students

Duration	Stress Score							
	Less than 43 points		43~65 points		More than 65 points		Total	
	n	Proportion/%	n	Proportion/%	n	Proportion/%	n	Proportion/%
30 minutes	23	20.63	16	30	4	35	46	24.65
30~60 minutes	81	76.91	24	53	2	16.4	98	62.43
More than 1 hour	17	15.72	15	29	8	71.3	33	18.98

#### 4. CONCLUSION

This paper brings greater scope for progress in physical education by integrating the advantages of both in the new blended education model. Teachers should focus on the enhancement of physical education expertise and skills, should make full use of technology, improve information literacy, provide a multi-faceted teaching model for physical education, help improve students' physical education professionalism and curriculum thinking literacy, and motivate students to achieve the purpose of strengthening their bodies and bodies. In the context of the information age, the online and offline integration teaching mode is a new way to promote the reform of physical education, which can effectively improve the teaching efficiency of physical education courses, increase students' enthusiasm and confidence in physical exercise, cultivate students' independent learning ability, help students establish the sports spirit of not being afraid of setbacks, being brave to challenges, and striving hard, which is conducive to promoting students' physical and mental health development, improving their comprehensive literacy, and enhancing their lifelong participation in physical exercise.

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# RESEARCH ON THE INNOVATIVE REFORM AND DEVELOPMENT OF JAPANESE LANGUAGE COURSE TEACHING IN UNIVERSITIES IN THE CONTEXT OF INFORMATION TECHNOLOGY

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## ABSTRACT

The integration and development of Japanese language course teaching and information technology in colleges and universities has become a key direction of classroom teaching reform nowadays. In this paper, teachers in the context of information technology should learn to psychologically regulate themselves, recognise that it takes a process to become proficient in the use of online platforms, and take the initiative to learn new teaching techniques and actively adapt to new teaching modes when first encountering online teaching platforms. The innovative reform of Japanese language teaching in higher education in the context of information technology will result in a significant improvement in students' communication and reading comprehension skills, as well as their intercultural and practical Japanese language skills. Finally, by making full use of the rich resources brought about by information technology, the teaching is helped to change dynamically in line with the content, target audience and objectives of teaching, further improving the quality of teaching.

## KEYWORDS

classroom reform; psychological adjustment; new models of teaching; full use; enrichment resources; teaching quality

## 1. INTRODUCTION:

With the development and maturity of information technology and the reform and innovation of educational concepts, how to combine speech and information technology with educational methods and approaches has become a hot research and practical trend in the field of education [1-2]. Informatization of Japanese language course teaching has become an inevitable trend in the current Japanese language course

teaching [3]. Informatization has become a major trend in the current economic development, and the future demand for Japanese language personnel is bound to change significantly [4]. This has also put forward new requirements for the reform, innovation and development of the Japanese language industry, and has constantly influenced the training objectives and training modes of Japanese language personnel [5]. The informatization requirements of Japanese language courses in higher education institutions have led to new changes in the content and methods of professional teaching [6]. The role of "Internet+" in the process of Japanese language teaching in colleges and universities is mainly reflected in the rapid organization and dissemination of Japanese theoretical knowledge and the comprehensive use of Japanese teaching practice[7]. With the diversification of the means of information technology in education, the reform of Japanese language courses in colleges and universities has taken the path of information technology[8].

This paper combines the use of Japanese language course teaching reform in the context of information technology should take advantage of the Internet information resources, improve the level of teaching hardware, enhance the digital teaching concept of teachers, reasonably choose teaching methods, through the continuous search for a new mode of teaching to adapt to the current Internet era of the Japanese language course new composite talent requirements, to lay a good foundation for students to work in the future Japanese language related work.

## **2. INNOVATIVE REFORM OF JAPANESE LANGUAGE IN HIGHER EDUCATION**

### **2.1 STUDENT NEEDS**

Nowadays, students are more interested in self-fulfilment, so teaching methods should also meet their individual needs. The flipped classroom puts learning outside the classroom, allowing students to choose their own time and place of study, and to control the content and amount of learning, making it easier for students to accept and enjoy the course. Students are also more likely to be motivated by the conversations, group work and problem solving in the classroom. Questionnaires show that the flipped classroom model can meet these needs.

### **2.2 THE TEACHING MODE IS RELATIVELY HOMOGENEOUS AND LACKS PRACTICAL TEACHING EXPERIENCE**

The traditional teaching mode is teacher-centred, with students being the passive recipients of knowledge in the teaching process, and teachers simply instil teaching content into students through such means as knowledge explanation, teaching boards and traditional multimedia equipment. Throughout the teaching process, students are always passive recipients, and the multimedia equipment only plays a supporting role.

Although this approach can enhance the teaching ability of teachers, it is difficult to mobilise students' individual initiative and creativity, thus limiting the cultivation of students' innovative ability and subjective initiative. In this way, the practical and comprehensive nature of the course itself will be diluted, making it difficult to train Japanese language personnel to meet the needs of the current information society. The modern Japanese language teaching work should make full use of the advantages of "Internet+" to cultivate students into the composite practical talents needed by society by means of engineering practice and school-enterprise cooperation.

### **2.3 APPLICABILITY OF INFORMATION-BASED TEACHING**

The Japanese course uses the new version of Standard Japanese as the textbook. In accordance with the requirements of the School of Foreign Languages and the Japanese syllabus, the Japanese course is now taught in 4 hours per week, one lesson per week. 2 hours are devoted to vocabulary and grammar, and 2 hours to the text, and although I try to involve students in classroom activities, the teacher still takes up most of the class time. The content of Beginner Japanese is relatively simple, starting with the most basic pronunciation and covering mostly the most basic grammar and conversation in Japanese. Each lesson has a main grammatical content and students are able to learn it on their own by watching the instructional videos. Class time is devoted to the internalisation of knowledge, with the teacher being not only the transmitter of knowledge but also the guide of the class, giving full play to the students' subjectivity through situations, collaboration and conversation. As we all know, language learning requires constant practice and reinforcement, so putting practice in the classroom will enhance practice and improve expression.

#### **2.3.1 TAKING ADVANTAGE OF THE INTERNET TO CONTINUOUSLY IMPROVE THE EFFECTIVENESS OF MOOC CONSTRUCTION**

Raise the awareness of Japanese language teachers in colleges and universities to build MOOC, and stimulate the enthusiasm of Japanese language teachers in colleges and universities to develop MOOC. When teachers have certain knowledge related to MOOC, schools should focus on improving the promotion of MOOC construction and stimulating the enthusiasm of Japanese language teachers to build MOOC, create MOOC and learn MOOC. Teachers use catechism resources to continuously improve students' initiative in learning Japanese and focus on making the MOOC a golden course. As the form of MOOC is evolving and developing, teachers can actively use online open courses represented by MOOC, integrate course applications and teaching services, and actively develop quality online courses for Japanese language students in universities.

### 2.3.2 ANALYSIS OF TRADITIONAL JAPANESE LANGUAGE TEACHING IN HIGHER EDUCATION

Firstly, the information knowledge of teachers is not sufficient. As most teachers are relatively lacking in information technology knowledge, they have generally adopted traditional teaching modes in their past teaching work, and are less likely to use online teaching formats such as catechism, live streaming and recording to teach their students. Faced with modern teaching platforms and teaching tools, about 40% of teachers feel more stressed as shown in Figure 1. In this context, teachers should learn to psychologically regulate themselves, recognise that it takes a process to become proficient in online platforms, and take the initiative to learn new teaching technologies and actively adapt to new modes of teaching when first encountering online teaching platforms. At the same time, for teachers with information knowledge needs, the college should provide them with uniform training on online teaching before the start of classes. Secondly, the interaction between teachers and students in classroom teaching is insufficient. Teacher-student interaction is a key aspect of the teaching process. In traditional classroom teaching, teachers tend to grasp students' mastery of knowledge by encouraging students to speak actively and observing students' micro-expressions, but in the Internet mode, teachers and students cannot communicate with each other face-to-face, so they cannot observe students' online learning status in time, making it difficult to adjust teaching methods and progress according to students' dynamic responses. Adjusting teaching methods and progress.

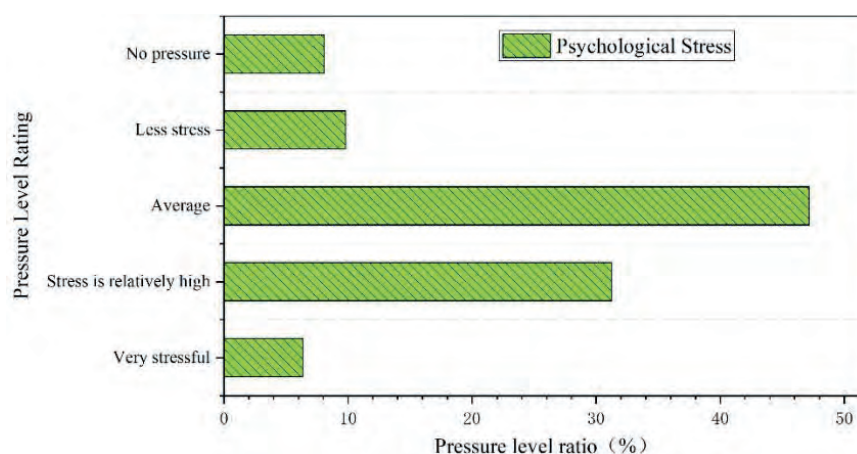


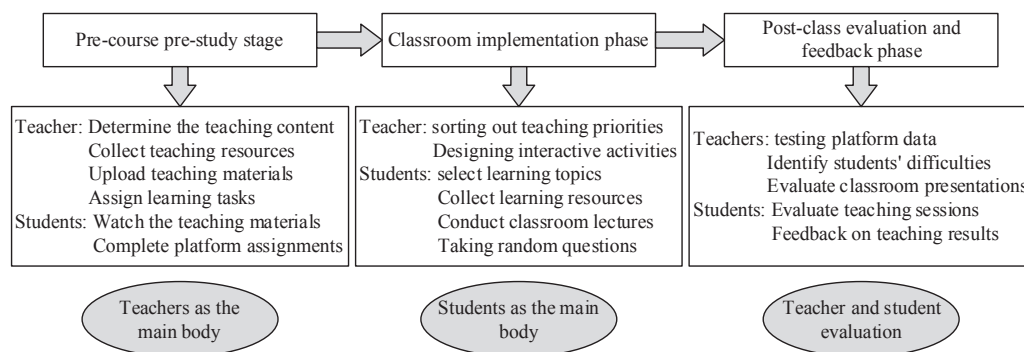
Figure 1 The level of pressure teachers feel about online teaching

### 3. DESIGN OF AN INFORMATION-BASED TEACHING MODEL FOR JAPANESE LANGUAGE COURSES IN COLLEGES AND UNIVERSITIES

As one of the most popular minor languages in foreign languages, there are a large number of institutions offering Japanese as a major. As of 2021, there are 473



universities offering Japanese as a major, and Japanese is now the second most popular foreign language in China. Faced with students who choose Japanese as their major, schools aim to teach Japanese language expertise while enabling students to grow into people with both foreign language and intercultural communication skills. In the current situation, then, it has become a new topic to optimise the drawbacks of online teaching and to achieve a deep integration of online and offline courses. Therefore, the three stages of pre-course, in-course and post-course Japanese teaching activities are designed as shown in Figure 2.



**Figure 2** Blended teaching process design

### 3.1 CLARIFY TEACHING DIRECTION AND STRENGTHEN TEACHERS' AWARENESS OF INFORMATION TECHNOLOGY

Under the background of information technology, how to cultivate Japanese language professionals who meet the needs of enterprises and society is a question worthy of in-depth consideration. At present, the teaching direction of Japanese language courses in higher education institutions should aim to cultivate talents and serve job positions as the core, and constantly infiltrate application knowledge in the process of teaching Japanese, so as to strengthen the cultivation of students' practical ability. Teachers should also enhance their awareness of information technology and make full use of the rich resources brought by the Internet to help teaching with the dynamic changes in teaching content, objects and goals. In order to further improve the quality of teaching, teachers should change their traditional teaching thinking, and only when teachers have a firm grasp of information technology can they teach students better. Therefore, teachers should adopt appropriate teaching media and make scientific and reasonable use of Internet resources to cultivate students' thinking skills in a targeted manner. At the same time, teachers should also learn more from new knowledge in the teaching process and constantly enhance their own ability to acquire and process information in order to enhance their multimedia teaching skills in a better way.

### **3.2 INNOVATIVE INFORMATION-BASED TEACHING MODELS**

The innovative teaching model integrates integrated course content based on the adaptation of the original basic Japanese course content. This is because many higher education institutions offer Japanese listening, speaking and audiovisual courses separately, and the number of hours available for different types of Japanese courses is limited. At the same time, if a single training approach is adopted for each course, it will increase the coursework burden of students. Therefore, it is recommended that a unified textbook be used to integrate the content of the listening, speaking and audiovisual courses, presenting the essence of the course in its entirety, stimulating students' senses aurally and visually, and continuously improving students' Japanese speaking skills and applications in an integrated teaching process. In the teaching process, teachers should be adept at incorporating industry and employment-related knowledge into their teaching to create certain conditions for students' future career planning. With the continuous development of information technology, it is difficult to meet the needs of future Japanese language related jobs in a single teaching place. In the process of teaching reform, teachers need to digitally transform the teaching place of Japanese language courses and make use of internet resources such as WeChat and micro-lessons to improve the quality of teaching, facilitate teachers' teaching and exercise students' ability to apply their knowledge. In practical work, it is important to ensure that the materials for different communication scenarios are informative and rich, not only to stimulate students' interest in learning, but also to fully connect with conversation training, listening and practising skills, and to master comprehensive Japanese skills.

### **4. CONCLUSION**

This paper has changed the traditional teaching methods through innovation and reform of Japanese language course teaching in colleges and universities, and can also guide students to take the initiative to learn. Finally, through the use of Japanese language course teaching reform in the context of information technology should take advantage of the Internet information resources, has improved the level of teaching hardware, enhance the digital teaching concept of teachers, and reasonably select teaching methods. By constantly searching for new modes of teaching to meet the current requirements of the Internet era for new composite talents in the Japanese language course, and by making full use of the resources of the Internet platform, the comprehensive teaching of information technology has been achieved thus improving teaching efficiency.

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# EXPLORATION AND RESEARCH ON CULTIVATING TALENTS OF LIBRARY AND INTELLIGENCE PROFESSIONALS IN UNIVERSITIES IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

In this paper, the importance of intelligent education has been widely emphasized by universities through the close integration of modern information technology and education teaching in the context of deep learning. The promotion of the "flipped classroom" has led to significant results in the construction of resources, innovation in teaching methods and information technology support in the curriculum. The proportion of intelligence professionals in public libraries is 10-20%, with over 50% of staff with a bachelor's degree or above. The study concluded that deep learning in education is an important way to solve the deep-rooted problems of intelligence education reform in universities because its competency framework is highly compatible with that of intelligence education.

## KEYWORDS

smart education; teaching methods; information technology; deep learning; significant results; enhancing talent

## 1. INTRODUCTION

The urgency and problems of training library and intelligence talents The training of library and intelligence talents in China began in the late 1950s, and for historical reasons, for more than 20 years in the middle, the training work was forced to stop until 1978, when the science and technology intelligence major of Wuhan University began to enroll, and only then did the training work of talents, which had been interrupted for many years, resume [1-2]. In the short 10 years since then, although the training of library and intelligence talents has achieved promising results, there are still many problems, such as a single knowledge structure of talents, poor ratio of education levels, confusing and lagging education contents, and a single flow of talents [3-4].

The gradual integration of modern science and technology with library and intelligence work has put forward completely new requirements for library and intelligence professionals in terms of breadth and depth of knowledge [5-6]. In the past, library and intelligence staff were managing print literature resources, and the processing, retrieval, provision and use of literature were mainly manual operations [7]. Nowadays, digital information resources are the object of management, and the operation of modern technical equipment such as computers is the main focus, which is a completely new field of work, and library and intelligence staff need to learn new theories, new methods and new technologies [8].

To sum up, the training of library and intelligence professionals in universities should be closely integrated with deep learning technology to enhance the level of deep learning technology and practical ability of students and help them better adapt to the needs of rapid development of information technology.

## **2. ANALYSIS OF THE TRAINING NEEDS OF LIBRARY AND INTELLIGENCE PROFESSIONALS IN COLLEGES AND UNIVERSITIES**

### **2.1 DEMAND FOR LIBRARY AND INTELLIGENCE PERSONNEL WITH A COMPREHENSIVE KNOWLEDGE STRUCTURE**

Library and intelligence talents have to provide services such as information resource development and utilisation, information organisation and information navigation, which places new requirements on the knowledge structure of library and intelligence talents compared to traditional services. They must master basic library and intelligence theory and technology, as well as information technology, management knowledge and certain research capabilities. Library and intelligence personnel must have profound professional knowledge, while having a broad knowledge base, solid basic knowledge of social and natural sciences, extensive knowledge of philosophy, economics, law, history, literature and science and technology, etc., with special emphasis on learning new knowledge in various disciplines reflecting the new economic and cultural developments in contemporary society. Computer and foreign language training should be strengthened and skills improved in order to meet the needs of academic internationalisation, knowledge globalisation and market informatisation. Of course, in the information age, library and information technology staff play the role of information technology platform, whose responsibility is to use electronic computer technology to automate the work; use optical technology to miniaturise and CD-ROM literature and information; use computer multimedia technology to integrate graphics, text, sound and image information; use modern communication technology to network reference services and high-speed information transmission.

## **2.2 THE URGENT NEED FOR THE DEVELOPMENT OF THE LIBRARY AND INTELLIGENCE INDUSTRY ITSELF**

The number of people employed in the library and intelligence industry in the traditional sense is rapidly declining and a similar situation has emerged with regard to the employment of library and intelligence graduates from other universities. Another survey data shows that the library and intelligence graduates assigned to work in university libraries are not interested in the work and more than a thousand non-library and intelligence graduates have more than a thousand people outflow, the brain drain has long become the library and intelligence sector with a universal and urgent problem to be solved. The current structure of professional staff is unreasonable, with a large increase in non-professional staff and a serious lack of backbone strength. Library and information institutions are service and academic institutions, requiring staff to have a high degree of professionalism, broad scientific and cultural knowledge, skilled professional skills, but most of the libraries in China, especially public libraries and school libraries have become places for the elderly, the weak, sick, disabled and their families and children, a veritable “hodgepodge of talent”.

## **2.3 COMPETENCE REQUIREMENTS FOR LIBRARIANSHIP AND INTELLIGENCE PROFESSIONALS IN HIGHER EDUCATION**

Library and intelligence professionals should be able to provide information products and services at the right time and in the right way, according to the information needs of specific clients. Library and intelligence professionals should also be able to take targeted measures to promote the generation, flow, sharing and use of information in accordance with the needs of the organisation they work for and the actual situation of the organisation itself, and encourage the staff in the organisation to actively participate in information management activities. Library and intelligence talents have to be creative in coming up with new ideas based on learning from the experiences and lessons of their predecessors and carrying out innovative activities based on theoretical learning and practice. Therefore, the current requirement for library and intelligence talents is not only to master solid professional basic theoretical knowledge, but also to understand technology, management and dare to innovate.

### **3 . CURRENT SITUATION AND COUNTERMEASURES OF CULTIVATING LIBRARY AND INTELLIGENCE TALENTS IN COLLEGES AND UNIVERSITIES**

#### **3.1 THE CURRENT SITUATION OF LIBRARY AND INFORMATION PERSONNEL IN HEBEI UNIVERSITIES**

The author investigated the most representative libraries in a province, such as City A Library, City B Library, Library C, Library D and City E Library, through online surveys and other forms, and compared the current situation of intelligence professionals in these libraries item by item, and tabulated and analyzed them as shown in Table 1. From an overall perspective, the proportion of intelligence professionals in the major municipal public libraries in province H ranges from 10% to 20%, with those with bachelor's degrees and above accounting for more than 50% and those with intermediate titles and above accounting for more than 50%. The proportion of intelligence professionals with a comprehensive knowledge structure and those who have studied library intelligence is very low. From the data in Table 1, it is easy to see that although the educational level of public librarians and intelligence professionals is high, their professional quality still cannot meet the requirements of modern library intelligence work, and their knowledge structure, information technology level, foreign language level and management ability are all shortcomings in the training of intelligence professionals. This talent structure reflects that the traditional mode of training library and intelligence talents has failed to meet the current needs of library intelligence work, and the continuing education of intelligence professionals is weak, so it is urgent to update the training mode to meet the requirements of improving the quality of library patron services in the new era.

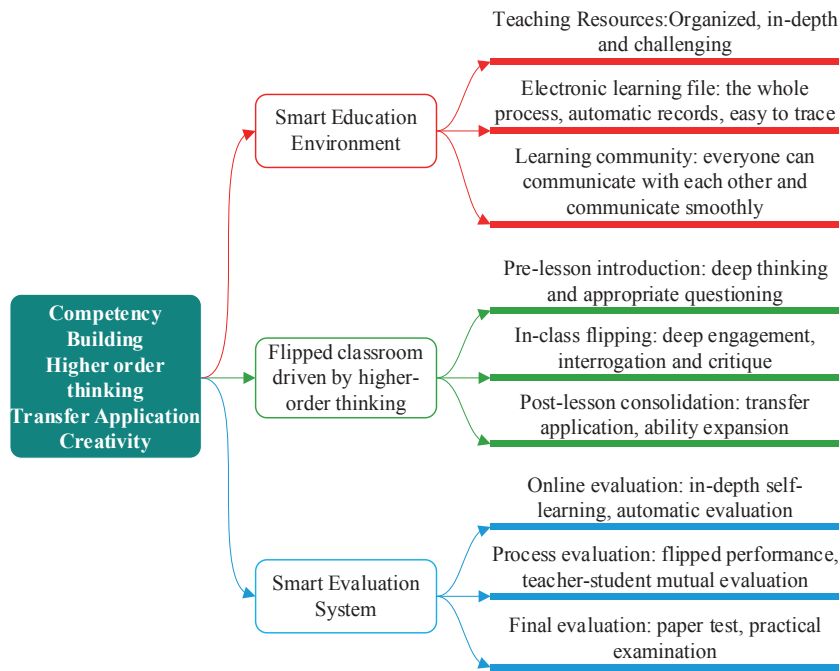
**Table 1** Survey of intelligence professionals in public libraries in some prefectures of province H

Public Library Name	Total number of librarians table	Bachelor's degree or above Number and proportion		Intermediate title or above and the proportion of		Number and percentage of people who have studied Library and Information Technology		Number and proportion of people with comprehensive knowledge structure	
		Number	Proportion	Number	Proportion	Number	Proportion	Number	Proportion
City A Library	49	27	53.45%	28	56.38%	7	13.61%	6	9.35%
City B Library	58	32	55.15%	37	64.86%	4	6.52%	3	4.56%
City C Library	65	37	57.46%	41	62.73%	8	12.12%	7	8.45%
City D ibrary	47	33	71.21%	37	79.54%	6	12.15%	5	7.61%
City E Library	61	36	63.43%	42	69.53%	4	5.89%	5	6.89%

### 3.2 DEEP LEARNING-BASED INTELLIGENT EDUCATION FOR UNIVERSITY LIBRARY INTELLIGENCE

Library and intelligence education is a systemic project, and this is especially true of smart education for library and intelligence. The teacher's in-depth teaching organisation provides a solid foundation for the students' in-depth learning, and the students' in-depth learning is a necessary way to reach higher-order thinking and competence development. Therefore, this study proposes a three-tier design for intelligent education as shown in Figure 1.





**Figure 1** Deep Learning Library Intelligence Teaching Organization

According to the three core elements of smart education, teachers' deep teaching organisation, as the foundation of the high-rise, needs to be built in three dimensions, including a smart education environment that points to deep learning, a flipped classroom driven by higher-order thinking, and a smart assessment system that cares for the effectiveness of deep learning. A smart educational environment for deep learning in library intelligence can be constructed in the following four aspects:

(1) Teaching resources for deeper learning.

In order to achieve the educational goals of higher-order thinking and creative development, the intelligent learning space for library intelligence needs to provide highly integrated, high-quality digital resources with depth, relevance and challenge to promote collaborative learning and deep participation. At the same time, students can broaden their horizons and ideas by providing links to quality resources or social practice windows, and use open learning resources to guide them to establish the right values.

(2) A deep learning smart education environment needs to promote collaborative learning among learners in addition to facilitating deep participation by individual learners. Therefore, the Personal Wisdom Deep Learning Terminal should provide a learning community that is "interoperable for all" and a natural, simple and real-time communication tool to facilitate shared learning.

(3) Space for creativity and demonstration of competence. A creative space for each individual learner, driven by creativity, encourages students to transfer and apply their knowledge, and to demonstrate their work. Not only does it provide learners with opportunities for higher-order learning, it also provides a window for learners to showcase their higher-order thinking skills and creative abilities.

#### **4. CONCLUSION**

The training of library and intelligence personnel has gone through four periods: compilation and reporting, professional research, systematic research and policy-making research, each of which has closely linked its own development to the changes of the times, constantly enriching its research content and improving the theoretical framework of intelligence research. Now, under the impetus of deep learning, intelligence studies should also keep pace with the times, take the initiative to seek changes and adapt, establish new growth points for the discipline and open up new horizons, so as to achieve the purpose of promoting its own development. This requires the intelligence disciplines of domestic universities to adjust the training objectives of talents in a timely manner, to follow the development of society, to adjust the curriculum and practical aspects in real time, to clarify the theoretical curriculum in the training of intelligence talents, to focus on practical education and training of talents, and in the information age, with the In the age of information technology, with the continuous improvement of the information level of library intelligence institutions, the requirements for talents are also gradually improved, in the transformation of the traditional teaching methods, innovative library intelligence talents training mode, cultivating compound and innovative talents in line with the development of society, thus promoting the good development of library intelligence professional talents training in the context of deep learning.

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# OPTIMIZATION OF THE PATH OF IDEOLOGICAL AND POLITICAL INNOVATION EDUCATION IN UNIVERSITIES BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

The state and colleges and universities have given ideological and political education significant attention since it is a crucial practical activity for the growth of college students. With the beginning of the Internet era, the ease of integrating resources, the quickness of information transmission, and the depth of resources have all greatly enhanced the substance of ideological and political education. 2.4% of students believe they utilize big data technologies sparingly, while 3% of college students believe big data is ineffective for informing college students' political and ideological views. This study uses the ideological dynamic prediction and educational decision-making capabilities of big data to raise the ideological level and political literacy of university students.

## KEYWORDS

Ideological and political education;big data era;information dissemination;ideological level;political literacy

## 1. INTRODUCTION

Ideological and political instruction in higher education institutions has recently been faced with the problem of transformation and upgradation due to the rapid development and deployment of big data technologies. Big data as a new information technology has sparked in-depth analysis and investigation of ideological and political teaching in colleges and institutions [1]. In this paper, we will examine how to utilize big data to improve political and ideological education in educational institutions, starting from the standpoint of maximizing the application route of big data in the political and ideological educational environment of educational institutions [2].

Big data may be used to enhance the ideological and political education provided at colleges and universities [3]. An accurate student image may be created by examining a significant number of students' course selections, academic performance, social network usage, and other data in order to offer a foundation and point of reference for the ideological and political education that is taught at colleges and universities [4]. Personalized matching and resource recommendations may be made using artificial intelligence technology and algorithms, which can increase the efficacy and enjoyment of education [5]. Big data may also improve how ideologies and politics are taught at universities and colleges. Traditional classroom-based ideological and political teaching techniques sometimes lack adequate engagement and interactivity [6]. By using big data technology, virtual social network platforms and online learning resource libraries can be established to achieve interactive communication, academic cooperation and resource sharing between students and teachers[7]. This can successfully increase the available instructional space, enhance the educational strategy, and boost students' motivation and learning effectiveness [8].

## **2. THE CURRENT STATE OF THE IDEOLOGICAL AND POLITICAL EDUCATION ENVIRONMENT IN HIGHER EDUCATION**

### **2.1 NETWORK ENVIRONMENT**

The Internet has been an increasingly significant part of college students' everyday life since the dawn of the digital era. College students' lives have become much more convenient thanks to the Internet, but the ideological and political climate of education in institutions has also faced significant problems. Firstly, the convenience of the Internet makes it possible for people to learn about the world's affairs without leaving home, and university students can learn about the latest news and current affairs through the Internet, treating interpersonal relationships coldly and seldom communicating with others. Secondly, being influenced by a variety of online information, views, and ideals, the not yet sound value system of university students has been destroyed, and different values affect the shaping of young students' literacy. In particular, some foreign forces, taking advantage of the enthusiasm, vitality and trustworthiness of university students, have been feeding them with wrong values and even establishing contact with them through the Internet, falsely claiming to be "making friends" but in fact stealing national information. Thirdly, the universities have not yet taken mandatory measures to manage the complex network environment. Although some network supervision organisations have been established to supervise the network environment, the network supervision work in universities has not yet reached an ideal level. On the one hand, the network supervisors in universities lack professional theoretical knowledge and on the other hand, they lack technology and are unable to filter the information on the network, it results in a subpar climate for ideological and

political teaching in colleges. Fourth, in addition to having an impact on the atmosphere of political and ideological discourse in colleges and institutions, the Internet also unknowingly erodes students' ideological system and disintegrates their positive attitude towards life, making students addicted to the Internet and unable to extricate themselves, and eventually eliminated by the times.

## **2.2 CULTURE BUILDING**

In order to improve the climate for ideological and political education, many colleges fly the flag of encouraging cultural construction and engage in a variety of cultural construction on campus. However, very few colleges have really put cultural building into practice. Some colleges forget to foster a cultural atmosphere and conduct ideological and political teaching through a variety of media in order to reap the economic rewards from the cultural creation. The following factors are also indicative of the issue of single culture construction in colleges and universities.

Firstly, the funds distributed by the university in the construction of clubs are limited, and some clubs are unable to carry out diversified, modern and interesting cultural activities due to the financial problems, which leads to the lack of a strong cultural atmosphere in the university.

Secondly, the operation of student organisations is not scientific enough. The student organisations in the school are mainly managed by the students themselves, who lack experience in management and operation, resulting in the student organisations not contributing much to ideological and political education.

Thirdly, cultural activities in the school are organised in a single form. Apart from sports events, singing competitions and cultural activities based on traditional festivals, there are no other types of cultural activities, and students are not very active in participating in cultural activities. The adoption of a single kind of cultural activities over an extended period of time causes students to become quickly fatigued and unable of acting as cultural builders for ideological and political education, which is detrimental to the development of students' ideological and political literacy.

Fourthly, students have no way to express their good ideas about the cultural construction of the school, and the cultural activities in the school lack the vitality, dynamism and creativity of the new generation, resulting in a negative cultural setting for the campus's atmosphere for political and ideological education.

## **2.3 MANAGEMENT SYSTEM**

The school's management system represents the opinions and preferences of the administration, but it does not take into consideration the views of the pupils or the desires of the instructors. As a result, the management system lacks scientific rigor and

provides little support for the work of ideological and political education, and students are not particularly aware of the ideological and political education they are getting.

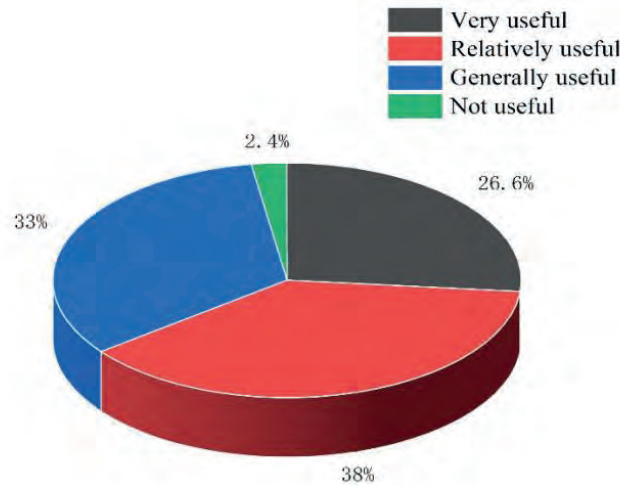
### **3. ANALYSIS OF THE PATH OF IDEOLOGICAL AND POLITICAL EDUCATION WORK IN HIGHER EDUCATION**

#### **3.1 CONTENT OF CIVIC EDUCATION IN HIGHER EDUCATION**

The adage "content is king" has gained prominence in the age of big data, and the integration of the media has greatly increased the usefulness and efficacy of the content. The big data platform gathers a variety of high-quality resources related to academics, social life, and recreational activities for university students. Big data technology enhances ideological and political education resources at universities while giving theoretical knowledge its due. With the advent of the network era, the speed with which information is shared, the depth of resources available, and the ease with which resources can be combined have all greatly enriched the content of ideological and political education, extending the field of students' access to knowledge, offering a larger learning environment, enhancing university ideological and political instruction, and broadening the scope of educational coverage. The groundwork for additional intellectual and political education efforts is laid forth.

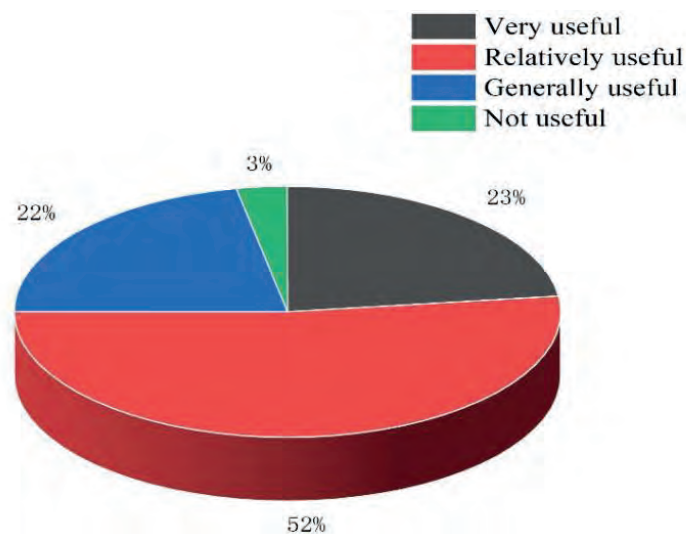
#### **3.2 OPTIMIZATION OF THE PATH OF USING BIG DATA IN THE IDEOLOGICAL AND POLITICAL EDUCATION OF COLLEGE STUDENTS**

In Figure 1, the statistical findings based on the significance of Big Data in Civic Education are displayed. It is evident that practically everyone uses big data technology for educational purposes and application, with just 2.4% of students believing that they barely utilize big data technology. A thorough and comprehensive analysis of the responses from those who claim not to use big data technology revealed that this group is skeptical of its use, believes that political and ideological education may be rendered ineffective by the data development process moving too quickly, and that some members of the group did not understand the specific application of data technology. However, in general, university students and ideological educators are more open to using big data technology.



**Figure 1** Importance of Big Data in Civic Education

Figure 2 displays the statistical findings of the level of ideological and political education based on big data. Only 3% of college students believe that using big data for political and ideological instruction of college students is useless. This is primarily because they use big data technology less frequently than other students and prefer traditional ideological and political methods of instruction in their studies. They also believe that face-to-face communication is the most effective form of communication, especially the group who believe it is very useful. As a result, the marriage of big data technology, ideological and political education, and is a real embodiment of inner ambitions.



**Figure 2** The extent to which big data is needed for Civic Education



#### 4. CONCLUSION

Big data technology is currently being used to educate university students about ideologies and politics. It is crucial to have a firm understanding of the relevance of big data and the correlation between personal data, but even more crucial is to rely on traditional education's experience with macro-level decision-making, use the effectiveness of current ideological and political education as a guide, and continuously use big data technology to improve the organization of the educational system. Throughout the process, a human-centred education objective is established, the basic rights and wishes and needs of students are fully respected, and a friendly and open environment of fair competition and collaborative progress is created for students. By relying on data resources and online education platforms, we can enhance the political literacy and leadership skills of Civic Education staff, as well as strengthen students' ideological awareness, enabling them to transition from practical and interactive learning to active learning, and truly realise learning for its own sake and application.

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**ANALYSIS OF THE INNOVATION OF THE CURRENT EXPERIMENTAL  
TEACHING MODE OF MOLECULAR BIOLOGY IN UNIVERSITIES BASED ON  
THE BACKGROUND OF BIG DATA**

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## **ABSTRACT**

In the era of rapid changes, molecular biology has penetrated into all fields of life science and gradually become an important tool in biology, agronomy, forestry, herbology, animal husbandry and other fields. This paper analyzes the characteristics and shortcomings of contemporary experimental teaching in molecular biology courses based on big data, and proposes follow-up experimental teaching systemic projects from the perspectives of teaching effectiveness and teaching mode. The flipped classroom teaching chapters of the course construction in the context of big data take up 12 marks in the examination paper for PCR technology, 6 marks for gene therapy and 12 marks for genetic engineering respectively. In this paper, through the innovation of the experimental teaching mode of molecular biology in colleges and universities in the context of big data, it not only improves students' performance, but also helps to build the cultivation of independent learning ability.

## **KEYWORDS**

molecular biology; classroom knowledge; interest in learning; enhanced analysis; collaborative skills

## **1. INTRODUCTION**

Molecular biology is a very practical subject. Compared with the experiments of other disciplines, molecular biology experiments are complex and finely technical, and are a typical course combining theory and practice and requiring students to feel and understand the process of knowledge generation and development in experiments, and to cultivate students' ability of independent thinking and innovation[1-2]. For a long time, the content of molecular biology experimental teaching is biased towards verification experiments comprehensive, design experiments less [3]. Teachers write the designed content and steps to students, students can only operate and verify the whole experiment according to the teacher's way of thinking is too programmatic [4]. Teachers' requirements for experimental teaching are also limited to the completion of experimental data and experimental reports. This kind of experiments, which are conducted strictly according to this book and box, restrict students' behavior and limit their thinking development, which hinders students' understanding of the nature of things and stifles their creativity [5]. In order to achieve the three functions of verification, synthesis and exploration of the molecular biology experimental teaching system [6]. to meet the needs of higher education reform and development, the author has taken the experimental teaching content, experimental teaching methods and evaluation system [7-8].

## **2. EXPERIMENTAL TEACHING MODE OF MOLECULAR BIOLOGY IN HIGHER EDUCATION**

### **2.1 CONTENT OF LABORATORY TEACHING IN HIGHER EDUCATION**

The supplies for molecular biology experiments are relatively expensive, and the equipment is expensive, resulting in insufficient sets for students. Students usually work in groups of four to six to do an experiment together, so it is not possible to guarantee that every student can do the experiment, which naturally results in some students who are often hands-on doing the experiment, while some students are unable to intervene and are in the miscellaneous or spectator phenomenon. This phenomenon eventually leads to some students having relatively strong hands-on skills, while others are not able to participate in the experimental process because they are not exercised. The lack of laboratory practice can easily lead to a vicious circle of "lack of interest in laboratory classes → lack of understanding of course theory → lack of motivation to learn → classes become metaphysical". The content of molecular biology laboratory courses is relatively old, and the experimental consumables for cutting-edge and advanced experimental techniques are more expensive, usually more than 10 times or even 100 times the cost of conventional molecular experimental consumables; and these advanced experimental techniques also require the laboratory teachers to spend a lot of time on serious study and pre-laboratory operations, while the workload of the laboratory teachers is only the class fee of the experiments, which cannot reflect the actual workload. For these reasons, in order to make students' experimental skills achieve better experimental effects, the experimental contents are still chosen as conventional, such as DNA extraction, PCR amplification of conserved genes and electrophoresis and other routine basic experiments, but rarely involve advanced experimental techniques, which naturally cannot meet the pace of rapid development of molecular biology. Some universities have established virtual simulation laboratories for molecular biology, which can solve the problems of timely updating of content and workload of teachers in laboratory courses.

### **2.2 CURRENT STATUS OF LABORATORY TEACHING IN HIGHER EDUCATION**

Under the advocacy of reducing the burden of university students, the total number of hours of university students has been significantly reduced, and there is no time to integrate some related experiments or some experiments cannot be integrated due to the long duration of the experiments, resulting in most of the experiments being isolated from each other and not coherent. It is also difficult to concentrate on a continuous schedule of experimental classes, as students have a fixed schedule of theory classes and a relatively fixed schedule of experimental classes, which makes it impossible to carry out coherent experiments. Under these conditions, experiments that could

normally be completed in one week are divided into more than four weeks. The intermittent duration of the experiments not only makes students' memory of the principles, content and steps of the experiments blurred, or even confused with other experiments or knowledge, but also makes the intermediate products of molecular biology experiments, such as DNA and RNA, susceptible to degradation or contamination, leading to unreliable results or experimental failure. The reduction of class time and the scattering of time for the course experiments also lead to a significant decrease in students' participation in the preparation of the experimental teaching process, the commissioning of the experimental apparatus, etc., or even the absence of it. Naturally, students only do part of the experiments, most of which are completed under the instructions of the teacher, it is difficult to form a complete and clear understanding of the experiment, and it is difficult to mobilise students' subjective initiative, which is not conducive to the combination of theory and practice.

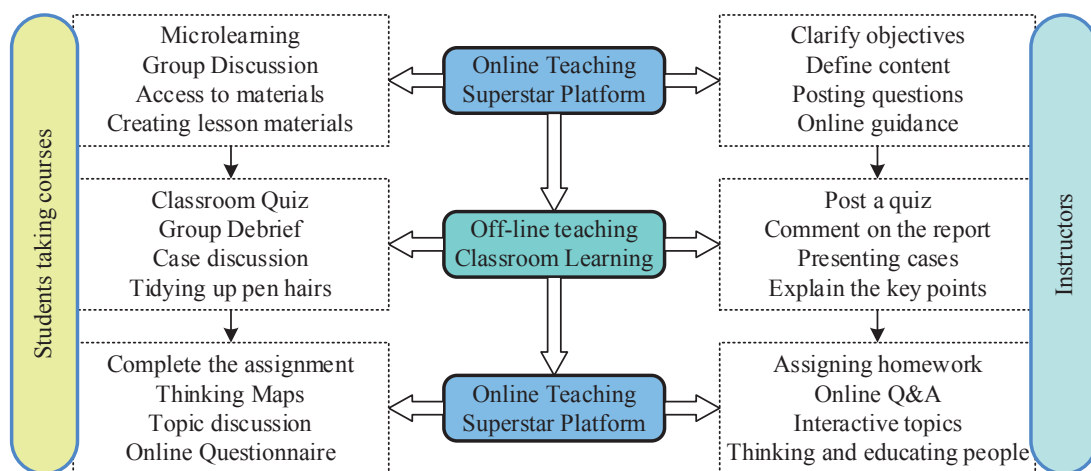
### **3. ANALYSIS OF BIOLOGY LABORATORY TEACHING UNDER THE BIG DATA MODEL**

#### **3.1 TEACHING METHODS AND PROCESSES FOR THE CONTROL GROUP**

The control group implemented traditional teaching, with the teacher's lecture as the main focus. The teacher introduced the course content through introductory questions, then taught the knowledge points according to the syllabus and lesson plan, combined with the course cases in the course of teaching construction of molecular biology, and finally summarized the important and difficult points and answered questions. Students mainly receive and memorise knowledge in class, and complete microlearning and assignments on the Super Star platform in class.

#### **3.2 EXPERIMENTAL GROUP TEACHING METHODS AND PROCESSES**

The experimental group implemented flipped classroom teaching in molecular biology. The teacher posted guided learning questions on the Chaoxing platform before the class. Students logged into the Chaoxing platform to study the micro-lessons and other resources on their own. 5-6 students worked in small groups to discuss the questions and prepare slides for the class report. During the lesson, the teacher first issues a quiz to find out how well the students have mastered the knowledge, and then the group reports on the guided learning questions. Finally, the teacher summarises the key points and answers questions. After the lesson, the teacher posts the assignment on the Chaoxing platform and interacts with students to answer questions as shown in Figure 1.



**Figure 1** Flipped classroom teaching process

### 3.2.1 TEACHING EFFECTIVENESS

Includes questionnaire and final exam evaluation. A self-administered questionnaire was used to understand students' satisfaction with the flipped classroom model and the effectiveness of teaching in the context of big data. The "Self-directed Learning Ability Scale for College Students" was used to evaluate the improvement of students' self-directed learning ability as reported in the literature. The final exam was administered by a medical school through a web-based question bank and was completed by machine testing. The questions included A1, A2 and X-type multiple-choice questions, of which the implementation of the classroom chapter of molecular biology was worth 12 points for PCR technology, 6 points for gene therapy and 12 points for genetic engineering.

### 3.2.2 TEACHING MODE

The results of the questionnaire survey showed that the experimental group was significantly more satisfied with the teaching mode than the control group  $p < 0.05$  as shown in Table 1. Most of the students in the experimental group believed that the flipped classroom teaching mode was conducive to the mastery of classroom knowledge and stimulated interest in course learning, enhanced analytical and problem-solving skills, improved teamwork skills and enhanced classroom participation.

**Table 1** Students' evaluation of teaching mode in both groups

Grouping	Good for knowledge acquisition	Stimulate the interest of learning	Enhanced problem-solving skills	Improved teamwork skills	Increased classroom participation
Control group	115(56.9)	119(58.9)	101(50.0)	83(41.1)	105(52.0)
Experimental group	165(83.8)	165(83.8)	146(74.1)	160(81.2)	174(88.3)

#### 4. CONCLUSION

Innovation in the context of big data is the soul of a nation's progress and the inexhaustible power of a country's prosperity. Molecular biology is a very important and fundamental subject in the field of life sciences, and laboratory teaching occupies a very important position. Therefore, it is necessary to carry out a series of reforms to the experiments of molecular biology courses. The teaching process is based on the use of online and offline platforms to achieve a high degree of integration between information technology and education teaching, which improves teaching efficiency and truly realises the "student-centred" teaching concept. Through the innovation of the experimental teaching mode of molecular biology in the background of big data, we have implemented the concept of all-round education for all staff and improved the independent learning ability of university students, which has achieved a good practical effect.

#### FUNDING

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# A FAST-RIPENING RESPONSE SYSTEM FOR LUXURY GOODS SUPPLY CHAIN BASED ON CROSS-BORDER E-COMMERCE PLATFORM

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## ABSTRACT

The luxury goods supply chain system is integrated through information technology and management methods to realise the whole process of monitoring and management from suppliers to consumers and improve the efficiency and quality of the supply chain. The cross-border e-commerce platform supply chain fast-ripening response system uses information systems to establish a complete project material management system to meet the centralised management of materials and achieve reasonable deployment and use. Only 40%-50% of the goods launched by luxury brands each season are consumed in the current season, and the remaining 50%-60% are mostly sold in the form of tail-end goods through discount shops, duty-free shops and factory shops. By establishing such a fast-maturing supply chain response system, this paper improves the supply efficiency and commodity quality of luxury suppliers, and also provides strong support for the development of luxury supply chains on cross-border e-commerce platforms.

## KEYWORDS

supply chain systems; cross-border e-commerce; luxury goods; information systems

## 1. INTRODUCTION

The current luxury goods supply chain is a complex system [1-2]. It includes a number of links from raw material procurement, production, warehousing, logistics and sales [3-4]. As consumer demand changes, the luxury goods supply chain is constantly adapting [5]. The luxury goods supply chain faces challenges and opportunities in terms

of technology, management and social responsibility [6]. With the accelerated globalisation and growing consumer demand for luxury goods, cross-border e-commerce platforms have become one of the important channels in the luxury goods supply chain [7-8].

By establishing such a fast-ripening response supply chain management system, this paper can improve the supply efficiency and product quality of luxury goods suppliers and enhance consumers' purchasing experience, as well as reduce the risks and costs in the supply chain management process, providing a strong support for a fast-ripening response system for luxury goods supply chain.

## **2. CURRENT DEVELOPMENTS IN THE LUXURY MARKET**

According to the Luxury Goods Association's China Luxury Report, consumers spent \$955 billion on high-end consumer goods worldwide in 2014, accounting for 21.9% of the global high-end consumer goods market, and more than 46% of the global market for personal consumption products. Consumers have become the undisputed buyers of the global high-end consumer goods market. In terms of consumption channels, in 2014, the proportion of Chinese consumers spending through domestic shops, proxy purchases and outbound purchases remained at around 30%, 15% and 55% respectively, with outbound purchases remaining the main channel for high-end consumer goods sales.

### **2.1. LUXURY SUPPLY CHAIN STUDY**

Many scholars have put forward their views and opinions on supply chain management, and many theories have been combined with actual cases of enterprises. However, most of the enterprises they have chosen are manufacturing enterprises with domestic production, assembly and warehousing as the mainstay, and the research issues are mostly about how to improve the production efficiency of enterprises through supply chain management. There are few studies on the supply chain management of multinational conglomerates involving two or more companies with the same or different departments, and even fewer studies on the optimisation and implementation of supply chain strategies for the whole supply chain at home and abroad, as proposed by the person in charge of the domestic company, and almost none in the field of fashion and luxury goods.

### **2.2. THE STATE OF THE LUXURY SUPPLY CHAIN**

The luxury goods supply chain is a complex system, which includes multiple links from raw material procurement, production, warehousing, logistics and sales. The luxury goods market is currently brand-driven with a high degree of brand concentration. Some large luxury groups own multiple brands and control the supply chain through

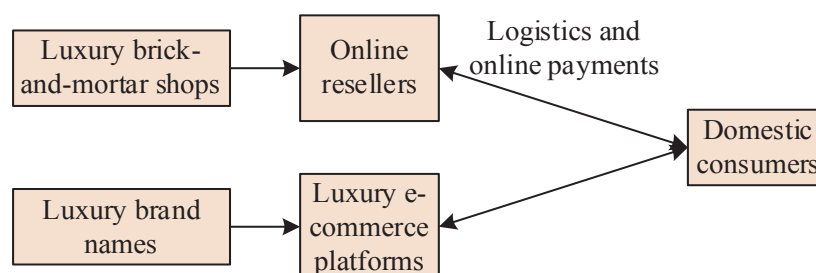
vertical integration to ensure product quality and scarcity. The production chain is diverse and includes hand-made, semi-mechanised and fully automated production. The different levels of technology and craftsmanship in each segment place greater demands on supply chain management. Supply chain transparency is low, with some brands not disclosing information about their supply chains. This poses a buying risk to consumers and makes supply chain management more challenging.

## 2.3. THE MAIN MODES OF ONLINE TRADING OF LUXURY GOODS IN CHINA

### 2.3.1 CROSS-BORDER SURROGACY MODEL

The so-called luxury goods cross-border agency is a luxury goods buyer who buys specified styles of luxury goods for domestic customers through his or her own channels. The main form is that the buyer relies on large online shopping platforms or social networking platforms to operate his or her own online shop, publish agency information, negotiate agency orders and fulfill agency transactions as shown in Figure 1. In recent years, the advantages of domestic luxury shops have been gradually weakened by the surging reversal of the cross-border buying boom. According to the report of China Electronic Commerce Research Centre, since 2014, the scale of luxury goods cross-border agency shopping has exceeded 100 billion, and has been growing year by year, and the sales have been forced to the traditional mainstream sales channels.

There are three main reasons for this phenomenon: Firstly, the price difference between luxury goods at home and abroad is huge, and cross-border agency shopping has obvious advantages over domestic counters in terms of price. Secondly, online shopping has broken the barriers to consumers' consumption abroad, allowing buyers to buy all the styles of major brands without leaving the country, and avoiding the risks that consumers may encounter in the process of cross-border shopping in terms of language communication, international settlement, security of funds and customs clearance; thirdly, cross-border buyers can purchase specified goods for buyers, and will provide services to meet the differentiated needs of buyers, with a high degree of Personalisation and flexibility.



**Figure 1** sketch of online trading of luxury goods

## **2.4. CROSS-BORDER E-COMMERCE PLATFORMS FOR LUXURY GOODS DEVELOPMENT**

Compared with foreign countries, the luxury goods consumers in China are young and, compared with traditional luxury goods consumers, Chinese luxury goods consumers pay more attention to the convenience and speed of the shopping process. It is evident that Chinese luxury consumption has a lot to do with the development of the internet. As early as six years ago, Chinese e-commerce companies started to explore in the luxury sector, with Go.com, Vipshop and Shangpin.com receiving a lot of investment support one after another. From the brands' point of view, foreign luxury brands that wanted to open a large number of physical shops in the Chinese market had to face huge operating costs brought about by high shop rents.

When the physical shops develop into relatively underdeveloped cities in China, it is difficult to guarantee the same service quality of the same brand physical shops in different areas due to the differences in infrastructure and people's consumption level and consumption psychology. The luxury purchase process and after-sales service is an integral part of luxury consumption, yet most luxury brand physical shops do not recognise goods purchased through online channels, and most brand shops do not have after-sales inspection services, which seriously undermines consumers' trust in online luxury purchases.

## **3. CROSS-BORDER E-COMMERCE PLATFORM MODEL**

A luxury cross-border e-commerce platform is an e-commerce platform that sells goods mainly or exclusively in luxury goods, and is also known as a luxury online shopping platform or luxury shopping website. These platforms generally have independent online domain names and provide one-stop services such as sourcing, consulting, warehousing, logistics and delivery, and are also known as self-operated luxury shopping websites. Sales data shows that only 40%-50% of the goods launched by luxury brands each season are consumed in the current season, while the remaining 50%-60% are mostly sold in the form of tailor-made goods through discount shops, duty-free shops and factory shops. Most of the luxury shopping websites cooperate with foreign tailor companies or buyer-type purchasing companies to make purchases, so that luxury goods sales are connected with domestic e-commerce, and most of the goods sold on the websites are not new in season but attract many consumers with their high cost performance. Due to the relatively special business scope and the relatively niche audience, luxury cross-border e-commerce platforms are significantly different from ordinary e-commerce platforms, as shown in Table 1.

**Table 1** Comparison of luxury and general merchandise e-commerce platforms

	Luxury e-commerce platform	General merchandise e-commerce platform
Product Price	Basically, they are above 2000 RMB	Most within 2000 RMB
Product category	With bags, apparel, watches, accessories as the main	Mainly for daily necessities, food, etc.
Goods source channel	from a luxury dealer or distributor wholesale purchase from luxury goods dealers or distributors. Secondly, through professional buyers to foreign luxury goods stores and discount stores. stores, discount stores, etc. Secondly, through professional buyers to foreign luxury stores, discount stores, etc.	Obtain online sales authorization from the brand and purchase directly; Second. After obtaining the online sales authorization from the brand. Purchase from agents and distributors.
Display form	Highlight the "luxury shopping" atmosphere, page mask gorgeous sense of design, graphics The pictures show the high-end quality of the products, the text The text emphasizes the brand legend and is attractive The text emphasizes the brand legend and is attractive.	We do not pursue luxury and design. Pictures focus on the presentation of the product itself. Copywriting to introduce the detailed parameters of the product. Strive for Intuitive and comprehensive

### **3.1. CROSS-BORDER E-COMMERCE PLATFORM SUPPLY CHAIN FAST-RIPENING RESPONSE SYSTEM**

The cross-border e-commerce platform supply chain fast-ripening response system takes engineering projects as the service object, material plans as the management object and procurement contracts as the tracking object, integrating business functions such as demand plan management, procurement management, inventory management, supply quality management and supplier management, forming a management system covering the whole process of project material supply. Convenient access to various business documents and reports, providing information support for the preparation of procurement plans.

### **3.2. CROSS-BORDER E-COMMERCE PLATFORM SUPPLY CHAIN FAST MATURITY SERVICE**

Cross-border e-commerce platform supply chain fast-ripening service is the use of information management system, the international trade guarantee, logistics

technology solutions for the whole process of data statistics and management of the integrated use of the system, through the system can control and track the entire process of supply. The system combines the transmission and processing of business information very well, and the employees of the enterprise can directly complete the business processing through simple operations, and the enterprise control department and leaders make decisions based on the system query statistical information. The information service system can optimise international trade business processes, improve the overall level of risk control of international logistics technology, improve efficiency, enhance the management level of enterprises, help enterprises to use resources more effectively, reduce costs and enhance core competitiveness.

#### **4. CONCLUSION**

The fast-ripening response system for luxury goods supply chain of cross-border e-commerce platform will undoubtedly become the development needs of the world, especially in the current global environment, the global supply chain system is facing unprecedented challenges, the application of integrated technology development, big data exchange, information security and risk control, will change the pattern of the global supply system.

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# RESEARCH ON THE CONSTRUCTION OF A FOURTH-PARTY LOGISTICS INFORMATION PLATFORM BASED ON THE TEXTILE SUPPLY CHAIN

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## ABSTRACT

The textile supply chain is a functional network chain structure established by core enterprises through the control of information flow, logistics and capital flow from raw material procurement, product processing and production and subsequent sales links, including raw material suppliers, manufacturers and sellers as well as consumers. According to the China Cotton Association, China will consume approximately 8.1 million tonnes of raw cotton in 2020, accounting for 30% of global consumption, up 5.9% year-on-year in 2019, and imports of raw cotton amount to 3 million tonnes, up 87.5% year-on-year. Build a basic framework for the circulation system of agricultural products based on a fourth-party logistics information platform to integrate the logistics and information flow of the textile supply chain, thereby achieving the goal of reducing circulation costs and improving circulation efficiency.

## KEYWORDS

textile supply chain; material sourcing; network chain structure; circulation efficiency; fourth party logistics information platform

## 1. INTRODUCTION

The current textile supply chain has many participating members in each link, the degree of information disclosure at each node in the supply chain is low and there is a lag in information transfer, which makes textile supply chain management more complex [1-2]. With the development of the global economy and the acceleration of globalisation, textile supply chain management is facing increasingly high challenges [3]. China's textile industry is still one of the industries with a relatively high level of

pollution, and the main sources of pollutants are water pollution and soil caking caused by the use of pesticides and fertilisers in the planting process, industrial waste emissions caused by the production of cotton textiles and waste of resources caused by the sales process [4]. The textile industry is a labour-intensive manufacturing sector with a complex supply chain and covering many enterprises [5]. The original crude growth approach of pursuing economic benefits at the expense of environmental quality is being replaced at an accelerated pace, and advanced high-quality green development is putting forward new requirements for the cotton textile supply chain [6-7]. In order to improve the efficiency and effectiveness of the textile supply chain, the concept of a fourth-party logistics information platform has emerged [8].

By analysing the problems of China's textile supply chain, this paper constructs the basic framework of textile supply chain based on the fourth-party logistics information platform from the perspective of the fourth-party logistics information platform, integrates the logistics and information flow of textile supply chain, and realises the optimisation of textile supply chain.

## **2. TEXTILE SUPPLY CHAIN CONNOTATIONS AND TYPES**

### **2.1 INSIDE THE TEXTILE SUPPLY CHAIN**

The supply chain is a functional network chain structure established by the core enterprise through the control of information, logistics and capital flow from raw material procurement, product processing and production and subsequent sales chain, specifically including raw material suppliers, manufacturers and sellers and consumers. The textile supply chain is centred on textiles, including cotton cultivation upstream and textile sales downstream.

### **2.2 TYPES OF TEXTILES**

From the textile use point of view, can be divided into clothing and apparel textiles, decorative textiles and industrial textiles three categories, clothing textiles mainly refers to cotton clothing, gloves, socks, etc.; decorative textiles usually include indoor decorative products, home textile bedding and outdoor products, such as curtains, towels, bed sheets and covers, etc.. The main consumer demand for cotton in China is in the field of clothing textiles and home textiles, and China's population base determines that the demand for cotton remains high.

Currently commonly used fibres mainly include cotton, wool, silk, hemp four types of natural fibres, hemp fibres are complicated to process, the need to separate the fibres from liquid and gum-like substances, the more gum content, the higher the cost of its initial processing will be, the lower the possibility of bulk textile fibres, followed by poor comfort because of hemp fabrics, so hemp fabrics are mainly used in summer clothing;

the use of silk made of clothing follow-up maintenance complex The four major natural fibres account for the highest proportion of cotton fabrics in home textiles and garment fabrics, as the cost of garment processing and maintenance is high and the unit price of products is high; wool fibres are subject to greater restrictions on the use of scenarios.

According to the China Cotton Association, China's 2020 raw cotton consumption of about 8.1 million tons, accounting for 30% of the total global consumption, up 5.9% from 2019, raw cotton imports amounted to 3 million tons, up 87.5%. Cotton textiles are widely used and the total amount used is larger.

### **2.3 TEXTILE SUPPLY CHAIN PROCESSES**

Textile supply chain management is further complicated by the large number of members involved in each link of the textile supply chain, the low level of information disclosure at each node in the supply chain and the lag in information transfer. The textile supply chain can be divided into cotton growing, textile production and textile distribution. In the subsequent use phase of textiles, there are also different environmental impacts due to consumer behaviour such as washing, but this part is determined by consumption habits and is difficult to measure and track.

## **3. FOURTH-PARTY LOGISTICS INFORMATION PLATFORM CONSTRUCTION**

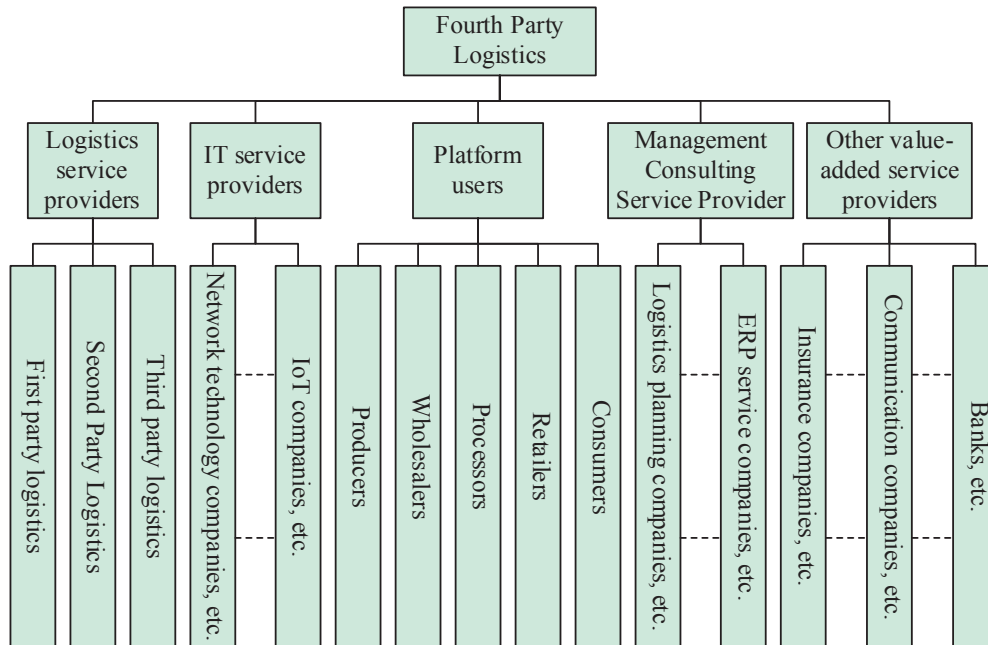
### **3.1 THE CREATION OF A FOURTH PARTY LOGISTICS INFORMATION PLATFORM**

Fourth party logistics is essentially a supply chain integrator based on a modern logistics service model, and the fourth party does not actually undertake specific logistics operational activities. Fourth party logistics is designed to improve the efficiency of material flow and help economic entities reduce costs through the effective integration of resources. After integrating all its resources and information, the provider ultimately offers a complete supply chain solution. Compared to third-party logistics, fourth-party logistics is more focused on providing supply chain optimisation solutions for economic participants in the distribution market, so it is also a very systematic information integration platform for logistics management.

### **3.2 ORGANIZATIONAL COMPONENTS OF THE FOURTH LOGISTICS INFORMATION PLATFORM FOR THE TEXTILE SUPPLY CHAIN**

Our national situation determines agricultural policy, and neither agricultural producers nor enterprises reflect the scale effect. With the development and popularity of information technology such as mobile internet, it has become possible to optimise the textile supply chain by relying on fourth-party logistics. Integrating diversified market players, information resources as well as operation methods in a system-integrated manner effectively solves the problems of small scale of operation, small market share,

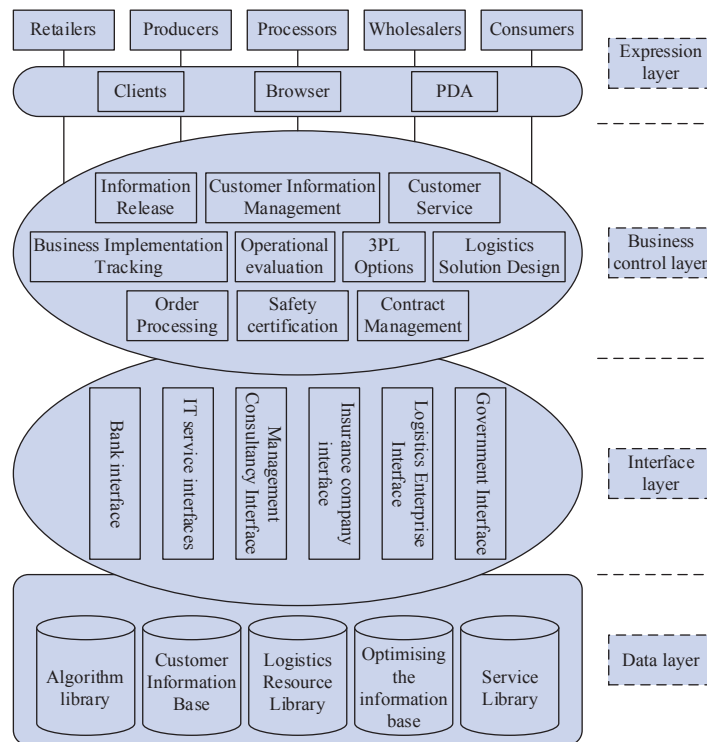
few service functions and weak competitive ability of textile supply chain entities. To break through the circulation framework dominated by third-party logistics, fourth-party logistics is undoubtedly a more efficient model and more in line with current practice. Fourth-party logistics has the advantages of information integration, resource integration and a large number of logistics subjects, which are incomparable to other circulation models. As shown in Figure 1.



**Figure 1** China's agricultural products distribution 4PL organization composition

### 3.3 A FOURTH-PARTY LOGISTICS INFORMATION PLATFORM SYSTEM FOR THE TEXTILE SUPPLY CHAIN

Based on the logistics and information flow of agricultural products circulation, the supply chain resources are integrated together to build the structure of agricultural products 4PL information platform, and the functions are divided into four levels: performance layer, business control layer, interface layer and data layer, as shown in Figure 2.



**Figure 2** Agricultural Product Distribution 4PL Information Platform

#### 4. CONCLUSION

With rapid economic development, more attention has been paid to the negative issues brought about by economic development, such as environmental pollution and waste of resources. With the progress of society and the development of economy, the traditional textile supply chain system is no longer adapted to the needs of textile supply chain. The textile supply chain system based on the fourth-party logistics information platform constructed in this paper will become the development trend of the textile supply chain. Under the background of China's agricultural supply structure reform, this agricultural products circulation system will definitely be improved and eventually realise the optimisation of the agricultural products supply chain. Managing the supply chain by building a fourth-party logistics information platform will become a new competitive advantage for enterprises, which is also the key to achieving sustainable development of the textile supply chain.

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# A SIMULATION STUDY ON MODELLING THE OPTIMISATION OF MENTAL HEALTH QUALITIES OF UNIVERSITY STUDENTS

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## **ABSTRACT**

At present, there is a lack of effective guidance mechanisms, and the improvement of university students' psychological quality cannot be achieved without external guidance mechanisms that stimulate psychological health, especially higher education is the main stage that shoulders this responsibility. A fuzzy clustering-based optimization of college students' mental health quality is proposed, fused with the theoretical idea of fuzzy clustering to analyze the characteristics of the interrelationship between college students' rebelliousness and behavioral hindrances. The  $\Delta CFI$  and  $\Delta TLI$  of the weak equivalence test were equal to 0.001 and 0.003 respectively, both of which were less than the critical index of 0.01. This paper shows that the proposed model provides a strong basis for enhancing the mental health of university students by examining the simulation results of optimising the quality of mental health of university students.

## **KEYWORDS**

university students; mental health; modelling methods; fuzzy clustering; interrelationships

## **1. INTRODUCTION**

The university stage is an important stage in the formation of one's personality [1]. It is an important period for the formation and development of self-awareness, as well as a critical period for mental health education and psychological quality enhancement [2-3]. General Secretary Xi Jinping stressed the importance of mental health services and psychological counselling at the National Conference on Health and Wellness [4-5].

The General Secretary's far-sighted and incisive analysis has pointed out the direction for our work in colleges and universities and the improvement of the psychological quality of college students [6]. We must raise our political standing and make every effort to do a good job of improving the psychological quality of college students for the height of educating people for our country [7]. With the continuous and rapid development of China's economy, mental health has attracted unprecedented attention from the whole society. In the face of the new requirements and challenges of mental health education in the new era, we need to innovate and develop new paths that are more contemporary, practical and operable. to improve the quality of mental health of college students and cultivate young college students who meet the requirements of the new era[8].

## **2. MENTAL HEALTH QUALITIES OF UNIVERSITY STUDENTS**

### **2.1 THE IMPACT OF THE QUALITY OF MENTAL HEALTH OF UNIVERSITY STUDENTS**

University students should have ambitious aspirations and ambitions, which are the main internal motivation for young people to improve their mental health. "During the Three Kingdoms period, Zhuge Liang taught his sons and nephews to have "high aspirations". High aspirations can make young people carry dreams and ideals to fly upwards into the blue sky. On the basis of the completion of the reflection of the basic condition of the psychological quality of college students nationwide, we will further examine the functional role of the psychological quality of college students. As mentioned earlier, a large number of empirical studies have shown that the psychological quality of young people significantly predicts their psychological health, social adjustment and academic development. Therefore, we will also examine the functional role of psychological quality among university students in terms of multiple indicators of psychological health, social adjustment and academic development, and explore how psychological quality influences these indicators as shown in Figure 1.



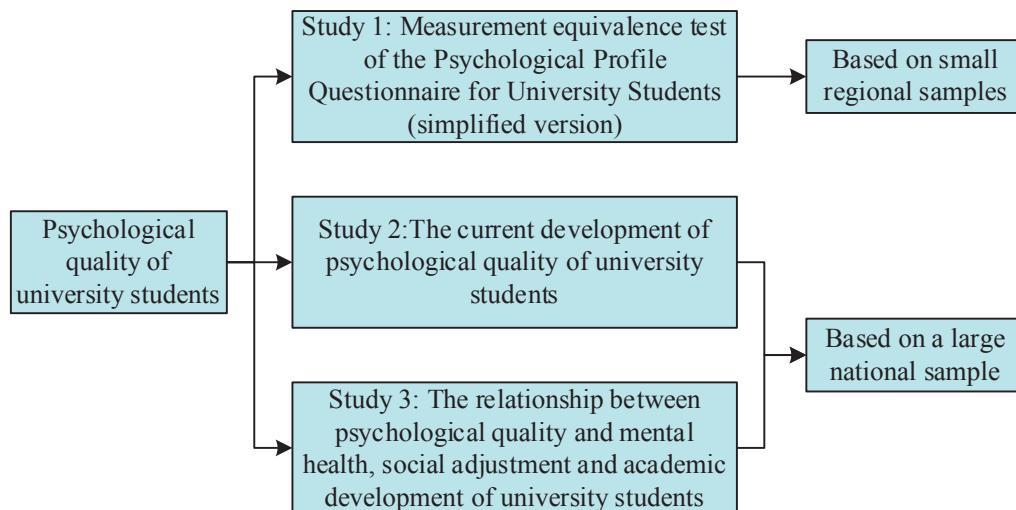


Figure 1 Pathway diagram of college students' psychological quality research

## 2.2 PERCEPTION OF MENTAL HEALTH QUALITIES

As the old saying goes, "There is a sequence of knowledge, and there is a specialisation in each profession", and any great achievement and learning must be based on the accumulation of knowledge over time. Although the ultimate success is influenced by various opportunities, when the accumulation of knowledge reaches a certain amount, the leap from quantitative to qualitative change will be achieved, and only then can the opportunities be favoured. This process is in fact the process of improving the psychological quality of every successful person, and there is no other way. The country and society need a large number of outstanding talents in various fields, without the accumulation and precipitation of a large amount of knowledge, it will not be possible to analyse and compare complex phenomena and research innovations. The lack of an effective guidance mechanism, the improvement of the psychological quality of university students is inseparable from the external guidance mechanism to stimulate mental health, especially higher education is the main stage to shoulder this responsibility. At present, there are certain gaps in this regard, no matter from the scientific system of all-round, all-field and all-factor, or from the main channel, synergy and responsibility.

## 2.3 DEVELOPMENT OF MENTAL HEALTH QUALITIES

The development of mental health qualities is a process of socialisation. In a certain social environment, university students develop both physically and psychologically, form a personality adapted to society and acquire socially acceptable ways of behaving. The psychological development of university students, in particular, emphasises the role of the social environment. Childhood and adolescence, which are periods of rapid physiological development, are also key periods in the psychological development of the individual, during which the solution of a series of problems in the growth of the

individual becomes necessary and important. All achievements in life are the result of struggle, and outstanding talents are the best of the best who have gone through many trials and tribulations, are indefatigable, have their feet on the ground and are constantly striving. Cherish the youthfulness, work on the ground, put ambitious ideals into small, detailed and practical actions, let diligent learning become the driving force of youthful flight, let the growth of skills become the energy of youthful combat!.

### **3. A SCHEMATIC MODEL OF A PSYCHOLOGICAL INFORMATION SYSTEM FOR UNIVERSITY STUDENTS**

In the process of forming the principle model of the psychological information system of university students, the psychological and physiological outstanding performance characteristics produced by university students are first obtained, and the objective factors of the external environment and the subjective factors of the university students' own psychological production are analysed through this characteristic to form the principle model of the psychological information system of university students. When using the principle model of the psychological information system of university students to optimise the modelling of mental health quality, the relationship between the psychological phenomenon performance characteristics of university students and the hindering effect of psychology on behaviour should be analysed in detail, but the traditional method completes the modelling by setting the attributes of different mental health quality categories based on the citation mapping table and the broad value of misclassification rate, but it is difficult to accurately extract the psychological phenomenon performance characteristics of university students, and there is a modelling error. The problem of large modelling error. A method based on fuzzy clustering is proposed to optimize the modelling of mental health quality of university students.

#### **3.1 MENTAL HEALTH QUALITY OPTIMIZATION MODELING SIMULATION MEASUREMENT EQUIVALENCE TEST**

The factor loadings were set to equivalence, i.e. the same indicator loaded consistently across gender and disciplinary categories. The  $\Delta CFI$  and  $\Delta TLI$  for the cross-gender weak equivalence test were equal to 0.001 and 0.004, respectively.  $\Delta CFI$  and  $\Delta TLI$  for the cross-disciplinary category weak equivalence test were equal to 0.001 and 0.003, respectively. both were less than the critical indicator of 0.01. This indicates that there are no significant differences in the loadings of the same indicator across gender and across disciplinary categories. The results of the single-group validation factor analysis for the gender and subject category groups of students showed that the two-factor structural model of the Student Psychological Profile Questionnaire showed good fit indicators for the total sample as well as for the male and female student

samples. The results of the analysis at the subject category level showed that the humanities and social sciences samples also fit well with the total sample.

### **3.2 A SIMULATION STUDY BASED ON OPTIMAL MODELLING OF MENTAL HEALTH QUALITY OF UNIVERSITY STUDENTS**

In the process of modelling the role of college students' rebelliousness on behavioural hindrance, fused in a kind of fuzzy theory of college students' mental health constraints based on granularity transformation from subjective and objective reasons, to get the nature of college students' psychology, quality optimization modelling method. Based on the introduction of the characteristic tendency to give the different stages of college students' rebellious psychology, to get the college students' rebellious psychology of each of the college students' mental health quality optimization modeling method. The corresponding information entropy of the behavioral hindrances produced by each stage is calculated, and the optimal modeling method for the quality of college students' mental health of college students who produce rebelliousness in nuclear clustering is calculated, and the behavioral tendency threshold of these traditional parties of rebelliousness.

## **4. CONCLUSION**

The average amount of information generated by each stage of rebelliousness of college students, the subjective reasons for the formation of rebelliousness of college students, and the broad value of the behavioral tendency of college students to generate rebelliousness were calculated. The theoretical idea of fuzzy clustering is integrated to analyze the characteristics of the interrelationship between rebelliousness and behavioural hindrances among university students, and the results are used to form a model of the effect of rebelliousness on behavioural hindrances among university students, and the ant theory is used to solve the model of the problem. Using the results of the calculations, the university students' mental health quality optimization model was developed. The results of the study show that the study has a great advantage in terms of modeling efficiency stability and time complexity for the improvement of college students' mental health.

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# RESEARCH ON THE EFFICIENCY AND INNOVATIVE MANAGEMENT MODE OF USING LARGE INSTRUMENTS AND EQUIPMENT IN UNIVERSITIES IN THE INTERNET ERA

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## ABSTRACT

The root cause of the inefficient use of large instruments and equipment in universities is mainly due to the lack of a comprehensive, systematic and complete instrument and equipment management system. The centralized and intensive management of large instruments and equipment in universities in the Internet era promotes their open sharing and efficient use, as well as better cultivation of students' hands-on skills. Looking at the funds for the acquisition and maintenance of instruments in province H, the funds for the acquisition of instruments in universities under the ministry were RMB 900,228,200, accounting for 53% of the total funds for the acquisition of instruments in universities in the province, and the survey data showed that the funds for the acquisition of instruments in universities under the ministry were huge. By studying the construction and application of the network sharing platform in the Internet era, the efficiency of the use of large instruments and the innovation of the management mode in universities has been effectively improved.

## KEYWORDS

manual skills; centralised and intensive management; efficient use; web-based sharing platform

## 1. INTRODUCTION

Strengthen the scientific use and management of large instruments in colleges and universities to improve their use efficiency and use effectiveness [1-2]. Make large instruments play a greater role in teaching and research in colleges and universities [3]. This is an important symbol of the management of large instruments in colleges and universities, and also a basic condition for continuously improving teaching and

scientific research [4-5]. With the development of China's higher education and the change of college asset management mode, the use and management of large instruments in colleges and universities need to be put on a scientific, institutionalized and standardized track [6]. On the basis of the milestones already achieved in the management of large instruments, we analyze and summarize the problems that still exist in the management now, and put forward scientific countermeasures and suggestions with timeliness in the Internet era [7-8].

In this paper, through the construction and application of the network sharing platform in the Internet era, the efficiency of the use of large instruments and the innovation of the management mode in universities are effectively improved, so that universities can better use large instruments to accomplish the mission of talent training, scientific research and social services.

## **2. REASONS FOR INEFFICIENT USE OF INSTRUMENTS AND EQUIPMENT IN HIGHER EDUCATION**

### **2.1 LACK OF A COMPREHENSIVE, SYSTEMATIC AND COMPLETE INSTRUMENT AND EQUIPMENT MANAGEMENT SYSTEM**

The management of instruments and equipment in higher education includes long-term planning, annual planning, scientific proof, reasonable procurement, careful acceptance, installation and commissioning, technical training, use performance, maintenance status file management and responsibility for use and other aspects. However, in practice, there is almost no long-term planning system for the management of instruments and equipment, annual plans are big and general, and scientific proofs are formalistic. The systems for rational procurement, careful acceptance, installation and commissioning are fairly well developed. The lack of a technical training system, the state of maintenance and file management are not given enough attention, and the use of performance is not only lacking in institutional safeguards, but also uncared for. Likewise, the lack of accountability for the use of instruments and equipment has led to dangers in terms of safety.

#### **2.1.1 LOW LEVEL OF OPEN SHARING**

The lack of the concept of sharing, free use or use is not linked to the income of the reporting department and individuals, resulting in the idea of "don't want it for nothing, want it for nothing" is quite common, and the phenomenon of competing for funds, occupying the equipment, making it convenient and light on performance is very serious, resulting in the exclusive use of units and individuals, and the difficulty of borrowing from each other between departments, and it has been difficult to substantially improve the utilization rate of instruments and equipment.

## 2.1.2 INSUFFICIENT OPENNESS AND SHARING WITH THE OUTSIDE WORLD

The open sharing of university instruments and equipment includes not only the interoperability between universities, but also the open sharing between universities and various enterprises and institutions in society. This kind of open sharing is not only theoretically feasible, but is actually being carried out. For example, a similar university has proposed to use the instruments and equipment of the author's school for a fee. The data after the survey shows that the annual average opening of large instruments and equipment in universities nationwide is less than 1200h, while the society's demand for university instruments and equipment is very strong.

## 2.2 THE CURRENT SITUATION OF THE MANAGEMENT MODE OF LARGE INSTRUMENTS AND EQUIPMENT IN UNIVERSITIES

The stock of large instruments is large, and the large instruments of the universities in H province are mainly concentrated in the universities under the ministry, with the number of units and original values exceeding 70% of the province's total. As shown in Table 1. The number and value of instruments and equipment owned by the universities under the ministry accounted for 42.34% and 57.51% respectively, of which the proportion of the number of large instruments and the total value were 78.62% and 81.76% respectively, which were obviously higher than the proportion of all the two items of equipment. The total number of large instruments in the five universities under the ministry was 1,422 units, amounting to RMB 140,824,000. The number of large instruments in comprehensive universities and polytechnics is on the high side, followed by agriculture and forestry colleges, and there are fewer large instruments in teacher training and finance colleges, which are mainly in the liberal arts.

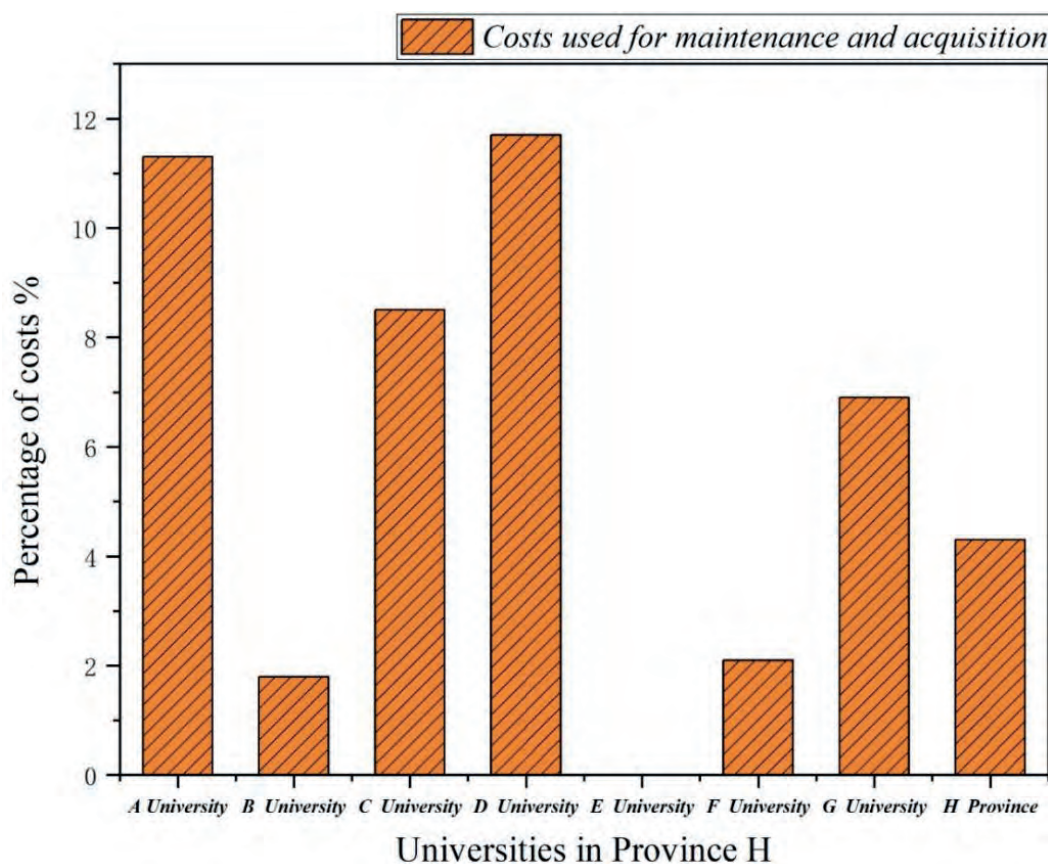
**Table 1** Instrument and equipment units and amount

Unit Name	Instrumentation			
	Tableware	Amount	Large-scale instruments	Amount
A University	134925	208631.12	412	46211.7
B University	136542	235422.51	465	52486.1
C University	41563	55173.7	133	22731.6
D University	77214	105623.52	227	15752.3
E University	51237	74581.3	185	3642.8
H Province	1273587	1302481.5	1863	191284.6
Percentage of	42.34%	57.51%	78.62%	81.76%

## 2.3 HIGH INVESTMENT OF FUNDS AND UNSCIENTIFIC ALLOCATION

The data show that the Ministry's universities have huge funding for instrument acquisition and significantly insufficient funding for maintenance as shown in Figure 1. In terms of the expenditure on the acquisition and maintenance of instruments in

province H, the expenditure on the acquisition of instruments in the universities under the ministry was RMB 900,228,200, accounting for 53% of the total expenditure on the acquisition of instruments in the universities in the province, and the expenditure on the maintenance of instruments was RMB 355,662,200, accounting for 50% of the maintenance expenses in the universities in the province, which seems to be reasonable. However, if we compare the acquisition and maintenance expenses horizontally, it is obvious that the ratio of the two expenses is not coordinated. According to the international practice, the budget for the purchase of instruments and equipment should be supplemented by 20% of the purchase cost of the instruments or through fund projects to ensure that the annual operating cost of about 6% of the original value of the instruments will be used for the maintenance and operation of the instruments. In seven universities in one region, the highest ratio of annual instrument maintenance to acquisition costs was 11.7% and the lowest 0%, both below the international standard of 20%.



**Figure 1** Use case for school maintenance and purchase

### 3. IMPLEMENTING PLATFORM BUILDING IN THE INTERNET ERA

Shared platforms are the basic conditions for teaching and research formed by the graded allocation and integration of high-quality large instruments, and are an important support for high-level scientific research. The construction of a shared platform is



different from the acquisition of instruments required by individual disciplines or subject groups, and has a clear public service character.

### **3.1 SHARING AND COMMON SYSTEMS**

The shared use system is to break the status quo of a closed, compartmentalised system in which the user submits a purchase application, the asset management department conducts an acquisition demonstration, and the purchased instruments are stored in the laboratory where each subject group is located and used and managed by the members of that subject group. The management model of shared use of large instruments is based on the premise of satisfying the needs of teaching and research in the university, carrying out expert verification, centralised procurement, entering the shared management system, disclosing instrument information, accepting appointments for use, implementing paid use, and finally carrying out scientific evaluation. It should be open and shared not only between the secondary schools within the university, but also to various disciplines and subject groups. It should be open and shared not only between teaching departments, but also between teaching and research. It should be open and shared not only between teachers, but also to students. It should be open and shared not only within the university, but also to similar institutions and various enterprises and institutions. It should be open and shared not only during working hours, but also during break times. The university should not only open up and share during working hours, but also during breaks. In this way, the use of instruments and equipment can be increased and the efficiency of the use of instruments and equipment can be improved.

### **3.2 . BUILDING A NETWORK PLATFORM**

Each shared instrument and equipment is in a grid point in the resource network, which is both an independent instrument and equipment use system and interdependent with related instruments and equipment, forming a three-dimensional instrument and equipment network to maximise the benefits of instrument and equipment use. At the same time, an information management system with functions such as daily management, online booking, information feedback, benefit evaluation, fund management, repair and maintenance, and end-of-life elimination should be developed.

### **3.3 NETWORK SHARING PLATFORM IN THE INTERNET AGE**

The most distinctive feature of a networked shared platform is that it provides strong technical support for cutting-edge scientific research. Relying on researcher project funding and instrument testing fees to fully fund the operation of the platform will result in a large number of basic and repetitive experiments that are in their infancy and will restrict young teachers and students who need access to instruments with limited funds.

Therefore, the university should raise continuous support for the operation of the platform to guarantee its sustainable development and operation. The platform's fund can be broadly divided into two areas, maintenance and operation. The university relies on the repair costs of large instruments in large research projects and establishes a large instrument maintenance fund, which is managed and used by the university in a unified manner for subsidizing the funds for the operation of large instruments, upgrading and renovation of instruments, and updating and replacing accessories.

#### **4. CONCLUSION**

As the state continues to increase its investment in education, the scientific research conditions of universities have been further improved, and the quantity and quality of large instruments and equipment in universities are also being rapidly enhanced. At present, the inefficiency of the use of large instruments and equipment in universities is mainly due to the lack of a comprehensive and systematic management system for large instruments and equipment, the lack of systematic and comprehensive pre-purchase demonstration of instruments and equipment, the low degree of open sharing, insufficient maintenance costs and backward management of large instruments and equipment, etc. Only by changing the concept can the efficiency of the use of large instruments and equipment in universities be improved. In this paper, through the construction and use of a network sharing platform in the Internet era, the original management concept is changed, making it possible to effectively improve the efficiency of the use of large instruments in universities and the innovation and optimization of the management mode.

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# THE CONSTRUCTION OF AN INNOVATIVE TEACHING MODEL BASED ON FUZZY NUMERICAL ANALYSIS FOR THE INTEGRATION OF UNIVERSITY LANGUAGE AND CIVICS EDUCATION

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## ABSTRACT

University language education is highly humanistic and rich in spiritual resources, which can cultivate students' humanistic qualities with beautiful literary works, and is unique in its function for ideological and political education of university students. This paper explores the integration strategy of university language and ideological and political education, and the innovative teaching model based on the fuzzy numerical analysis method for the integration of university language and ideological and political education to jointly promote the development of ideological and political education in universities. The analysis of the excavation of ideological and political education in university language only half of the students could find out the ideological and political elements contained in the selected texts, 25.6% of the students only found out partially, and 19.3% of the students were still not sure what the ideological and political elements were. This paper shows that the innovative teaching mode construction of the integration of university language and thought politics education promotes the development of ideological and political education in universities through the method based on fuzzy numerical analysis.

## KEYWORDS

humanities literacy; integration strategies; fuzzy numerical analysis; innovative teaching; educational resources

## 1. INTRODUCTION

With the increasing number of university students, university language and Civics education are becoming increasingly important in the university classroom [1-2]. The two courses are taught very differently, but they also have much in common [3]. In order to better integrate the two courses, innovative teaching models need to be constructed

[4]. In this regard, a method based on fuzzy numerical analysis can be used to guide the construction of an innovative teaching model for the integration of university language and Civics education [5]. In order to construct an innovative teaching model for the integration of university languages and Civics education through the fuzzy numerical analysis method, scholars need to first find the starting point and basis for the construction process, and collect data and information related to the two subjects [6]. Subsequently, fuzzy numerical analysis is used to construct and optimise the teaching model [7]. This method allows the performance, relevance and importance between the two courses to be determined through a fuzzy numerical analysis of the teaching process and the course objectives [8].

## **2. FEATURES OF UNIVERSITY LANGUAGE COURSES AND IDEOLOGICAL AND POLITICAL EDUCATION IN HIGHER EDUCATION**

### **2.1 THE IMPLICIT CIVIC FUNCTION OF UNIVERSITY LANGUAGES**

Civic education is the foundation of moral education in universities, and it is closely linked to personal development and the political, economic and cultural development of society. The university language is highly humanistic and has functions such as nurturing the awareness and aesthetics of university students. This is equally closely linked to the development of the individual student and society. And the implicit function of university languages in the function of ideological and political education is thus expressed. This implicit approach to ideological and political education. Although it does not directly educate students in ideology and politics, it helps them to understand the ideological views of different periods, the charm of different authors and the content of different texts through the study of literary works, for example, through the teacher's analysis of the context and artistic characteristics of different works. It can cultivate students' sentiments and deepen their love for the rich culture of their country and enhance their national pride and self-confidence. This provides a wide space for students to identify with and empathise with in the process of learning. It can be described as silent.

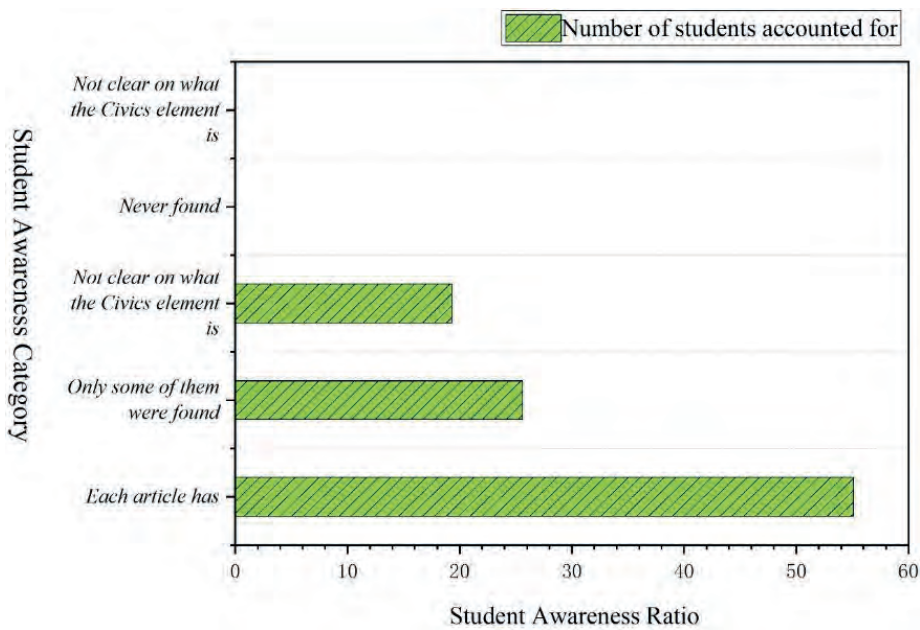
#### **2.1.1 A UNIQUE CIVIC RESOURCE FOR UNIVERSITY LANGUAGES**

The main purpose of university education is to guide students to establish a correct outlook on the three concepts, and the unique resources of university languages provide a good basis for this. The charm of university languages is that they allow students to experience the charm of different times. The summaries of the theoretical essence of the sages help students to establish a correct outlook on life and to cultivate patriotic feelings among students. The university language provides a rich resource for the ideological and political education of students, broadening their horizons and

guiding them to understand themselves and the world. It also helps students to think about life.

### 2.1.2 MINING CIVIC EDUCATION IN UNIVERSITY LANGUAGES

Students' awareness of tapping into the ideological elements of the textbook content is shown in Figure 1. It is possible to see that teachers were largely able to find the ideological elements of each text when they tapped into them, but only half of the students were able to discover the ideological elements embedded in the selection, 25.6% only partially, and 19.3% were still unclear about what the ideological elements were. Teachers are inherently more capable of understanding and comprehending than students, so we need to see that teachers who are largely able to tap into the Thinking and Politics elements on their own will hopefully be able to enable those students who are not yet clear about what they are to understand the Thinking and Politics elements conveyed in the selections and to better guide their practice and build strong ideals and beliefs.



**Figure 1** Students' awareness of the ideological elements of tapping into textbook content

### 2.2 THE INTEGRATION OF UNIVERSITY LANGUAGE AND UNIVERSITY THINKING AND POLITICAL EDUCATION

Despite the uniqueness and advantages of university languages, there are still a number of problems in university language education, one of which is misplacement. University students still lack awareness of university language courses and still define them only as a part of learning their mother tongue. In fact, university languages are much more than a basic knowledge course that trains students to read, write and speak;

they are an education in nationalism, traditional culture and humanism. It is therefore important that we study the integration of university language courses and university political education as a diversified teaching method, and understand the positioning of university languages, which can only be useful in ideological and political education if they are correctly positioned.

Teachers of university languages play a leading role in the teaching of university language courses, which is the guarantee that the ideological and political functions of university languages can be brought into full play. Teachers use the literary works in university language textbooks as a basis to create the situation of the author at the time, to infect and educate students. At the same time, the full play of the ideological and political function of university languages. It is not only the professional knowledge and skills of teachers that are needed. What is more important is the ideological and political quality of the teacher, as well as his or her noble personality. A university language teacher is not only a transmitter of knowledge, but also a sower of students' souls. Therefore, university language teachers need to improve not only their professional skills but also their ideological and political qualities. In this way, they will be able to understand and grasp more accurately the ideas conveyed by the different authors in the textbooks. In this way, students can be led into a sublime context. This will lead students into a noble context. In the training of university language teachers by the state and universities. The language teachers should also be guided to pay attention to the improvement of their own ideological and political quality, to educate and guide students to do a good example to truly be a teacher, for the construction of socialism with Chinese characteristics to train qualified builders and reliable successors of both moral and talent.

### **3. DESIGN OF AN EVALUATION INDEX SYSTEM FOR THE INTEGRATION OF INNOVATIVE TEACHING MODELS**

Innovative teaching requires teachers to prepare teaching materials, teaching materials and lesson plans before they begin teaching. These tasks will determine whether the teacher is able to stimulate students' interest and raise their awareness of the classroom. The most crucial part of the innovative teaching model is the teaching process, which includes the teacher's familiarity with the content, his or her ability to control the classroom, his or her use of teaching methods, and his or her ability to link theory to practice and to solve students' practical problems in the project. The effectiveness of teaching refers to the degree to which teachers have achieved their teaching objectives, the degree to which they are satisfied with the results, and the degree to which students have completed their projects and gained experience in the innovative teaching mode of curriculum integration.

Fuzzy hierarchy analysis is used to evaluate the innovative teaching model of curriculum integration. Based on the analysis of the evaluation objects, a reasonable and feasible project teaching evaluation index system is determined.

( 1 ) Use hierarchical analysis to determine the weights of each indicator.

( 2 ) Define the rubric set. Measurements are made for each tier of indicators to

determine a grade and form a rubric set  $V = (V_1, V_2, V_3, \dots, V_5)$  .

( 3 ) Building a fuzzy evaluation matrix.

$$R = \begin{bmatrix} R_{11} & R_{12} & \dots & R_{1n} \\ R_{21} & R_{22} & \dots & R_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ R_{m1} & R_{m2} & \dots & R_{mn} \end{bmatrix}, \text{ of which } R_i (i = 1, 2, \dots, n; j = 1, 2, \dots, m)$$

denotes the degree of affiliation to the  $j$  th level of the rubric, i.e. the affiliation vector

o

( 4 ) Constructing a fuzzy comprehensive evaluation model. According to the

synthesis algorithm of fuzzy matrix, its comprehensive evaluation model  $A$  for :

$$A = W' \cdot R = (A_1, A_2, \dots, A_n) \quad , \quad \text{if } \sum A_i \neq 1 \quad , \quad \text{then } A' = (A'_1, A'_2, \dots, A'_n) \quad ,$$

$$A' = A_j / \sum A_j, (j = 1, 2, \dots, n) \quad .$$

( 5 ) Determining the set of scores。 set  $K = (K_1, K_2, \dots, K_n)T, n$  Equivalent to the

number of levels in the rubric set ,  $K_i$  denotes the score of the level  $i$  rubric , With a

score out of 100, the  $K_i = i \times 100 / n (i = 1, 2, \dots, n)$  .

( 6 ) Calculation and evaluation of results.  $B = A \times K$  或  $B = A' \times K$  , This is the score

of the evaluation object, and the project-based traction teaching is evaluated according to the magnitude of the B-value. The evaluation can be divided into three levels, i.e. preparation for teaching, teaching process and teaching outcomes.

#### 4. CONCLUSION



University language and Civic Education are becoming increasingly important in the classroom, and the two courses are taught very differently, yet they have much in common. By using fuzzy analysis to construct an innovative teaching model that integrates university language and Civic Studies education, teachers can better integrate the two subjects and enable students to gain more benefits in the learning process. In the construction of the innovative teaching model, the fuzzy numerical analysis method can take the students' learning experience and learning effect into consideration, so as to achieve a more comprehensive and scientific teaching, making the university language contains valuable educational resources to mention the ideological and political quality of the students, so that the students can really become a moral and talented person.

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# AN ACCELERATED GENETIC ALGORITHM-BASED MODEL FOR GUIDING PUBLIC OPINION IN MAJOR PUBLIC CRISIS EVENTS

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## ABSTRACT

At the present time when we are in the transition period of social development, all kinds of major sudden public crisis events are very likely to generate online public opinion. In this paper, we analyze the relevant literature on the risk of online public opinion in China, outline the current main research directions, and establish a dynamic grid public opinion risk identification system optimized by accelerated genetic algorithm based on big data analysis and grid modelling ideas. Genetic algorithm is used to predict the risk of public opinion in major public crisis events, and the prediction accuracy of the constructed risk prediction model is 94%.

## KEYWORDS

major sudden public crisis events; online public opinion; accelerated genetic algorithm; risk prediction

## 1. INTRODUCTION

At present, the Internet is the main forum for the brewing and fermentation of public opinion in major public crisis events, and the issue of public opinion governance in the interim has become a key area of relevant research [1-2]. Negative and uncontrolled online public opinion often intensifies conflicts, aggravates the situation and even endangers the public [3]. Online public opinion is a manifestation of social opinion, which is the public's remarks and opinions on hot events and topics in the Internet space [4-5]. And big data opinion monitoring is developed to adapt to the new features of public opinion in the era of big data [6]. Risk identification of online public opinion based on big data analysis technology can effectively identify the information sources of crisis events and social risks from massive online information, analyze public opinion views and emotional tendencies, and carry out risk assessment and strategy optimization

selection by matching similar events already in the database [7]. Discovering and identifying the hidden risks of online public opinion and analyzing its evolution and development patterns are the prerequisites for timely response to public opinion crises [8].

Based on the ideas of big data analysis and grid modelling, this paper initially establishes a dynamic grid risk identification system optimized by genetic algorithm, which can filter key information from the massive public opinion information obtained from the big data platform and effectively predict and evaluate public opinion risks.

## **2. CHARACTERISTICS OF ONLINE PUBLIC OPINION IN MAJOR PUBLIC CRISIS EVENTS**

### **2.1 RAPIDLY SPREADING**

The breakthrough of time and space boundaries and the speed of dissemination are the distinctive features of online communication. In major public crises, the widespread use of online instant messengers allows information to spread outward at an exponential rate, raising the level of concern and topic heat rapidly, and creating public opinion on the Internet. The emergence of inflammatory and misleading views and voices in online public opinion can be very destructive.

#### **2.1.1 PERIODIC DISSEMINATION**

Generally speaking, online public opinion in major public crisis events has its own development rules, and its basic direction is generally consistent with that of public crisis events. It is roughly divided into four stages of development: germination, development, outbreak and receding. The development of real-life events and the development of online public opinion interact with each other. Therefore, online public opinion is closely related to public opinion and public concern, and the management of online public opinion is inseparable from the resolution of real social conflicts and the handling of crises.

#### **2.1.2 DIFFUSION AND DISSEMINATION**

The Internet is characterised by the two-way interaction of information dissemination. Internet users are receiving information and sending it out at any time and anywhere, which has rapidly increased the speed and scope of information dissemination on the Internet compared to traditional media. In the case of a sudden public crisis, the breadth and speed of this diffusion allows a wider audience to be informed of the event and to participate in the discussion. In turn, the participation of a larger audience contributes to the increase in public opinion, which increases the probability of public crisis and the difficulty of public opinion management.

## 2.2 THE EVOLUTION OF ONLINE PUBLIC OPINION IN MAJOR PUBLIC CRISIS EVENTS

(1) Budding stage: The "fuse" of a crisis event has just appeared on the online platform and has not yet caused large-scale re-posting and comments, but its risk point has already taken shape and has aroused attention in a small area. The corresponding life sign of public opinion in this period is characterized by gestation. In other words, public opinion is relatively calm, but the number of people who have "discovered" the "trigger" of a crisis event is slowly increasing, and the number of people who are concerned about the event is gradually expanding. The top priority of public opinion management on the Internet should be to monitor public opinion, detect risks, provide early warning and prevent problems before they occur.

(2) Development stage: The impact of crisis events gradually expands, the public finds that crisis events are closely related to their own interests and even their lives, and the heat of online public opinion continues to increase. The life sign of public opinion at this stage is characterized by proliferation. A large amount of relevant information spreads outward on the online platform, forming extensive discussions, forwarding and comments, which also gives room for inaccurate information to survive.

(3) Explosive phase: This is the phase when the crisis event itself receives the most attention and the public opinion formed around it is the most heated. The life sign of public opinion at this stage is characterized by outbreaks. Internet users engage in large-scale discussions around important information related to the crisis event, expressing their concerns and basic attitudes towards the event in various forms, and these behaviours will show an explosive growth over time. During this period, the developing status of the crisis event and the behind-the-scenes information that continues to be revealed can easily stimulate the public's sensitivities and provoke conversation. The elicitation of one point of view evolves in a cascade into more points of view, which become entangled with each other, creating secondary public opinion and extending it volatily.

(4) Decaying period: As time advances, crisis incidents are gradually resolved, authoritative official information is fully disclosed, the truth of the incident and subsequent development dynamics gradually become clear, and rumors are cleared and combated. Under such circumstances, the vital signs of online public opinion also change, and decay becomes a typical feature. At this point, the public's attention is easily attracted by other hot events, the attention to the incident decreases, and the discussion around the incident becomes less and less, and the whole public opinion slowly falls back. It should be noted that the dissipation of public opinion does not mean that it disappears, and if there are new developments or new information is disclosed

about the crisis. If there is a new development or new information is disclosed, or even a similar incident suddenly occurs, it will stimulate public opinion and cause it to rebound.

### **3. GENETIC ALGORITHM OPTIMIZATION OF PUBLIC OPINION RISK MODELS IN MAJOR PUBLIC CRISIS EVENTS**

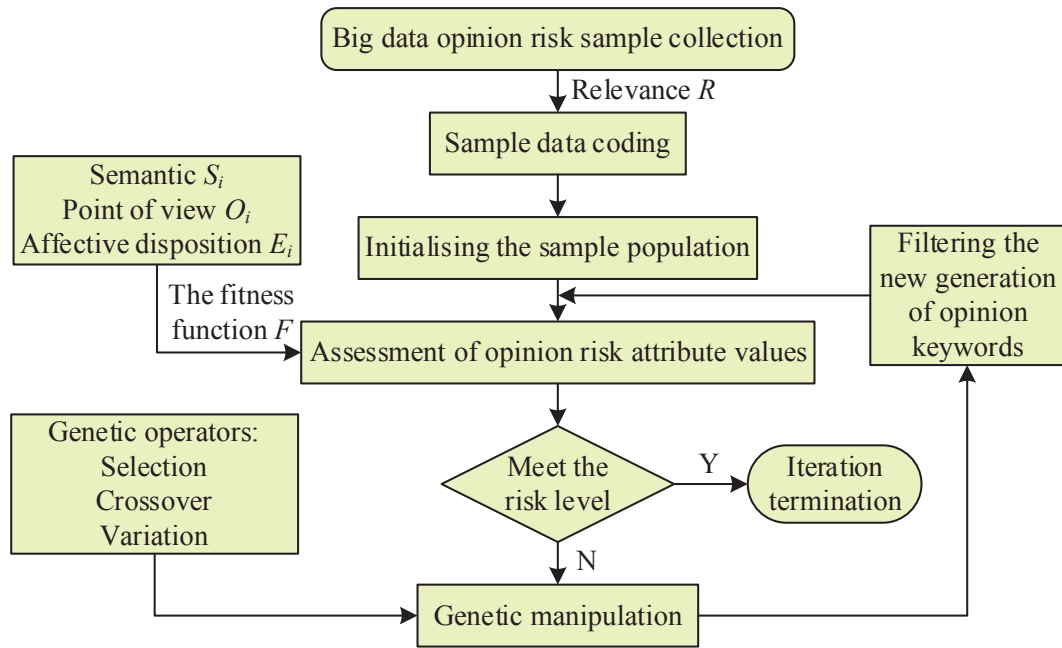
Unlike the traditional regular grid opinion model, the dynamic grid model based on genetic algorithm optimization established in this paper emphasizes that the connection relationship is probabilistic to a certain extent. Considering that the influence of various opinion factors is probabilistic, the edge connections of nodes in the opinion network should also be probabilistic to a certain extent. Complex dynamic grid models can effectively assess edge probabilities and changes over time in dynamic network analysis. The complex dynamic grid model analysis is built based on the relevant public opinion data collected by the public opinion monitoring platform. To build a risk evolution model for online public opinion, the primary task is to obtain information about online public opinion. As the information contains a large number of high-frequency keywords, it is necessary to integrate similar keywords and introduce probabilistic relationships.

#### **3.1 THE DRIVING RELATIONSHIP BETWEEN OPINION FACTORS**

As a complex social phenomenon, the formation and evolution of online public opinion risk also involves the interactions between the various drivers of online public opinion. The complex dynamic grid public opinion model can well describe the interrelationship between the elements in the development of a particular public opinion crisis, and to a certain extent reflect the mechanisms controlling the role of internal drivers of public opinion evolution.

#### **3.2 GENETIC ALGORITHM OPTIMIZATION**

In view of the parallel and non-linear requirements for mining and identifying massive public opinion information in the era of big data, this paper adopts a genetic algorithm with strong parallel search performance for risk model optimization. Genetic algorithm is a search and optimization mechanism based on the principle of natural evolution, which has good global search capability and can acquire and collect effective data in the search domain for optimal solution during the search process. The advantages of genetic algorithm can be fully utilized in the big data platform to better improve the grid model of online public opinion risk, improve the convergence effect of the model and better predict and identify public opinion risk. The flow of the genetic algorithm is shown in Figure 1.



**Figure 1** Genetic algorithm flow chart

### 3.3 GENETIC ALGORITHM-BASED PUBLIC OPINION RISK PREDICTION

In this paper, a genetic algorithm is used as the inference algorithm to obtain a conditional probability table. Due to space reasons, only some of the comparison data of the 6 validation results are listed as shown in Table 1. After 6 cross-validations, there are 2 events with inconsistent test results and actual results, such as event 1, where the probabilities of low, medium and high risk are all 35%, leading to incorrect results due to very close probabilities, and event 2 for the same reason. For such errors, the model accuracy can be optimised by further refining the risk classification levels. Overall, the prediction accuracy of the constructed risk prediction model was 94%.

**Table 1** Partial simulation cross-validation comparison data

Events	Event specific data	Test results	Actual results
Events 1	[p,c,2,3,1,u,1,1,2,1,s,1,s,1,n,1,1,2,1,2]	low ( 66%). medium(18%) , high( 18%)	Low Risk
Events 2	[t,s,3,3,2,u,3,3,1,3,s,3,sl,2,n,1,1,2 ,2 ,2]	low ( 35%),medium( 35%) , high ( 35%)	Low Risk
Events 3	[t,s,3,3 ,2,u,3,2,1,1,w,3 ,s,2 ,m,2,2,2,2,2]	low( 16%),medium(16%) , high( 68%)	High Risk

#### 4. CONCLUSION

From the perspective of the development and evolution of online public opinion, the research on dynamic grid public opinion modelling based on complex structures in the era of big data is reviewed. Considering the classification criteria of complex dynamic grid public opinion models and the ability to characterize the multidimensional structure of online public opinion risks in the era of big data, a particle interaction model on a regular grid is used to model online public opinion dynamically. Based on the attribute analysis of semantics, opinions and emotions of online keywords, an accelerated genetic optimization algorithm containing big data sample collection, opinion risk adaptation function, risk source identification selection and cross-variation is designed. At present, many scholars have conducted in-depth research on online public opinion from multiple perspectives. This paper proposes a dynamic grid public opinion modelling method based on genetic algorithm optimization, which can provide an important reference for coping with the risk of online public opinion of major public crisis events in the era of big data.

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# STUDY ON THE OPTIMIZATION OF THE PATH OF HIGH-QUALITY DEVELOPMENT OF RECREATION TOURISM INDUSTRY IN THE CONTEXT OF INFORMATIONIZATION

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## ABSTRACT

This paper studies the characteristic attributes covered by the competitiveness of the recreation tourism industry, constructs the competitiveness influence factor index system from three aspects: thrust factors, gravitational factors and supporting factors, and studies the interaction relationship of these factors. Taking the recreation and tourism industry in Hainan Province as an example, the grey correlation method is used to explore the correlation development between the recreation and tourism industry, so as to propose the optimization path for the high-quality development of the industry. The integration degree of recreation industry and tourism industry in Hainan is only 0.6295, which is a low level, and the interaction degree of resources between recreation industry and tourism industry is insufficient.

## KEYWORDS

Recreation tourism industry; Industrial competitiveness; Gray correlation method; Integration degree; Resource interaction

## 1. INTRODUCTION

As an emerging industry, the recreation and tourism industry is gaining more and more attention from the general public and government enterprises [1-2]. With the development of the economy, the tourism industry has also emerged more and more problems in this process. To give full play to the tourism industry's main role in market competition and improve its own market competitiveness, it is necessary to vigorously develop the natural resources of recreation tourism and improve the development level of recreation tourism [3-5]. With the update and progress of the times, the main purpose of people's tourism is no longer as simple as sightseeing and playing, but they pay more and more attention to their own health level [6-8]. Wellness tourism has an increasingly important role in people's lives, and it is also very important for China to strengthen cooperation with other countries through cross-border tourism, give full play to its own location advantages, and improve the level of opening up to the outside world [9-10]. Therefore, this paper measures the level of industrial development by constructing the indexes of influencing factors of the competitiveness of recreation tourism industry, and proposes countermeasures for the high-quality development of the industry based on the industrial integration analysis of gray correlation method.



## **2. ANALYSIS OF THE COMPETITIVENESS OF RECREATION TOURISM INDUSTRY IN THE CONTEXT OF INFORMATIONIZATION**

### **2.1. ANALYSIS OF FACTORS INFLUENCING THE COMPETITIVENESS OF RECREATION TOURISM INDUSTRY**

#### **2.1.1. COMPOSITION OF INFLUENCING FACTORS**

The competitiveness of the recreation tourism industry has the characteristic attributes of general tourism activities, but also covers many industry features such as economic, social, cultural, health and ecological, etc. It needs to follow scientific research methods and principles to analyze and study the influencing factors affecting its development.

The thrust factor of recreation tourism industry is composed of a series of factors that affect the demand of recreation tourism industry, including policy tendency, economic base, tourism development and so on. The government plays an important role in promoting and publicizing the development of recreation tourism, expanding the influence of recreation tourism through a series of activities planned and promoted by the government, while a series of relevant policies and regulations formulated by the government can regulate the development of recreation tourism and guide the construction and development of recreation tourism on a macro level. The gravitational factors of the recreation tourism industry are composed of various tourism attraction elements, and on the basis of the traditional tourism industry, a variety of new business models are integrated, so that tourism resources, cultural environment, ecological environment and other elements are included. Tourism resources are the important basis of tourism, and its attraction as a direct impact on the willingness of tourists to travel. The support factors of recreation tourism industry are the development conditions that support recreation tourism, which are divided into infrastructure and service facilities guarantee. Infrastructure is the hardware guarantee for the development of recreation tourism, mainly including road facilities, transportation, etc. Tourism service facilities are the important guarantee for the development of recreation tourism.

#### **2.1.2. CONSTRUCTION OF THE INDEX SYSTEM OF INFLUENCE FACTORS**

The development of recreation tourism industry is usually influenced by many factors. In this paper, on the basis of studying the research results, considering the influencing factors of recreation tourism industry in actual development, eight index element variables are selected, including recreation policy tendency, recreation social economy, recreation tourism economy, recreation tourism resources, recreation cultural environment, recreation ecological environment, recreation infrastructure and recreation service foundation. The index system of influencing factors of the competitiveness of recreation tourism industry is constructed, and its influential role on the development of recreation tourism industry is studied. The index system of influencing factors of competitiveness of recreation tourism industry is shown in Table 1.

**Table 1. Competitiveness Impact Factor Indicators**

Overall layer	Element Layer	Indicator layer
Thrust Factors	Construction of projects related to recreation and tourism	Policy Tendencies
	Per capita living consumption expenditure of residents	Social Economy
	Tourism income to GDP ratio	Tourism Economy
Gravitational Factors	Number of A-class scenic spots	Tourism Resources
	Number of Museums	Cultural Environment
	Comprehensive Air Quality Index	Ecological Environment
Supporting Factors	Road density	Infrastructure
	Number of health institutions	Health Service Foundation

## 2.2. INTERACTION OF INFLUENCING FACTORS

Recreation tourism resources, recreation cultural environment and recreation ecological environment as the gravitational factors of recreation tourism industry have significant influence on the competitiveness level of recreation tourism industry in Shandong Province, and all three can be used as attractors to promote the development of the competitiveness level of recreation tourism industry. Recreation policy tendency and recreation tourism economy as the thrust factor of recreation tourism industry also have more significant influence on the competitiveness level of recreation tourism industry, both of them can guide the consumption together with local social economy and stimulate the gravitational factor to make counter force to it, so as to promote the production of recreation tourism. Wellness service foundation as one of the supporting factors of the wellness tourism industry, the level of competitiveness of the wellness tourism industry also has a more significant impact, and its role as a basic condition to support the attraction, but also indirectly promote the development of the wellness tourism industry. In short, the three major factors interact and influence each other, and work together for the development of the competitiveness level of the recreation tourism industry.

## 3. EMPIRICAL ANALYSIS OF THE DEVELOPMENT OF RECREATION TOURISM INDUSTRY IN HAINAN PROVINCE

### 3.1. ANALYSIS METHOD AND SELECTION OF INDICATORS

Gray correlation analysis is a method used to analyze the interrelationships between factors within a sample and a system with insufficient information, and it calculates the correlation coefficient and the degree of correlation between factors. The change trend of factors and the data of correlation degree are proportional to each other, the higher the correlation degree, the higher the degree of synchronous change, and vice versa, the lower. In this paper, we believe that there are many complex factors affecting the degree of integration in the recreation tourism industry, so the method of gray correlation analysis is applicable.

After data collection, it was found that tourism, as the leading industry in Hainan Province, has been recorded at the provincial and municipal levels for tourism-related data over the years. Therefore, the added value of the sports industry in Hainan Province in the recent three years from 2018-2020 was selected as an indicator of the recreation and health industry in Hainan Province ( $Y$ ). In terms of health industry, the total investment in health and health in Hainan Province from 2018-2020 was selected as the indicator of health industry ( $X_1$ ). In terms of tourism industry, the total tourism revenue of Hainan Province in the last three years from 2017-2020 is selected as an indicator ( $X_2$ ), aiming to analyze the correlation between the total

revenue of tourism industry in Hainan Province and the added value of sports industry in Hainan Province in recent years. This paper develops gray correlation analysis by combining the above-mentioned influencing factors indicators of the competitiveness of recreation tourism industry in order to better propose a high-quality development path.

### 3.2. ANALYSIS OF GREY CORRELATION RESULTS

Firstly, this paper takes the added value of recreation industry as the reference series  $Y(t)$ , and the total expenditure of health and the total income of tourism industry in Hainan as the comparative series  $X_i(t)$ . Secondly, this paper adopts the initialization to dimensionless the data to improve comparability. The normalization formula is:

$$X'_i(t) = X_i(t) / \bar{X}, i = 1, 2, t = 1, 2, 3 \quad (1)$$

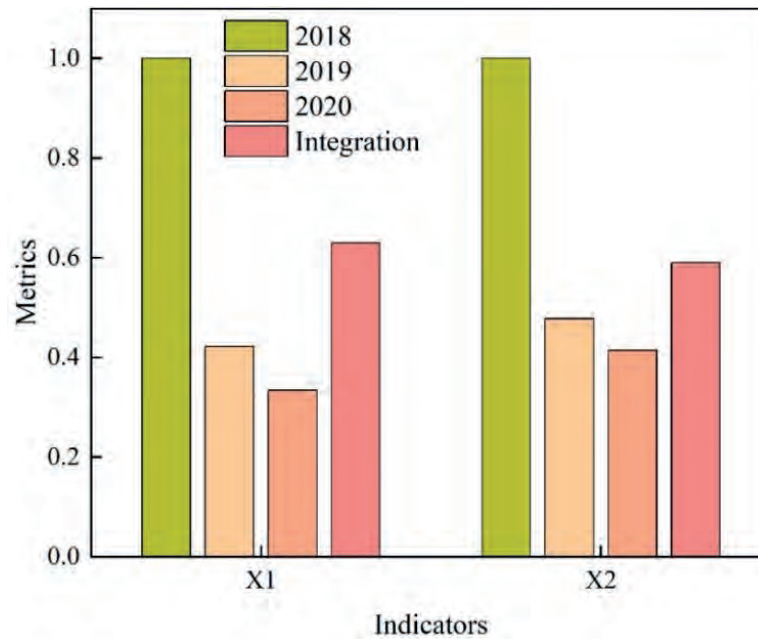
where  $X'_i(t)$  is the result of dimensionless processing.  $\bar{X}$  is the normalized initial value, which is taken as the corresponding value in 2018 in this paper.

Finally, the extreme difference absolute value calculation is performed to derive the maximum and minimum values of the comparison series and the reference series, and the correlation degree is derived by substituting into the gray correlation degree calculation formula. The gray correlation degree calculation formula is:

$$\zeta_i(t) = \frac{\min_i \min_t |\bar{X} - X'_i(t)| + \rho \cdot \max_i \max_t |\bar{X} - X'_i(t)|}{|\bar{X} - X'_i(t)| + \rho \cdot \max_i \max_t |\bar{X} - X'_i(t)|} \quad (2)$$

where  $\rho$  is an adjustable factor in the range of  $(0,1)$ , and in this paper it is  $\rho=0.5$ .

The results of data dimensionless processing and correlation degree analysis are shown in Figure 1. To a certain extent, the degree of integration between industries reflects the degree of interaction between industrial integration subjects, the degree of circulation between industrial resources and the degree of contribution of industrial integration value. When using gray correlation analysis, the correlation value is between 0 and 1, and the closer the value is to 1, the higher the degree of integration. The degree of integration between recreation industry and tourism industry in Hainan is only 0.6295, which is lower than the national average. This reflects the lack of interaction between resources, the lack of integration depth and the lack of comprehensive integration development between the recreation industry and tourism industry in Hainan. The integration degree of health industry and tourism industry in Hainan is 0.5902, which also indicates that the integration development of recreation industry and tourism industry in Hainan may have reached the bottleneck.



**Figure 1.** Data dimensionless processing and correlation analysis results

### 3.3. OPTIMIZATION PATH OF HIGH-QUALITY DEVELOPMENT OF RECREATION TOURISM INDUSTRY

The purpose of wellness tourism is to allow tourists to adjust their mood and release stress. Therefore, it is necessary to adhere to the perspective of tourists and understand the reasons why tourists choose recreation tourism destinations thus enhancing the tourism experience. Recreation tourism needs to invest a lot of money in the initial development, relying on the financial power of the government alone is far from enough, and the participation of social funds is not high due to the lag and uncertainty of the economic benefits of the tourism industry. Therefore, in the development of recreation tourism to accelerate the innovation of the project's investment mechanism, as far as possible to attract the participation of recreation tourism main body. The government can encourage the districts and counties to give full play to their green ecological advantages, increase the mutual cooperation between each district and county, and introduce a regional synergistic cooperation mechanism. Combining the characteristics of local resources and tourism market demand, based on the existing attractions, fully integrate regional resources to create a new model project of recreation tourism.

### 4. CONCLUSION

In this paper, through the industry analysis of recreation tourism industry, the influencing factors of the competitiveness of recreation tourism industry are studied, and the index system of influencing factors for the development of competitiveness is constructed. The gray correlation method is used to analyze the correlation degree between recreation industry and tourism industry in Hainan Province by combining the competitiveness indexes. Hainan Province is rich in recreation tourism resources, laying a solid foundation for the development of recreation tourism industry. Hainan Province promotes industrial integration through the development of big health industry, breaks the industry barrier and extends the tourism industry chain, but the development of its recreation tourism industry is still in the primary stage. The development path of recreation tourism industry in Hainan Province can be started from consolidating infrastructure, overall scientific planning, strengthening talent training, innovating recreation products and promoting industrial integration.

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# PRACTICAL EXPLORATION ON THE ENHANCEMENT OF CULTURAL CONSCIOUSNESS OF STUDENTS' CIVIC EDUCATION IN THE INFORMATION AGE

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## ABSTRACT

The purpose of the Civic Education in colleges and universities is to promote the cultivation of high-quality talents, and it is also necessary to enhance the cultural self-awareness and cultural self-confidence of talents in the cultivation process. This paper starts from analyzing the necessity of enhancing the cultural self-awareness of college students in Civic Education in the information era, and explains the main characteristics and importance of cultural self-awareness in Civic Education. By analyzing the data of cultural consciousness of college students based on cluster analysis, the problems faced in the cultivation of cultural consciousness in civic education are derived. The cultivation and development of cultural consciousness of college students can be realized by enhancing the cultural consciousness ability of educators, expanding cultural consciousness channels, enriching educational and cultural resources, and promoting cultural innovation of college students.

## KEYWORDS

Information era; Civic education; Cultural consciousness; Cultural resources; Cluster analysis; Cultural innovation

## 1. INTRODUCTION

Civic education has both cultural and political overtones, and schools must build a high-quality education system with a firm and correct political orientation and draw on cultural resources that meet the needs of students' growth. With the power of leading and inspiration of excellent culture to implement the fundamental task of establishing moral education and spreading mainstream values, the profound meaning of excellent culture and the contemporary connotation of thinking education together constitute the foundation of moral education in schools [1-2]. Civic education in the new era assumes the responsibility of inheriting and spreading excellent culture, and culture is not only an important component of the content system of school civic education, but also an important carrier of spreading mainstream ideology, which influences the direction of civic education work [3-4]. If we want to effectively enhance the effectiveness of the cultural consciousness of Civic Education, schools need to accelerate the construction of culture and deeply plant the spiritual connotation of excellent national culture in students' blood. To enhance young students' identification with excellent national culture and cultivate their national cultural self-awareness, so that they can grow up to be well-rounded talents with both virtues and talents [5-6].

Educating people with culture is a fine tradition of Civic Education and an important way to cultivate students' cultural self-awareness. At present, the wave of cultural globalization is

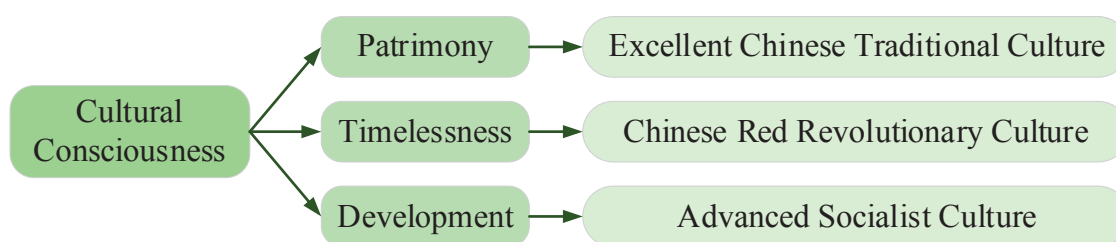
becoming increasingly severe, and the cultural value concepts, traditional customs and behavioral habits of different ideologies are intertwined, forming a greater impact on the mainstream Chinese values and easily misleading people's value choices [7-8]. In the information era, as the main path of ideological communication, the ideological education should take the initiative to play the cultural function, strengthen the dominant role of cultural values, cultivate the cultural consciousness of young students with the help of the effectiveness of educating people, and strengthen the educational infectivity and penetration in order to effectively enhance the effectiveness of educating people.

In the new era of informationization, it is the urgent need to adapt to the new era, the objective need for the cultivation of talents in colleges and universities, and the practical need for the overall improvement of the literacy of contemporary college students to give full play to the advantages of the university's civic education and focus on cultivating the cultural self-awareness of college students. This paper analyzes the necessity of enhancing the cultural self-awareness of college students in the era of information technology, so as to give the role of thinking education in enhancing the cultural self-awareness of college students and the problems faced by it. In response to the problems, the path of enhancing cultural self-awareness in Civic Education is given, which can promote the enhancement of cultural self-awareness in Civic Education through various aspects such as teachers' self-awareness ability, enriching educational and cultural resources, strengthening college students' self-reflection and broadening educational channels.

## 2. THE NECESSITY OF ENHANCING THE CULTURAL CONSCIOUSNESS OF COLLEGE STUDENTS' CIVIC EDUCATION IN THE INFORMATION ERA

### 2.1. MAIN FEATURES OF COLLEGE STUDENTS' CIVIC EDUCATION IN CULTIVATING CULTURAL CONSCIOUSNESS

Under the strong impact and erosion of Western culture, the development of socialist culture with Chinese characteristics has been affected to a certain extent, and the wrong cultural view of self-centeredness and total westernization has spread. General Secretary Xi Jinping pointed out that "China has firm road, theoretical and institutional self-confidence, the essence of which is cultural self-confidence based on the inheritance of a civilization of more than 5,000 years." Remembering history is the foundation of cultural confidence, and the excellent Chinese traditional culture is the historical source of the four self-confidences. Cultural confidence is the affirmation, recognition and pride in the value of socialist culture with Chinese characteristics. Only by affirming the reasonable value and scientific spirit of socialist culture with Chinese characteristics can we have confidence in socialist culture with Chinese characteristics, and then we can sincerely feel proud and confident in the comparison of the value of various different cultures at home and abroad, so as to realize the inheritance, innovation and promotion of socialist culture with Chinese characteristics. Combining the existing researches, the main characteristics of the ideological and political education of college students to cultivate cultural self-awareness are summarized as shown in Figure 1.



**Figure 1.** Key features of cultivating cultural self-awareness

## 2.2. THE IMPORTANCE OF CULTIVATING CULTURAL CONSCIOUSNESS IN COLLEGE STUDENTS' CIVIC EDUCATION

Cultural self-confidence is the people's ability to grasp the reality of China and the needs of the times, and to scientifically identify and grasp the characteristics and essence of various different cultures even in the face of the complex and diversified cultural trends in the world today. Scientifically screening and rationally discarding socialist culture with Chinese characteristics and foreign cultures is the core force to realize the rational choice of culture by college students. Therefore, teachers should make good use of the platform of ideological and political education to cultivate college students' self-confidence in socialist culture with Chinese characteristics and promote the formation of college students' cultural self-awareness, so as to help them establish correct cultural views and values. The main contents of the importance of cultivating college students' cultural self-awareness are shown in Figure 2.

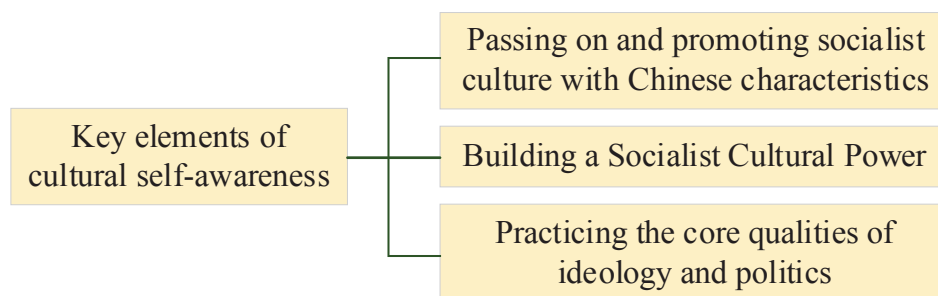


Figure 2. Key elements of cultural self-awareness

## 3. ANALYSIS OF THE PROBLEMS OF CIVIC EDUCATION ON ENHANCING THE CULTURAL CONSCIOUSNESS OF COLLEGE STUDENTS

### 3.1. DATA MODELING OF COLLEGE STUDENTS' CULTURAL SELF-AWARENESS BASED ON CLUSTER ANALYSIS

Assume that there is  $n$  sample data  $D = \{x_1, x_2, \dots, x_n\}$ , where  $x_i$  represents the  $i$ th sample. Sample  $x_i$  can be carved by  $m$  attribute indicators, i.e.  $y = \{y_1, y_2, \dots, y_n\}$ . Then the sample values under the attribute set are noted as  $x_i = \{x_{i1}, x_{i2}, \dots, x_{im}\}$ , where  $x_{ij}$  is the value of the  $i$ th sample under the  $j$ th attribute indicator, and the data matrix can be obtained as

$$D = (x_{ij})_{n \times m} \quad (1)$$

The dataset  $D$  is represented as  $n$  sample row vectors  $x_1, x_2, \dots, x_n$  or as  $m$  attribute column vectors. The mean of the sample vector  $X_i = \{x_{i1}, x_{i2}, \dots, x_{im}\}$  and the attribute vector  $Y_j = \{y_{1j}, y_{2j}, \dots, y_{mj}\}$  in this dataset can be calculated. To measure the deviation of a random variable from its mathematical expectation, then the variance of the sample vectors  $X_i$  and  $Y_j$  can be calculated. Also, the data can be normalized using equation (2). That is:

$$x_{ij}^* = \frac{x_{ij} - \bar{x}_i}{S_1}, y_{ij}^* = \frac{y_{ij} - \bar{y}_j}{S_2} \quad (2)$$

where  $S_1, S_2$  is the standard deviation of sample vectors  $X_i$  and  $Y_j$ .

To determine whether the trend between two variables is consistent, the covariance



$cov(u, v)$  of two variables  $u, v$  can be calculated and the covariance of different variables can be filled into a matrix to form a covariance matrix, i.e:

$$C = (C_{ij})_{n \times m} \quad (3)$$

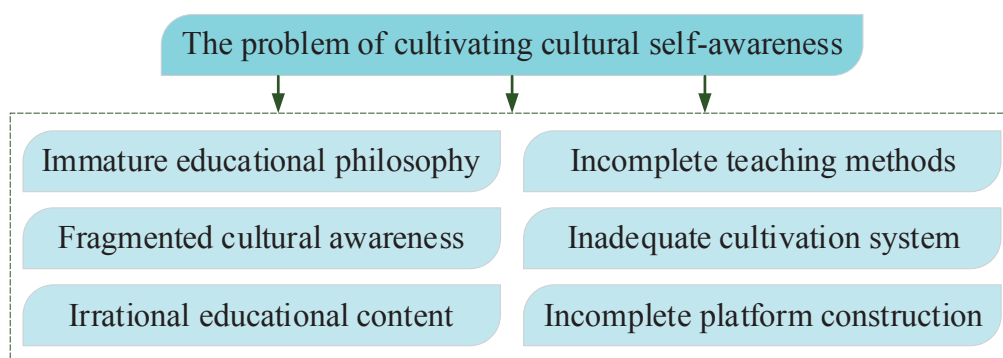
Among them,

$$C_{ij} = \frac{1}{n-1} \sum_{k=1}^n (u_{ki} - u_i)(u_{kj} - u_j) \quad (4)$$

In the age of information technology, the problems faced by college students in the process of cultivating cultural consciousness in civic education are clustered through the method of cluster analysis to find out similar categories and compare them. In this way, it can better help universities to implement the reform of Civic Education and further clarify the problems that may exist in the process of cultural consciousness cultivation of college students, so as to improve the effectiveness of cultural consciousness cultivation.

### 3.2. PROBLEMS FACED IN THE CULTIVATION OF CULTURAL SELF-AWARENESS IN CIVIC EDUCATION

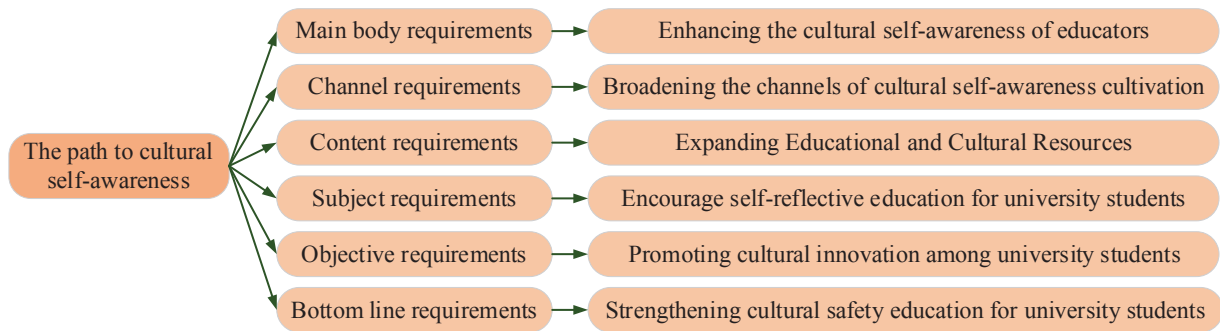
Based on the previous modeling of the data of cultural consciousness of college students and the clustering analysis of the data of cultural consciousness of college students in Civic Education, the current problems faced by the cultivation of cultural consciousness are derived. The specific classification is shown in Figure 3.



**Figure 3.** Problems faced in the cultivation of cultural self-awareness

## 4. EXPLORING THE PATH TO ENHANCE THE CULTURAL CONSCIOUSNESS OF COLLEGE STUDENTS IN THE ERA OF INFORMATION TECHNOLOGY EDUCATION

As a product of spiritual civilization, cultural self-awareness cannot be produced without social progress and development of the times. With the in-depth development of the information era, contemporary college students must have cultural self-awareness, so that they can draw nutrients from the rich soil of Chinese traditional culture and realize cultural innovation based on the improvement of their own ideological understanding. The main construction of the path of cultural self-awareness enhancement of the thinking and political education of college students in the information era is shown in Figure 4.



**Figure 4.** The path to cultural self-awareness

(1) Enhance the cultural self-awareness ability of educators. The first and foremost thing to cultivate cultural self-awareness in universities is the cultural self-awareness of educators, and the teachers of college Civics courses, as the main body to cultivate the cultural self-awareness of college students, should take the initiative to assume the historical mission of cultural inheritance and innovation and strengthen the sense of mission in the cultivation of cultural self-awareness.

(2) Broaden the channels of cultivating cultural self-consciousness, to give full play to the explicit education of the main positions of Civics and other classroom teaching, to strengthen the construction of curriculum Civics, and to need the invisible education of campus culture and family education.

(3) Expand the educational and cultural resources, and guide the college students to establish “theoretical confidence, road confidence, system confidence and cultural confidence” by teaching them the relevant theories of the Party and the country.

(4) Encourage self-reflection education of college students, encourage college students to improve their self-reflection ability through reading and self-study is a necessary requirement, cultural self-awareness and self-confidence is a process of ideological identity, which must be internalized in the heart and externalized in action.

(5) To promote cultural innovation among college students, cultural self-awareness is necessary for cultural self-improvement, and cultural self-improvement requires cultural innovation. Cultural innovation is the practice of cultural self-awareness cultivation, and promoting cultural innovation of college students is an inevitable requirement to lead the new development concept in the new era.

(6) Strengthening the cultural safety education of college students is a necessary process of cultivating cultural self-awareness among college students.

## 5. CONCLUSION

Cultivating cultural self-awareness among college students in the information age is the right thing to do to realize a strong cultural nation and the Chinese dream. This paper takes the analysis of the necessity of enhancing the cultural self-awareness of college students’ civic education as the starting point, uses the cluster analysis in the information era to model the data on the cultivation of college students’ cultural self-awareness, and analyzes the current problems faced in the cultivation of cultural self-awareness. It also gives the path to enhance the cultural self-awareness of college students in the era of information technology, but the cultivation of cultural self-awareness is a complex and long process, which requires the college and university civic education workers to actively promote the cultivation and practice of the cultural self-awareness of college students by combining the channels of curriculum, campus, family and society.

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# RESEARCH ON THE DEVELOPMENT MODE OF UNIVERSITY ENGLISH INFORMATIZATION TEACHING IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE

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## ABSTRACT

This paper discusses the framework of the development model of educational informatization and the development history of informatization teaching of college English. On the basis of theories based on informatization teaching, the three stages of the development of informatization teaching of college English are further detailed. Next, the development of English education informatization policy is described, including specific content system analysis and value system analysis. The study shows that artificial intelligence technology should be used in current university English informatization education to develop technologies such as adaptive learning, personalized teaching, natural language processing, and speech recognition. It also strengthens the development and management of education informatization policies in order to achieve sustainable development and innovation of university English informatization education.

## KEYWORDS

Information-based teaching; University English; Policy development; Content system; Value system; Artificial intelligence

## 1. INTRODUCTION

With the rapid development of artificial intelligence technology, various industries are also actively exploring and applying artificial intelligence technology, including the field of education [1-2]. Nowadays, information-based teaching has become one of the main means of university English teaching, because it can break the time and space constraints, improve teaching effectiveness, and personalize and differentiate courses [3]. However, traditional information-based teaching still has limitations that make it difficult to meet the diverse learning needs of contemporary students and the changes in teaching mode [3-4]. In fact, many scholars and researchers have carried out research on informational teaching of college English based on artificial intelligence technology [5]. The literature [6] proposed a model of English listening teaching system based on machine learning technology, and achieved good teaching results. In addition, the literature [7] studied the teaching model of English writing based on artificial intelligence technology in MOOC environment and achieved higher learning effectiveness than traditional teaching. In this paper, we discuss the development mode of informative teaching of college English in the context of artificial intelligence, and analyze and discuss it systematically. The theoretical basis of informatization teaching is introduced to lay the foundation for the subsequent contents. The content and value system of English education informatization policy development are also explored, demonstrating the importance and impact of the policy.

## 2. FRAMEWORK OF EDUCATION INFORMATIZATION DEVELOPMENT MODEL

### 2.1. INFORMATIONAL TEACHING THEORY

Information-based teaching theory refers to the theory of combining information technology with teaching and learning and exploring how to better use information technology to promote teaching reform and teaching quality improvement. Its core idea is to realize the organic combination of education modernization and informatization by taking students as the center, teachers as the leading, information technology as the support, and improving teaching effect as the goal. The theory of informatization teaching mainly includes the following aspects:

(1) Educational technology theory mainly studies how to use various educational technology tools, such as multimedia and network, to promote teaching reform and teaching quality improvement.

(2) Cognitive psychology theory mainly studies the cognitive process and psychological mechanism of learners, and how to use information technology to promote students' learning and cognitive ability.

(3) Educational evaluation theory should study how to use information technology to realize the scientific and personalized educational evaluation, and improve the accuracy and effectiveness of evaluation.

(4) Educational management theory is to study how to use information technology to modernize and scientify educational management and improve the efficiency and effectiveness of management.

### 2.2. THE DEVELOPMENT HISTORY OF UNIVERSITY ENGLISH INFORMATIZATION TEACHING

#### 2.2.1. THE INITIAL STAGE OF UNIVERSITY ENGLISH INFORMATIZATION TEACHING

In the 1990s, information-based teaching of English in college began to take off. Teachers began to use e-mail, multimedia courseware and other technical means to improve teaching effectiveness. During this period, information-based teaching was mainly applied to the management of teaching resources and courseware production, and teachers' knowledge and application of information-based teaching were still relatively low.

Let the size of the local range of time from the beginning of the evolution of the start-up phase of university English informatics teaching to the moment  $T$  be  $2\Delta t$ , and the proportion of node  $i$  in each  $2\Delta t$  time, be  $m_{T-\Delta t}, m_{T-\Delta t+1}, m_{T+\Delta t}$ . Then the average value  $\bar{m}$  of the proportion of its messages in the moment  $T$ , is

$$\bar{m} = \frac{\sum_{t=T-\Delta t}^{T+\Delta t} m_t}{2\Delta T} \quad (1)$$

Then, at moment  $T$ , the fluctuation coefficient  $\kappa_i$  of node  $i$ , is

$$\kappa_i(T) = \frac{\sum_{t=T-\Delta t}^{T+\Delta t} (m_i(t) - \bar{m})^2}{2\Delta T} \quad (2)$$

According to the temporal evolution of  $\kappa_i(T)$ , the temporal fluctuation characteristics of various English informatics developments can be derived, and the health of the English

informatics teaching development model can be analyzed based on this characteristic.

### **2.2.2. THE DEVELOPMENT STAGE OF UNIVERSITY ENGLISH INFORMATIZATION TEACHING**

At the beginning of the 21st century, with the rapid development of computer technology and network technology, university English informatization teaching has entered a stage of one-by-one development. Teachers began to use online teaching platform, electronic whiteboard, online interaction and other technical means in order to achieve teaching goals well. The information-based teaching in this period was mainly applied to the sharing of teaching resources and online learning, and teachers' awareness and application of information-based teaching gradually improved.

### **2.2.3. THE INNOVATION STAGE OF UNIVERSITY ENGLISH INFORMATIZATION TEACHING**

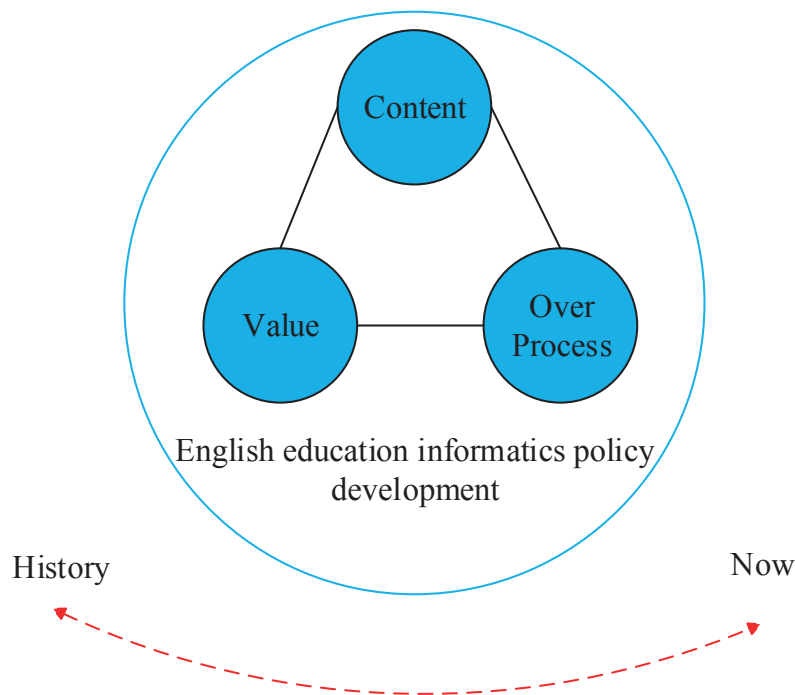
Currently, university English informatics teaching has entered an innovative phase. Teachers have begun to use cutting-edge technological tools such as artificial intelligence and virtual reality to better meet the learning needs of students. The information-based teaching in this period is mainly applied to personalized learning and intelligent assessment, and teachers have reached a high level of awareness and application of information-based teaching.

## **3. ENGLISH EDUCATION INFORMATIZATION POLICY DEVELOPMENT**

### **3.1. CONTENT SYSTEM ANALYSIS OF ENGLISH EDUCATION INFORMATIZATION POLICY DEVELOPMENT**

The content system of foreign language education informatization policy development is a specific factor of foreign language education informatization policy, which is an important link between policy theory and practice, and it includes both vertical and horizontal aspects. Vertically, the content analysis of foreign language education informatization policy refers to various ecological factors within the foreign language education informatization policy ecosystem, such as: hardware of foreign language education informatization such as infrastructure construction, software such as resource construction and application of foreign language education department informatization, teachers in the context of informatization, foreign language pedagogy, foreign language teaching materials, testing and evaluation, curriculum standards, etc. Horizontally, the policy ecosystem of foreign language education informatization interacts with and constrains other ecosystems in society, such as economic system and political system. Figure 1 shows the theoretical analysis framework of foreign language education informatization policy development in colleges and universities, and it can be seen that the issue of value orientation of foreign language education informatization policy plays an extremely important role in the planning activities of foreign language education informatization.

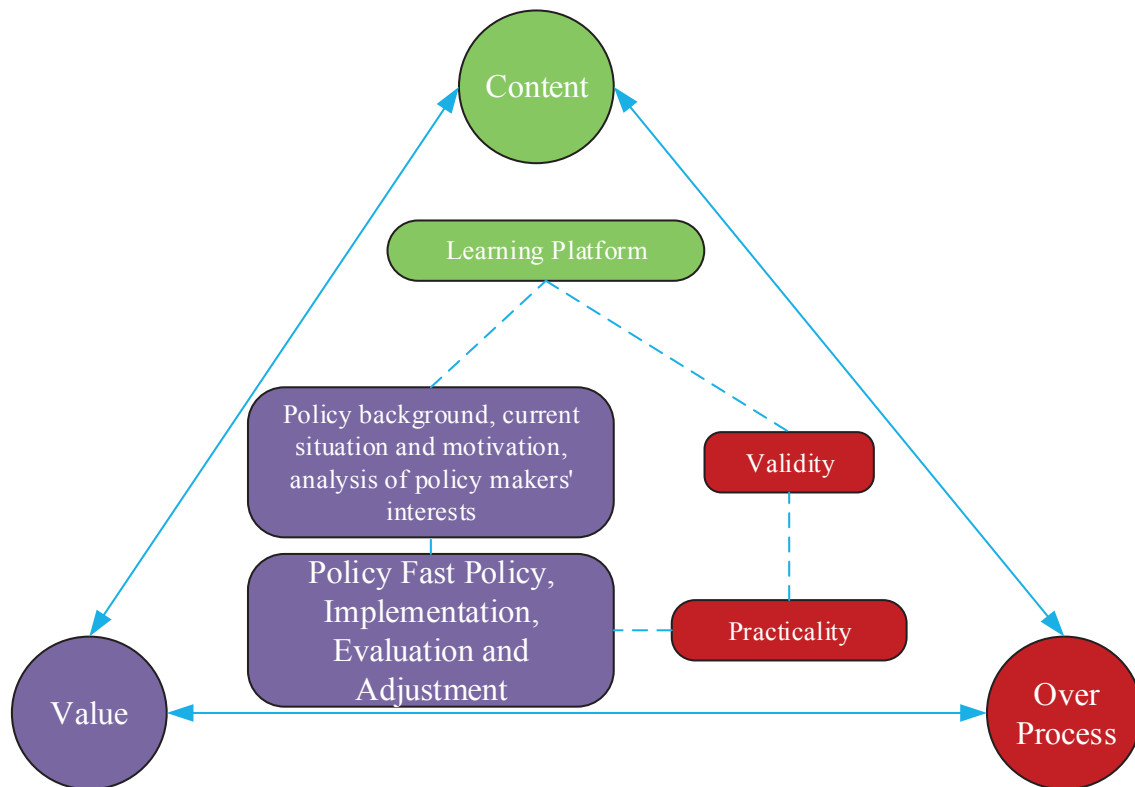
It is closely related to the motives and goals of language policy and education informatics policy planning, and governs the entire planning process of foreign language education informatics.



**Figure 1.** Policy development framework of English education informatization in higher education

### **3.2. VALUE SYSTEM ANALYSIS OF FOREIGN LANGUAGE EDUCATION INFORMATIZATION POLICY DEVELOPMENT**

Among the three factors of foreign language education informatization policy analysis, the process factor and the content factor of foreign language education informatization policy are governed by the value factor. The development of foreign language education informatization is a process of using modern information technologies in all areas of the foreign language education system in a comprehensive and in-depth way, accelerating the modernization of foreign language education and developing the full potential of foreign language learners using information technologies. Figure 2 shows the framework of the policy development model of foreign language education informatization in colleges and universities proposed in this paper.



**Figure 2.** Framework of English education informatization policy development model

With the continuous development and application of artificial intelligence technology, the development of university English informatization teaching will also develop in the direction of more intelligence, personalization and efficiency. Artificial intelligence technology will be widely used in the teaching process, such as intelligent voice recognition and intelligent assisted question answering, which will greatly improve the teaching effect and learning efficiency. The teaching content will be more personalized and diversified, and teachers can tailor the teaching content and teaching methods for students according to their learning situations and needs. The teaching platform will be more intelligent and efficient, and teachers and students can communicate and interact more conveniently and efficiently through the platform.

#### 4. CONCLUSION

This paper examines the development model of informatization teaching of college English in the context of artificial intelligence technology. By analyzing the framework of education informatization development model and the history of university English informatization teaching. This study concludes that university English informatization education has gone through three stages: start-up, development and innovation, in which artificial intelligence technology has been gradually incorporated. On this basis, this paper further analyzes the development content and value system of English education informatization policy, and puts forward suggestions for the current development of university English informatization education that requires the use of artificial intelligence technology and the strengthening of education informatization policy formulation and management.

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# RESEARCH ON RELIABILITY AND CONTINUITY OF POWER SUPPLY AND DISTRIBUTION SYSTEM BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

In this article, we investigate the distribution system's reliability and continuity predictions using the correlation of large-scale power supply and distribution data. According to the research, the factors with average variation above 0.0025 are the cableization rate of the 110kV power grid, the average maximum load rate of the 110kV power grid lines, the average maximum load rate of the 35kV power grid lines, the average power supply radius of the 10kV power grid, the number of high loss distribution substations of the 10kV power grid, and the average percentage of line strip that is satisfied by the 10kV power grid. Big data-based supply and distribution systems have a certain level of dependability and continuity, which can satisfy customers' needs for a dependable power supply and high-quality electricity.

## KEYWORDS

Power supply and distribution system; Power supply reliability; Management system analysis; Component reliability; Index analysis

## 1. INTRODUCTION

China's electricity system has grown bigger and more complex with the growth of the country's economy thanks to ongoing expansion and grid integration [1]. Although large systems are beneficial to the economic operation of the entire power grid, they make the possibility and hazards of major disasters and accidents greatly increased [2-3]. The power system is made up of three components: the power generation system, the transmission system, and the distribution system. Its primary function is to transmit qualified electrical energy to power users in a safe, cost-effective, and dependable manner [4-5]. The distribution system, which is the last component of the power system, is made up of substations that distribute power at various voltage levels, distribution lines and distribution feeders that constitute the distribution network and its equipment, whose role is to connect the power source or transmission and substation system to the users and to distribute and supply electrical energy to the users [6]. It is clear that the distribution system is the component of the power system that is most directly related to consumers and has a direct impact on the amount of power supplied to and used by end users [7-8]. The capacity of the power system to provide electricity and power to customers continuously in accordance with acceptable quality standards and necessary quantities is measured by the reliability and continuity of the power supply and distribution system. The reliability assessment of the power system is typically a measurement of the system's suitability. [9]. In this study, the power supply and distribution system's reliability and continuity evaluation analysis is built using big data technology, and the power supply and distribution system's reliability indices are examined. As compared to the component's stable

operation phase, system failures occur more frequently and last longer on average during the first fault phase and depletion fault phase. This has an impact on the power supply and distribution system's dependability and continuity.

## 2. RELIABILITY STUDY OF POWER SUPPLY AND DISTRIBUTION SYSTEM

### 2.1. BASIS OF RELIABILITY INDEX ANALYSIS OF SUPPLY AND DISTRIBUTION SYSTEM

The foundation for evaluating dependability is reliability indices. Different reliability indices are often directly generated in the reliability evaluation of the power supply and distribution system to quantitatively respond to the dependability level of the distribution network from many aspects. The distribution system reliability evaluation indexes are mainly divided into three kinds of indicators, such as outage time type index, outage frequency type index and power supply quantity, covering load point index and system index, average load point failure rate, average load point outage duration per failure, average load point annual outage time, average system outage frequency, average system outage duration, average power supply availability, average power supply shortage, average power supply quantity index, etc.

#### 2.1.1. COMPONENT RELIABILITY PARAMETERS

Component reliability parameters are the basic index data for reliability assessment, and the component reliability parameters involved in reliability assessment are failure rate and failure repair time.

Components in the unit of statistical time due to failure and can not continue to perform the specified function of the number of times called the failure rate, the statistical time is generally one year, its calculation formula is:

$$\mu = \frac{s}{h} \quad (1)$$

where  $y$  is the number of failures during the statistical time and  $t$  is the statistical time.

Component failure resulting in power failure to the faulty components through the repair or replacement of new equipment and the restoration of power supply experienced time is called fault repair time, generally reflected by the derivative of the repair time, its calculation formula is:

$$U = \lambda\mu \quad (2)$$

where  $s$  is the number of component repairs during the statistical period and  $h$  is the total time that the component was repaired.

#### 2.1.2. LOAD POINT RELIABILITY INDEX

The load point reliability index, which is a probability index that represents the predicted value under a certain probability distribution, measures the degree of dependability of continuous power delivery at each load point.

##### (1) Average Failure Rate

The total number of outages brought on by component failures over the course of a year is the average failure rate of a load point. The amount of the failure rate is a good indicator of how dependable the power supply is at the load point.

##### (2) Average Restoration Time

The ratio of the outage time to the total number of outages at a load point per year is known

as the average restoration time. The average restoration time, in a sense, reflects how soon the load point receives power following an outage; the higher the value, the slower the load point receives power.

### (3) Average Outage Duration

The total number of outages at a load point over the course of a year is the average annual outage length for that load point, and this indication directly represents the dependability of the power supply at each load point. The distribution network frequently uses each load point's outage time to determine how reliable the overall power supply is. The definition states that the calculating formula is:

$$U = \lambda\mu \quad (3)$$

where  $\lambda$  is the mean time to failure and  $\mu$  is the mean time to repair.

## 2.2. SYSTEM CONTINUITY ANALYSIS

### 2.2.1. SYSTEM STATIC STABILITY AND RESERVE FACTOR

The stability reserve factor of power system is not only used to indicate whether the given power system is stable under normal operation mode, but also can be used to understand the size of the stability limit of this normal operation mode and indicate the ability of power system to withstand the deterioration of operation mode or parameters. The reasonable stability reserve factor should be based on the summary analysis of power system design and operation experience and technical and economic arguments, and at the same time should use statistical methods to estimate the possibility of stability damage in individual parts of the power system and its consequences. If the reserve factor is too large, the equipment in the power system will not be used very effectively. On the contrary, if the reserve factor is too small, it will not ensure the safe operation of the system when certain changes in system parameters or operation methods occur.

### 2.2.2. TRANSIENT CONTINUITY ANALYSIS

The question of whether the generators can retain synchronous operation after the power system has been subject to significant disruptions is referred to as the transient stability of the power system problem. The following are the primary reasons for significant power system disruptions:

- (1) An abrupt shift in load, such as the addition or removal of heavy users, etc.
- (2) The removal or addition of significant system components, such as generators, transformers, and lines, etc.
- (3) Short-circuit problems happening.

The most severe disruption is a short-circuit fault, which is frequently used to determine if a system meets the requirement for transient stability. Various electromagnetic characteristics that describe the operational status of the system are vulnerable to fast changes when the power system is subject to a significant disruption. But before the power of the prime mover can be modified, a certain period of time must pass due to the governor's high degree of inertia. As a result, the generator's electromagnetic power and the prime mover's mechanical power are no longer in balance, and an imbalanced torque is produced. Under the action of the unbalance torque, the generator starts to change its speed, so that the relative position between each generator rotor changes (mechanical movement). The change in the relative position of the generator rotors, i.e. the relative angle, in turn affects the change in current, voltage and generator electromagnetic power in the power system. Because of this, the

complicated process of the power system transient produced by huge disturbances, when there is a tangle of mechanical motion between the generator rotors and electromagnetic transient processes.

### 3. RELIABILITY ANALYSIS OF POWER SUPPLY AND DISTRIBUTION SYSTEM BASED ON BIG DATA TECHNOLOGY

#### 3.1. RELIABILITY ANALYSIS

The model trained using big data technology is able to be used to conduct sensitivity analysis of pertinent influencing factors and examine the level of influence of each pertinent factor on the predicted value of supply and delivery reliability. The prediction results are then displayed in Figure 1. The cableization rate for 110kV grid, the average maximum load rate for 110kV grid lines, the ratio of main substations satisfied by 35kV grid, the average maximum load rate for 35kV grid lines, the average supply radius for 10kV grid, the number of high loss distribution substations for 10kV grid, and the ratio of lines satisfied by 10kV grid are the factors with an average variation above 0.0025.

According to the prediction results, the aforementioned seven factors have a disproportionately large impact on the reliability of the power supply and distribution system, and this information has a specific reference value for the measures to increase the system's level of dependability, i.e., improvements can be made in these seven areas to increase the system's level of dependability.

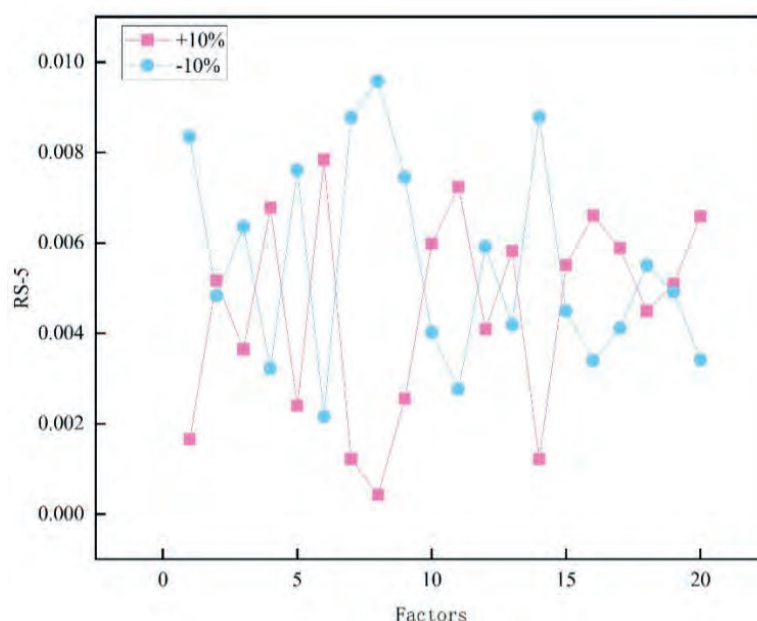


Figure 1. Comparison of the magnitude of change in each factor

#### 3.2. ANALYSIS OF BUILDING A BIG DATA FUSION MANAGEMENT SYSTEM

A large data analysis experiment based on the fusion management system is constructed in order to examine the reliability and continuity research of the power supply and distribution system, the computation is completed in the following four schemes after the addition of the time-varying failure rate model and time-varying load., and the system reliability indexes calculated under different schemes are shown in Table 1:

Scheme 1: The load model employs the average load, and the component failure rate is constant.

Scenario 2: The load model employs time-varying load, and the component failure rate is

constant.

Option 3: The component failure rate is modeled as a time-varying failure rate that considers the impact of equipment life cycle, and the load is modeled as variable in time load.

Option 4: The load is a variable in time load model, and the component failure rate is a variable in time failure rate model that considers both equipment life cycle and environmental conditions.

According to the experimental results, the average frequency and duration of system outages are higher during the initial fault stage and wear-out fault stage than during the stable operation stage, and the corresponding system power shortage EENS increases and the system power availability ASAI decreases.

**Table 1.** Calculation results of system reliability indicators under different scenarios

Different programme indicators	SAIFI	SAIDI	CAIDI	EENS	ASAI
Option 1	1.7804	7.1103	5.2573	53.8306	98.4595
Option 2	1.6734	7.8034	6.0451	57.3075	96.5791
Option 3	2.2008	8.9551	6.3208	59.3922	99.4910
Option 4	2.1067	9.4538	6.3361	61.5270	98.1287

#### 4. CONCLUSION

People's expectations for a dependable power supply and high-quality power are increasing as China's economy and society expand. Meanwhile, the distribution system, which has a direct impact on the consistency and dependability of the power supply, is getting larger and larger in scale, and the grid structure is becoming more and more complex, so it is more difficult to analyze its reliability by traditional methods.

The advent of the information age has brought about a massive amount of data from multiple heterogeneous sources, innovations in related technical means, and changes in people's way of thinking. This paper intends to give voice to the data and conduct research on the reliability and continuity prediction assessment method of distribution system from the relevance of big data of electricity distribution. For an open and complex distribution system, there are intertwined correlations among its components, and the correlations among various types of data generated by the system are the concretization of such correlations. Based on the relationship between big data and the dependability and continuity of the power supply and distribution system, the elements pertaining to the reliability of the distribution network are mined from the vast amounts of data in this study. By employing big data analytic technology to train and learn from past data on distribution system continuity and reliability, the prediction model is created to forecast and evaluate the degree of distribution system dependability throughout the course of the future. The distribution system's system dependability may be predicted and calculated using big data analytic technology.

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# A STUDY OF PSYCHOLOGICAL STRESS ASSESSMENT ALGORITHMS FOR SECURITY PERSONNEL IN HIGHER EDUCATION INSTITUTIONS IN DIFFERENT PERIODS

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## ABSTRACT

This paper analyzes the causes and physiological mechanisms of psychological stress changes in university security personnel. The accuracy of the psychological stress assessment method with multimodal physiological signals is explored. The characteristics of three physiological parameters, EEG, ECG and EMG, which contain rich information of psychological changes were fully utilized. The average correct classification rate of EEG signal was 84.7%, that of ECG signal was 83.16%, and that of EMG signal was 81.12%. Therefore, the psychological stress assessment method based on the fusion of multiple physiological parameters can more objectively determine the psychological stress state of the test subjects.

## KEYWORDS

Security personnel in higher education institutions; Psychological stress assessment; Integration of multiple physiological parameters; Information on psychological changes; Physiological mechanisms

## 1. INTRODUCTION

Appropriate psychological stress can improve people's work efficiency, but excessive or long-term psychological stress will have adverse effects on people's lives and even affect their physical health [1]. How to accurately assess the state of psychological stress has become a key direction of modern psychological research [2-3]. In the field of psychology, psychological stress is assessed mainly by means of questionnaires, which only subjectively assesses the test taker's psychological state and thus lacks accuracy and objectivity [4-5]. In contrast, the method of psychological stress assessment based on physiological parameters can more objectively determine the state of psychological stress of the tester [6]. Security guards, in the new era, play an irreplaceable role in maintaining social security and stability [7]. Security work, due to the nature of its work, is bound to face more dangers, which puts it in a bad psychological condition for a long time. When people are under psychological stress, the human physiological system will produce corresponding stress changes and maintain a balanced state within its tolerance range. However, if people are subjected to a greater degree of psychological stress for a long time, the physiological equilibrium state of the human body will be broken, and then, a series of adverse effects on the human body, such as depression and cardiovascular diseases [8]. In order to ensure the psychological health of security personnel in higher education institutions, it is very urgent to quickly and accurately assess the psychological state and help regulate the psychological stress in a reasonable way.



## **2. CAUSES AND PHYSIOLOGICAL MECHANISMS OF PSYCHOLOGICAL STRESS CHANGES IN UNIVERSITY SECURITY PERSONNEL**

### **2.1. ANALYSIS OF PSYCHOLOGICAL STRESS OF SECURITY PERSONNEL IN COLLEGES AND UNIVERSITIES**

#### **2.1.1. PSYCHOLOGICAL STRESS BASED ON THE NATURE OF SECURITY WORK**

Security work due to its nature of work, is bound to face more dangers, including the capture of suspects, will be the other side of strong resistance, or even force confrontation. For security personnel's physical fitness, skills level is not high, in the face of emergencies, can not be timely and correct disposal, and make itself in an isolated situation. From the experience of others or themselves, security personnel will have fear and nervousness about this danger.

#### **2.1.2. PSYCHOLOGICAL STRESS BASED ON THE EMPLOYMENT RELATIONSHIP OF SECURITY WORK**

Most of the security professions in China are irregular and temporary jobs, and the relationship between security personnel and universities is mostly employment. The rights and obligations of security personnel are mostly stipulated by the hiring party, which cannot fully protect the legitimate rights and interests of security personnel. There is no industry organization to protect the rights and interests of security personnel. In addition, the temporary nature of the work makes security personnel to get by. The psychology of not concentrating on security work leads to low efficiency and fails to achieve the goal of keeping the peace.

#### **2.1.3. PSYCHOLOGICAL QUALITY OF SECURITY PERSONNEL CONTENT**

(1) Conscientious and responsible working attitude. Be honest and easy-going, smart and strong, good at learning and thinking, active, serious and responsible, down-to-earth, extremely enterprising, confident in the future, trying to make themselves a valuable person.

(2) Rich in understanding and compassion. First, it is shown in the interaction with students can be equal to others, modest and calm, honest and trustworthy, good at communicating with others, self-aware and compassionate.

(3) Have the spirit of unity and cooperation. Solidarity and cooperation are the abilities that modern college security guards have.

(4) Have a more perfect psychological quality ability. An important task of security work in colleges and universities is to distinguish individuals who are mixed in the crowd and may carry out sabotage activities. In this identification process, the social experience of security personnel is a severe test. Security personnel should master the psychological quality of basic skills: keen observation, accurate memory, good thinking skills, strong communication skills, the necessary grappling skills.

### **2.2. PHYSIOLOGICAL MECHANISMS OF CHANGES IN PSYCHOLOGICAL STRESS**

#### **2.2.1. PHYSIOLOGICAL EFFECTS OF CHANGES IN PSYCHOLOGICAL STRESS ON THE HUMAN BODY**

When a person experiences a physical or psychological stressful stimulus, the brain initiates a stress response, followed by a series of reactions within the body. The stress response is a healthy defense mechanism that involves the release of many biochemical and physiological indicators related to hormones. However, the continued release of these hormones during chronic psychological stress conditions can be detrimental to physical health, increasing the risk of many diseases, including heart disease, stroke, and angina. Stress hormones can weaken the immune system and cause the body to be susceptible to infections.

The human autonomic nervous system is specifically associated with negative psychological states such as stress, anxiety, and depression. The ANS performs and regulates automatic bodily functions related to respiration, heart rate, digestion, and the endocrine system, and the ANS contains sympathetic and parasympathetic nervous systems that initiate the stress relaxation response, respectively. Normally, a balance is maintained between the sympathetic and parasympathetic nervous systems, and chronic stress can disrupt this balance, leading to the development of stress-related health problems.

### **2.2.2. ANALYSIS OF ELECTROCARDIOGRAPHIC SIGNALS IN PSYCHOLOGICAL STRESS STATES**

The ECG signal is closely related to human psychological stress, and the relevant physiological indicators extracted from the ECG signal can visually reflect the state of human psychological stress, among which heart rate and heart rate variability are extremely important indicators for analyzing ECG characteristics.

In a normal person, the number of heart beats per minute in a quiet state is 60 to 100 beats per minute. When the human body is subjected to certain external stimuli, the phenomenon of psychological tension or nervous excitement will arise, which will make the human heart diastolic and contraction speed up, and the heart rate will increase as a result.

## **3. PSYCHOLOGICAL STRESS ASSESSMENT BASED ON THE INTEGRATION OF MULTIPLE PHYSIOLOGICAL PARAMETERS**

### **3.1. STUDY ON THE APPLICATION OF PHYSIOLOGICAL SIGNAL ACQUISITION SYSTEM IN PSYCHOLOGICAL STRESS ASSESSMENT**

Psychological stress, also known as psychological stress, is a state of physical and mental tension that the human body exhibits physiologically and psychologically when it is stimulated by the internal and external environment. Considering that the characteristics of physiological signals cannot be disguised, the physiological signals of the human body can be used to objectively and effectively assess the psychological stress state of the human body.

This system is based on a multimodal physiological signal-based psychological stress assessment method, including physiological data acquisition, preprocessing, feature extraction, data set partitioning, training process, assessment process and three psychological stress assessment outputs of calm, mild stress and high pressure. The training process starts with the classification of the features extracted from a single modality by SVM and calculates the posterior probability and confusion matrix based on the classification results of the single modality. This is used to construct the basic probabilities of DS decision layer fusion, and finally the classification judgment of decision layer is performed using DS evidence theory to calculate the comprehensive classification results of psychological stress under multimodal information.

### **3.2. GA-BASED OPTIMIZATION SEEKING SVM CLASSIFICATION RESULTS**

In this paper, three physiological parameters, EEG, ECG, and EMG, were collected simultaneously in the data acquisition, where two electrodes, FP1 and FP2, were collected for the comparison of the mental stress information embedded in the EEG signals of the left and right hemispheres of the brain. The electrode leads of the ECG signal were the right upper limb and the left and right lower limbs, while the EMG signal was collected from the expression muscles on both sides of the cheeks, i.e., the surface EMG signal. A total of 50 samples were collected in the paper, and the ratio of the number of samples in the training set to the number of samples in the test set was set to 30:20. GA-seeking SVM classification was performed for the three physiological parameters, and the maximum and average correct rates of the training and test sets are shown in Table 1. The EEG signals were collected simultaneously from two

electrodes, FP1 and FP2. In the training and test sets, the maximum correct rate and the average correct rate of EEG signal classification were greater for the FP1 electrode than the FP2 electrode, based on the fact that the FP1 electrode was located in the left forehead of the brain and the FP2 electrode was located in the right forehead of the brain, indicating that the EEG signal of the left forehead of the brain contained richer information of psychological stress than that of the right forehead of the brain.

Comparing the classification accuracy of three physiological parameters, EEG, ECG and EMG, the maximum correct rate and the average correct rate of classification of EEG signals in the FP1 region of the brain were the largest in either the training set or the test set, with the maximum correct rate of 90.21% and the average correct rate of 82.34% in the test set. In summary, SVM combined with DS can effectively classify three different stress states, and their classification accuracies are all relatively high.

**Table 1.** GA Optimization Search SVM Classification (%)

Physiological parameters	Training set correct rate		Test set correct rate	
	Maximum value	Average value	Maximum value	Average value
EEG-FP1	93.24	85.23	90.21	82.34
EEG-FP2	89.45	80.48	82.36	83.27
ECG	92.26	84.32	85.42	78.32
EMG	90.34	82.19	87.14	79.48

### 3.3. COMPARISON OF SVM FEATURE LAYER CLASSIFICATION AND DS EVIDENCE THEORY DECISION LAYER CLASSIFICATION RESULTS

The maximum values of correct classification rates for EEG and ECG signals during SVM feature layer fusion classification are shown in Table 2. 92% and 86%, respectively. Only one of the two sample ordinal numbers for the misclassified EEG signal and the sample ordinal numbers for the misclassified ECG are the same, and the rest are different, i.e., for different physiological parameters, they do not contain exactly the same amount of information about psychological stress, and the classification results indicate that the EEG signal contains more information about psychological stress than the ECG signal. The average correct classification rate of the EEG signal was 84.7%, the average correct classification rate of the ECG signal was 83.16%, and the average correct classification rate of the EMG signal was 81.12%. This indicates that the classification of EEG signals is the best, followed by ECG signals, and the classification of EMG signals is lower than that of EEG and ECG signals when performing GA-seeking SVM feature layer fusion classification.

In summary, all three physiological signals, EEG, ECG, and EMG, are capable of effective quantitative analysis of psychological stress levels. Among them, DS evidence theory decision layer classification is more effective than feature layer fusion on a theoretical basis, and this is also proved by experimental data. When performing psychological stress classification, the higher the correct rate, the better it can help people to regulate psychological stress.

**Table 2.** Comparison of SVM and DS evidence theory classification results (%)

Classification		Test set correct rate	
		Maximum value	Average value
SVM feature layer fusion classification	EEG	92	84.7
	ECG	86	83.16
	EMG	84	81.12
DS Theory Decision Level Fusion Classification	EEG+ECG	98	89.42
	EEG+EMG	94	84.27
	ECG+EMG	94	85.61
	EEG+ECG+EMG	96	87.45

#### 4. CONCLUSION

In this paper, three typical physiological parameters, EEG, ECG and EMG, are used to achieve effective assessment of psychological stress based on a decision layer fusion algorithm combining DS evidence theory and SVM. In order to verify the feasibility of the multimodal physiological signal acquisition system, relevant calibration experiments were designed to further validate the stability and reliability of the system for resting physiological parameter acquisition by conducting comparison tests on EEG, ECG, EMG, and parameters, respectively. Psychological stress assessment experiments were designed to extract the time domain, frequency domain and nonlinear feature parameters related to psychological stress in the signal to form a psychological stress dataset, and the dataset was divided into training and test sets according to the computational model. Finally, the subjects' psychological stress states were classified by multi-classification SVM and DS evidence theory algorithms. The experiments demonstrate the feasibility of assessing psychological stress based on the fusion of multiple physiological parameters for psychological stress.

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# RESEARCH ON REFORMING THE TEACHING MODE OF COLLEGE STUDENTS' AESTHETIC EDUCATION BASED ON DIGITAL MEDIA TECHNOLOGY

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## **ABSTRACT**

With the rapid development of digital media technology, a new development opportunity has been brought to traditional art education. In this paper, in order to study the reform of the teaching mode of aesthetic education for college students based on digital media technology, students' views on the use of digital media technology for aesthetic education teaching are analyzed. In order to explore the feasibility of digital media technology for aesthetic education teaching mode reform, the research data show that 62.9% of students think it is very necessary for teachers to apply digital media courseware, and 10.2% of students think it is somewhat necessary. It shows that the reform of the teaching mode of college students' aesthetic education based on digital media technology solves the long-standing teaching problems in traditional teaching.

## **KEY WORDS**

Traditional art education; College students' aesthetic education teaching; Teaching mode reform; Art curriculum; Art curriculum design

## **1. INTRODUCTION**

With the reform of education, the contradiction between the richness of art classroom content and the scarcity of teaching hours is in front of educators [1] How to stimulate students' interest in the university art classroom and how to fit the development of the era of digital media art, so that the art classroom can really achieve short time and high efficiency and richness, and truly realize the goal of the university art curriculum standards and promote the reform of university students' aesthetic education teaching mode [2-3]. In the general environment of digital media, we should uphold the scientific and diversified path to create the best use channel applicable to university art course education, and explore and improve it continuously in practice [4-5]. The introduction of digital media art into university art courses aims to enable students to understand and master cutting-edge artistic expressions and approaches, change their learning styles, expand their thinking, cultivate their creativity and practical skills, and enrich their aesthetic and expressive approaches [6-7]. The promotion of digital media technology has led to a significant increase in teaching efficiency and a marked improvement in the effectiveness of the university art classroom. The key has been significantly effective in inspiring students' creativity, broadening their horizons, and enhancing their motivation to learn art [8].

This study seeks to explore the practical value of digital media in reforming the teaching mode of college students' aesthetic education, to do practical analysis on the introduction of digital media into the college art classroom, and to explore new methods of research to better

cut digital media technology into the reform of college aesthetic education teaching mode.

## **2. THE NECESSITY AND FEASIBILITY OF DIGITAL MEDIA TECHNOLOGY TO REFORM THE TEACHING MODE OF AESTHETIC EDUCATION**

### **2.1. THE NECESSITY OF USING DIGITAL MEDIA TECHNOLOGY IN AESTHETIC EDUCATION**

#### **2.1.1. THE NEED TO CULTIVATE STUDENTS' INTEREST IN ART LEARNING**

Mobilizing students' interest in learning is the key to achieving the desired teaching effect. In a boring learning life, if digital media technology can be used to make art classes interesting and fun, it will certainly attract students' attention and make them interested in art teaching, so that they can participate more seriously in art teaching classes and continuously improve their art level and artistic cultivation. Art is one of the art disciplines with strong intuition. In the traditional art teaching, teachers often cannot get rid of the teacher's general talk, a lot of jargon explanation, lack of limited picture materials, monotonous and uncreative imitation exercises, which, over time, make students' original active and divergent thinking become rigid and formatted, completely losing the original purpose of art teaching as the teaching goal of inspiring students' creativity and imagination. In fact, art classes can be colorful. In fact, art classes can be colorful, and the key is to make clever use of teaching aids like digital media technology. Digital media technology provides an extraordinary wealth of materials and tools for the art classroom, whether it is a variety of vivid and interesting videos, a variety of pictures, or computer painting and creation itself, all of which can be effectively linked to the art classroom and become tools to assist in the development of classroom teaching.

#### **2.1.2. THE LACK OF TRADITIONAL ART TEACHING**

The main reason for using digital media technology in art teaching is that traditional art teaching has deficiencies and shortcomings, and does not fully motivate students' interest in learning art. In traditional art teaching, teachers usually only explain the theory, and use blackboard painting and display some objects to enhance students' art appreciation and ability. Such teaching methods are relatively backward, boring and tedious. Traditional art teaching still adopts the indoctrination teaching method, students' interest in participation is not high, and the classroom effect is also very ordinary. If digital media technology can be used, the teaching effect will be very different. By using digital media technology in art teaching, not only the teaching effect is obviously very effective, but also the teaching objectives can be successfully accomplished.

#### **2.1.3. THE NEED TO DEVELOP STUDENTS' MEDIA LITERACY**

In the information-based society, the expression and dissemination of art are expanding. In the past, people could only learn about art information through books and art museums, but now they can access art information at any time whether they are walking on the street or at home. With the continuous development of digital media art, the ways of artistic expression have diversified, and how to train students to express themselves with media information in the art classroom has become an important part of the art curriculum, so that students can understand the beauty of art and enhance their creative and practical skills. Today, artistic expression has been diversified by the influence of digital media technology, and modern media are well integrated with classical art.

### **2.2. FEASIBILITY OF DIGITAL MEDIA TECHNOLOGY FOR AESTHETIC EDUCATION TEACHING MODE REFORM**

In modern society, the Internet has become an important way for people to understand the world, present themselves and communicate with each other. At the same time the internet is

an important resource to support the teaching of modern media art. The network also makes the world connected and the art open more and more. At the same time, the advantages of fast transmission speed and short update time of network resources are beyond the reach of traditional publications. As a contemporary teacher, it is important to learn to use Internet resources wisely and to collect the latest artworks at all times. The teacher first teaches students how to use Internet resources, selects resources with a positive attitude towards life, and teaches them to improve their artistic taste from Internet resources, thus enhancing the quality of their own creations.

### **2.3. REQUIREMENTS OF TEACHERS FOR THE INTRODUCTION OF DIGITAL MEDIA INTO ART COURSES**

In this new attempt to introduce digital media art creation into the university art classroom, the teacher must be psychologically prepared for a change in role. On the one hand, the teacher must be a good facilitator of the active construction of meaningful knowledge for the learners, and on the other hand, he or she must pay attention to the cultivation of his or her own comprehensive qualities and prepare the students for the active construction of knowledge structures as necessary:

#### **(1) Teachers should have media awareness**

The introduction of digital media into the college art classroom is both an opportunity and a challenge for art teachers. On the one hand, digital media provide us with multifaceted classroom resources, such as graphics, video, audio, etc. to enrich our classroom content and improve classroom efficiency, on the other hand, the use process often brings trouble to education and teaching due to improper understanding or use. In order to solve the difficulties, first of all, we should have the right media awareness.

#### **(2) Teachers should have the ability to explore new teaching methods**

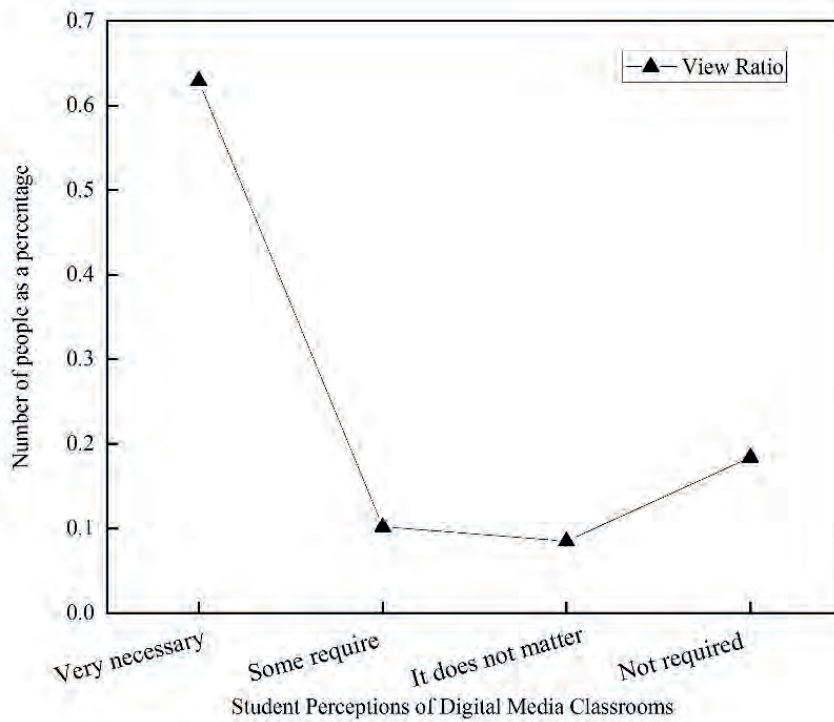
The introduction of modern media art creation into the college art classroom is a new attempt in art education, and there are countless teaching methods waiting for teachers to try and explore. In the era of information-based education, the role of teachers has changed from being the organizer and transmitter of knowledge to being the facilitator of students' knowledge construction. While the role of teachers changes, classroom teaching methods must also change and new, scientific modern educational ideas and concepts must be established.

## **3. RESEARCH ON REFORMING THE TEACHING MODE OF AESTHETIC EDUCATION BASED ON DIGITAL MEDIA TECHNOLOGY**

### **3.1. CONSTRUCTION OF DIGITAL MEDIA ART CREATION CURRICULUM DESIGN STUDY**

Students are the subjects of the classroom and the active constructors of knowledge. In order to study the necessity of digital media technology for aesthetic education teaching. The analysis of students' views on the use of digital media technology for aesthetic education teaching is shown in Figure 1. The research data show that 62.9% of students think it is very necessary for teachers to use digital media courseware, 10.2% of students think it is necessary, 8.5% of students think it is indifferent, and 18.4% of students think it is not necessary. This shows that the majority of students still want teachers to use multimedia courseware containing a lot of picture information in the art classroom.





**Figure 1.** Students' research on teaching aesthetic education in digital media

### 3.2. ADVANTAGES OF REFORMING THE TEACHING MODE OF AESTHETIC EDUCATION IN DIGITAL MEDIA TECHNOLOGY

In response to the role of digital media technology used in the classroom, a study was set up to analyze the impact of digital media technology on the teaching mode of art education, and the analysis data are shown in Table 1 below. Students mostly affirmed the value of digital media art, and believed that the role played by the introduction of digital media art in the art classroom was also multifaceted, enriching art teaching materials and making classroom teaching more interesting, as well as making art knowledge more understandable and increasing interaction with the teacher in the classroom. This shows that students highly approve of the use of digital media technology in the art classroom.

**Table 1.** Advantages of using digital media technology

The role of digital media technology use	Number of people	Proportion
Richer teaching materials	164	83.2%
Richer materials for teaching art	118	78.6%
More understandable knowledge	94	64.7%
Increased classroom interaction	109	74.3%
Other	87	48.7%

### 4. CONCLUSION

With the advent of the digital age, the integration and unification of technological development and art creation is becoming the development direction of art education in universities around the world, and the reform of the teaching mode of aesthetic education for college students based on digital media technology deserves further exploration and research in the dual dimensions of education and teaching experience and doctrine. Nowadays, the tentacles of science have penetrated into all aspects of social life, and the era of media and technology has quietly come. Education, as a fundamental backbone of social development, also needs to draw on the energy of science and technology. Along with the rise and rapid

development of digital media, the teaching process has begun to integrate more digital media elements and assist in the creation of art disciplines and the cultivation of aesthetic education, which is a worldwide trend. Only by stimulating the degree of students' interest can art teaching be implemented effectively and the depth and breadth of teaching be improved. The use of digital media in art teaching not only provides teachers with rich and diverse teaching contents and means but also greatly broadens students' knowledge and vision, solving many long-standing teaching problems in traditional teaching.

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# RESEARCH ON THE TEAM BUILDING MODEL OF FOREIGN LANGUAGE TEACHERS IN UNIVERSITIES BASED ON FUZZY ALGORITHM

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## ABSTRACT

At present, the main problem of foreign language teachers' team construction in colleges and universities is the lack of a reasonable performance evaluation system and a sound incentive mechanism. This paper explores the team building model of foreign language teachers in colleges and proposes to build a performance system of foreign language teachers in colleges and universities based on fuzzy algorithm. The evaluation factors of teachers in the performance evaluation assessment system are set. The information of teachers is collected and the evaluation factors of teachers are designed in layers, and the weights of factors in each layer are ensured to be accurate. Thus the fuzzy algorithm-based performance system for foreign language teachers in colleges and universities has some guiding significance in achieving the promotion of professional development of teachers' teams.

## KEYWORDS

Stratification of evaluation factors; Team building model; Scientific performance evaluation; Teacher performance system; Performance evaluation factors

## 1. INTRODUCTION

As a form of promoting teachers' professional development, team building for foreign language teachers in higher education is a way for teachers to combine into an organization in some form in a culture of cooperation and sharing [1-2]. And in the organizational life around the common aspirations and development goals, in the process of continuous learning and practice, through cooperation, communication, sharing and reflection, they cooperate and support each other and share their practical experiences with each other, so as to achieve the teachers' own professional development [3-4].

At present, computer technology has penetrated into all levels of social life, and the efficiency of people's life and work has been significantly improved [5]. In various schools, the traditional teacher performance evaluation qualification assessment system, which is based on human subjective criteria, faces many human factors in order to improve the objectivity of the evaluation and reduce the interference of human factors [6-7]. Therefore, from the study of the drawbacks of teacher performance evaluation, the evaluation of teachers in the face of which cannot be quantified, the traditional evaluation methods are currently unable to reflect the teacher's teaching level, moral quality level, and scientific research level in a comprehensive manner [8]. It is also no longer suitable for the requirements of society that the evaluation of talent quality is becoming more and more scientific and standardized, so the development of a new teacher performance evaluation and assessment system becomes

inevitable, as well as the use of the teacher performance system to conduct the teacher performance evaluation and assessment system.

## **2. ANALYSIS OF THE CURRENT SITUATION OF FOREIGN LANGUAGE TEACHERS' TEAM BUILDING IN COLLEGES AND UNIVERSITIES**

### **2.1. THE DEVELOPMENT OF FOREIGN LANGUAGE TEACHER TEAM BUILDING IN HIGHER EDUCATION**

#### **2.1.1. LONG-TERM FIXATION OF FOREIGN LANGUAGE TEACHER TEAMS IN COLLEGES AND UNIVERSITIES**

Due to the problem of imperfect regional teacher exchange mechanism, teacher resources do not flow up, which leads to the fault of teacher structure. The construction of foreign language teachers' team in colleges and universities is affected by the teacher establishment, the team has few new teachers joining and no new teachers supplementing the team, and the team's vitality appears to be increasingly insufficient. The existing team of English teachers has a single education, a single knowledge structure, weak scientific research power, low level of writing papers, unable to raise their teaching practice to the theoretical level, resulting in no hard scientific research achievements in the title evaluation. Therefore, the development of foreign language teachers' team in colleges and universities needs to be supplemented by the mobility of teachers and new teachers.

#### **2.1.2. LACK OF CULTURE OF COOPERATION AND SHARING WITHIN THE TEAM OF FOREIGN LANGUAGE TEACHERS IN HIGHER EDUCATION**

A team of foreign language teachers in higher education is a cooperative organization with common ideals, goals and beliefs, a relatively stable, united and cordial group formed based on cooperation guided by professional or industry norms. Cooperation and sharing are the prerequisites for the community to carry out community activities and the basic principles for maintaining the partnership among community members. Cooperation and sharing transcends the traditional, simple mentoring and being mentored relationship among members. This relationship not only strengthens collaboration and communication among teachers, but also is beneficial to increasing the unity and friendship among teachers, forming a democratic, open and lively interpersonal atmosphere, triggering the positive psychology of teachers' love for education and commitment to practice, and promoting the professional development of individuals and groups in the community.

However, from the current situation of the development of foreign language teachers' team building in colleges and universities, it can be seen that the culture of cooperation and sharing is generally lacking. There is more competition than cooperation among teachers, a lack of sharing consciousness among teachers, and a lack of mutual trust and support atmosphere. The individualistic teaching culture of teachers is deeply rooted in the teachers' group and permeates all aspects of teachers' work and study, and it is becoming a major obstacle to the development of the community day by day.

### **2.2. RESEARCH ON FOREIGN LANGUAGE TEACHERS' PERFORMANCE IN UNIVERSITIES BASED ON FUZZY ALGORITHM**

#### **2.2.1. ESTABLISH SCIENTIFIC PERFORMANCE EVALUATION INDEX SYSTEM BASED ON FUZZY ALGORITHM**

Teacher development is a major issue in educational research and practice because quality education is only possible with high quality teachers. The role of teachers in education depends on the quality of teachers themselves on the one hand, and on a reasonable and effective teacher management system on the other. Therefore, it is more important than ever

to establish an effective teacher performance evaluation system based on fuzzy algorithm to evaluate teachers' performance in an open, fair, scientific and efficient way.

## **2.2.2. SYSTEM INDEX CONTENT OF PERFORMANCE APPRAISAL OF TEACHERS IN COLLEGES AND UNIVERSITIES**

According to the different weights of performance appraisal indexes of university teachers, the types of appraisal systems can be divided into three types, research-oriented, teaching-oriented and comprehensive-oriented. If the research-oriented performance appraisal system is used, the weight of research should be increased to guide teachers to pay attention to research in order to meet the development strategy of research-oriented universities. If a teaching-oriented performance appraisal system is used, the weight of teaching should be increased, and teaching should be the main focus, and research should be the secondary focus, in order to adapt to the development strategy of teaching-oriented universities. The comprehensive-oriented performance appraisal system should give equal weight to teaching and research to support the balanced development strategy of the university.

## **3. FUZZY ALGORITHM-BASED PERFORMANCE SYSTEM FOR FOREIGN LANGUAGE TEACHERS IN UNIVERSITIES**

### **3.1. ANALYSIS OF FOREIGN LANGUAGE TEACHERS' PERFORMANCE EVALUATION SYSTEM IN HIGHER EDUCATION**

How to make a fair and objective evaluation of teachers' teaching is also an important issue for foreign language teachers' team building. In the past, the sum method was often used in teaching evaluation, i.e., students, experts, and peers used the evaluation form, and students, experts, and peers gave the teachers scores and then summed them up to find the total. This method has some drawbacks. In some cases we set different weights depending on the assessment index but there are still problems. In many cases, certain index factors are ambiguous, such as teaching objectives, teaching methods, etc., which are difficult to evaluate with a single score. "In many cases, it is difficult to use one score to evaluate the teaching objectives and teaching methods. Therefore, it is very important to establish a fair and objective performance system for foreign language teachers in universities.

### **3.2. LOGIC MODEL OF FUZZY ALGORITHM-BASED PERFORMANCE EVALUATION SYSTEM**

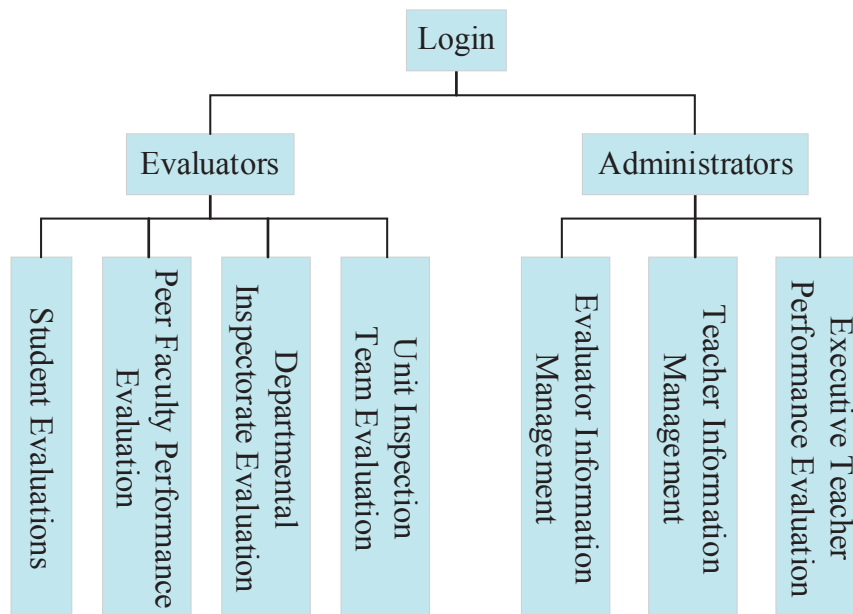
The logic model of the performance evaluation system based on fuzzy algorithm is shown in Figure 1.

(1) Rich expressiveness, i.e., the ability to express various needs of users and fully reflect the real world.

(2) Easy to communicate and understand. The conceptual model has strong verbal expression ability, which is a language for users to communicate with database designers and can directly express different semantic knowledge in the application.

(3) Easy to modify and expand. In order to reflect the needs of users and changes in the environment at any time, the conceptual model must be able to change flexibly.

(4) It can be converted to different data models. Since the conceptual model is independent of the DBMS, it can be easily converted to various data models such as mesh model, relational model or hierarchical model.



**Figure 1** System logic function model

### 3.3. DATA ANALYSIS OF EVALUATION FACTORS OF TEACHER PERFORMANCE EVALUATION ASSESSMENT SYSTEM

In order to improve the teacher performance evaluation assessment system and collect the basic information of teachers in an objective and detailed way, the evaluation factors of teachers in the performance evaluation assessment system are shown in Table 1. The weights in each of their evaluation factors are set accurately. The information of teachers is collected and the evaluation factors of teachers are designed in layers, and the accuracy of the weights of the factors in each layer is ensured. Design a large number of tables and a large number of recorded factor data in the evaluation factor data so that the evaluation results are more correct and objective. Accurate definition and operation are carried out in the process of implementation, and the operation efficiency of the system is gradually improved.

**Table 1.** Table of evaluation factors of teacher performance evaluation system

Level 1 evaluation factors	Weights	Level 2 evaluation factors	Weights
Business level	0.45	Study the business diligently	0.1
		student management	0.25
		Job target tasks	0.3
		Job task quality	0.3
Work discipline	0.3	Commute to work on time	0.25
		Concentrate on work during working hours	0.25
		School Rules and Regulations	0.25
		Compliance with professional ethics	0.25
Work Style and Collaboration	0.25	Spirit of Giving	0.2
		Serious work	0.25
		Cooperation and Communication	0.30
		willingness to help	0.2

## 4. CONCLUSION

The team building of foreign language teachers in colleges and universities not only promotes the professional development of foreign language teachers, but also promotes the change of teacher management in educational management communities and schools as well as the construction of teachers' teams in the region. In this paper, the research of foreign language teacher team building model in colleges and universities based on fuzzy algorithm is fully used in the teacher performance evaluation system through the gradual and in-depth

study of fuzzy algorithm. The existing fuzzy evaluation algorithm is also improved. A multi-level fuzzy comprehensive weighted evaluation algorithm is designed, thus breaking the limitations of the single-level fuzzy comprehensive evaluation algorithm and improving the objectivity of teacher performance evaluation assessment as well as the evaluation efficiency of the evaluation system. Through the continuous improvement of the teacher performance evaluation factors and the accurate setting of the weights of each evaluation factor, the evaluation system not only overcomes the influence of many human subjective factors. It effectively solves the difficulties of human evaluation which requires a lot of data statistics and calculations. The system will be continuously improved in the future to enhance the objectivity of performance evaluation, so as to promote the cultivation of internal development consciousness of foreign language teachers' team and solve the problem of teachers' burnout. It can bring the teacher performance evaluation system to a new level and promote the construction of foreign language teachers' teams in colleges and universities.

## FUNDING

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# A STUDY ON THE USE OF PPP FINANCING MODEL IN THE CONSTRUCTION OF UNIVERSITY INFRASTRUCTURE IN CHINA

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## ABSTRACT

As China's higher education gradually steps from the stage of elite education to that of mass education, the absolute quantity of higher education resources has increased greatly, which can no longer meet the needs of the fast-developing social economy for intellectual resources. By thoroughly analyzing PPP financing mode experience both domestically and internationally and making reference to the effective PPP financing mode model in general companies, we actively investigate the need for and viability of its implementation in building colleges' and universities' infrastructure. The country's education funding in 1994 was almost nine times that of 1980, with an astonishing growth rate. This paper combines the advantages of the government and private enterprises through the PPP financing model for universities, allocates risks to all parties, achieves risk sharing and effective management, and thus minimises the overall risk of PPP financing projects, while also improving the construction of university infrastructure.

## KEYWORDS

educational resources; PPP financing model; infrastructure development; combination of advantages; effective management

## 1. INTRODUCTION

China's higher education sector has taken on a global role, evolving from elite to mainstream education gradually, with a growing tendency toward marketization [1-2]. In China, the great majority of colleges and universities are public benefit organizations with a limited number of channels and a single funding system [3]. Almost all of China's top institutions are currently suffering from a severe lack of funding for infrastructural development [4-5]. Additionally, in order to ease the burden of a funding shortfall, this pushes big institutions to exclusively seek money from society through a variety of



channels and methods [6]. But since universities are institutions whose primary function is to develop talent, they cannot simply chase economic advantages and take significant risks [7]. There are now a number of issues that need to be resolved about the type of finance strategy that universities should use to address the issue of the lack of funding for campus infrastructure building while also ensuring that it can be carried out in a largely secure and stable environment [8].

## **2. INFRASTRUCTURE DEVELOPMENT IN HIGHER EDUCATION**

### **2.1 CURRENT STATUS AND PROBLEMS OF INFRASTRUCTURE DEVELOPMENT IN HIGHER EDUCATION INSTITUTIONS**

Infrastructure for teaching and research and infrastructure for living services make up higher education institutions. Teaching and research infrastructure covers teaching buildings, administrative office buildings, student experimental and practical training centres, laboratory construction, libraries, gymnasiums and sports grounds, while living infrastructure mainly includes student dormitories, restaurants and supermarkets. At present, the infrastructure construction of higher education institutions mainly includes the overall planning and construction of new campuses, the expansion of teaching, research and living service facilities, etc.

### **2.2 FUNDING SHORTFALLS HINDER RAPID DEVELOPMENT OF HIGHER EDUCATION**

The state has been giving education work an increasing amount of attention ever since the reform and opening up. Due to the nation's economy's rapid growth, the gross domestic product has expanded year after year, and the state has raised the amount it invests in education financing. From 1978 to 1985, this investment climbed by an average of 1.694 billion yuan annually, and from 1985 to 1994, the ten-year period was as high as 6.310 billion yuan per year, and in 1994 the education funding was almost nine times that of 1980, an impressive rate of growth. Despite the quick growth in the scope of higher education, public spending on education across all levels of government has not expanded proportionally and promptly, thus the average student education expense is still declining. Due to the relative scarcity of state support, the fast growth in the number of universities, the spike in student enrollment, and the unique factors driving price increases, university funding is still extremely limited for the majority of institutions, particularly non-key universities.

### **2.3 SHORTAGE OF STUDENT ACCOMMODATION AND CLASSROOMS, OUTDATED TEACHING EQUIPMENT**

The state of school buildings has gotten worse as a result of the sharp increase in the number of registered students. Many colleges lack enough classrooms, or the

equipment in those classrooms is antiquated and unable to accommodate current teaching. The overall value of teaching equipment in many institutions is below the appropriate national requirements owing to budgetary issues, and a lot of old and out-of-date laboratory equipment cannot be upgraded and disposed of in a timely manner. Each of them has made a substantial contribution to the growth of higher education and the enhancement of educational quality.

## **2.4 INEFFICIENT USE OF EDUCATION FUNDS**

China's higher education finance has had a highly humiliating predicament for the entire time. On the one hand, higher education financing is invested in comparatively insufficiently, and on the other hand, the effectiveness of using education funds is quite inefficient. For instance, the use of classroom space, athletic equipment, and lab equipment in schools is underutilized. Due to institutional crossover and relocation, a sizable portion of the university's funding goes toward paying for management staff. Additionally, staff redundancy causes an increase in daily management friction, which decreases efficiency.

## **3. DEFINING THE PPP FINANCING MODEL**

The PPP financing model refers to the cooperative financing mechanism formed by the government and private enterprises or private capital to jointly build infrastructure projects and provide public goods and services, in which the government and private capital are partners who share the benefits and risks, and both parties sign contracts to clarify their responsibilities and obligations, utilize governmental and societal resources to enhance the standard of public services and create mutually beneficial collaboration. PPP funding has been widely employed in a number of projects, as it has improved the efficiency of construction and the effectiveness of the use of funds.

### **3.1 APPLICATION OF PPP FINANCING MODELS IN HIGHER EDUCATION**

As higher education expands quickly, more money is being invested in it, but this financial assistance is not sufficient to address the issue of colleges and universities' financial troubles. The implementation of the PPP model in higher education can, among other things, improve investment efficiency, broaden the funding sources available to colleges and universities, and leverage social capital. It can also create a diversified financing system under the direction of the government and involving social capital. The introduction of social capital, on the other hand, can effectively alleviate the situation, resolve the debts of colleges and universities, and promote the beneficial operation of colleges and universities in the conflict between the lack of local financial strength and the improvement of college operating conditions. In this process, the government plays an important role in policy formulation, supervision and management, provides corresponding supporting services for private capital, and realizes the

conversion of government functions in the framework of government-enterprise cooperation.

### **3.2 PPP FINANCING MODELS HELP DIVERSIFY PROJECT RISKS**

The construction of infrastructure in universities requires a large amount of investment and the recovery of funds is slow, and the project's construction and management unavoidably include a number of hazards. Project risks are spread out thanks to the PPP finance model's use in higher education.

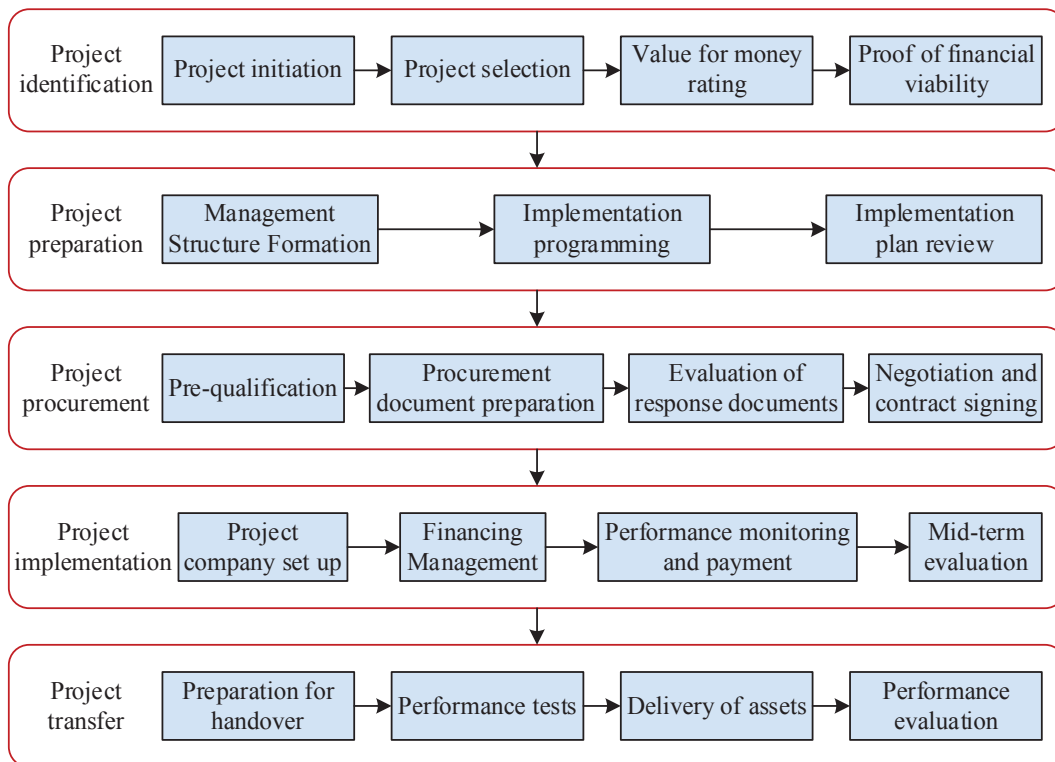
Firstly, under the competitive bidding mechanism of PPP projects, the winning enterprises have strong financial strength and strong risk management ability, which can improve the comprehensive ability to prevent and control PPP projects.

Secondly, the PPP financing mode of universities introduces a special subject of private capital, which can make use of its cash management experience and high technical means, and the project is handled by a professional team from risk identification to risk allocation and risk control stages, which improves the feasibility of the project.

Thirdly, the university PPP financing model can combine the advantages of the government and private enterprises, allocate risks to all parties, achieve risk sharing and effective management, thus minimising the overall risk of PPP financing projects and improving project stability.

### **3.3. PPP PROJECT OPERATION PROCESS**

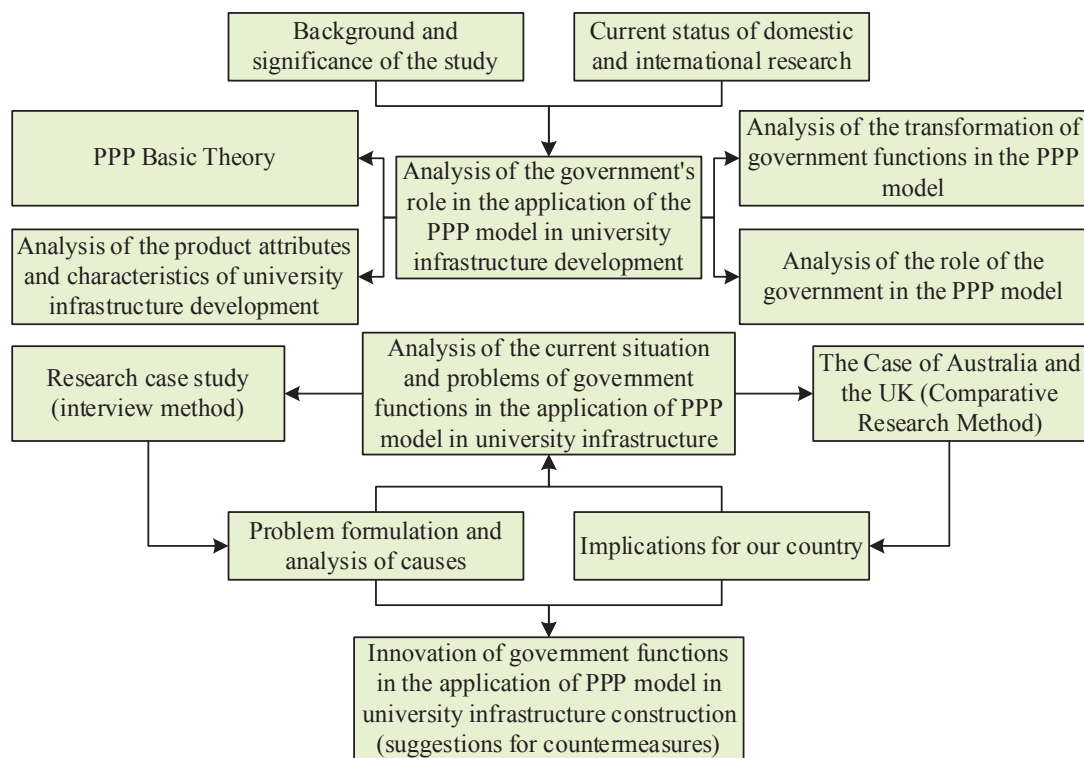
As PPP construction projects have many approval links, long cycles and complex operations, they place high demands on the government's management capabilities. In order to standardise the use of PPP in practice and strengthen policy guidance, the Ministry of Finance issued the Operational Guidelines for Government and Social Capital Cooperation Model in November 2014, which systematically introduces the whole life cycle operational process of PPP construction projects, as seen in Figure 1, project identification, planning, procurement, implementation, and transfer are the primary project-related activities.



**Figure 1** Government and social cooperation project flow diagram

### 3.4 FEASIBILITY OF PPP FINANCING MODEL APPLIED IN UNIVERSITY INFRASTRUCTURE DEVELOPMENT

After domestic and international research shows that the PPP model has been applied in public infrastructure fields such as transportation, municipalities, waste treatment, energy, education, culture and medical care. The foreign PPP model has been applied more successfully in the construction of school infrastructure in Australia and the UK. Figure 2 illustrates how some domestic scholars have discussed the viability of implementing the PPP finance strategy for building university infrastructure using the quality of quasi-public higher education offerings. They did this while taking into account the pressure of public finance expenditures on universities and the challenge of raising funds for the construction of university infrastructure.



**Figure 2** PPP financing model framework diagram

#### 4. CONCLUSION

The education sector is a fundamental sector with significant implications for the nation's future development. It is a budding sector with a large market and promising growth potential. However, the demand for building money for the quick expansion of universities cannot be satisfied by the conventional financial allocation-based support for education. A significant amount of local and foreign cash has poured into China's higher education industry as a result of China's WTO membership and the country's continued educational advancement. This essay examines the need for and viability of financing college infrastructure through public-private partnerships. We can see that not only can we construct college infrastructure using the PPP finance model with our own features, but also keenly sense the vigor and enormous push it provides for the logistical reform and leapfrog development of China's colleges and universities. The university infrastructure PPP investment and finance model not only addresses the issue of challenging university infrastructure investment and financing, but also stimulates the whole university logistics industry.

#### Funding

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# INTELLIGENT DEVELOPMENT OF STUDENT MANAGEMENT IN HIGHER EDUCATION INSTITUTIONS IN THE CONTEXT OF HUMAN-CENTREDNESS

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## **ABSTRACT**

With the development and progress of the times, the education reform of higher education institutions is also deepening, and the theory of education management in higher education institutions has been greatly enriched compared with that before. The traditional institutionalized management mode has gradually ceased to adapt to today's student management in higher education institutions, and the management concept in the context of human-centredness is gradually accepted by major universities. As many as 90.77% of the respondents chose student management staff as very important, and no survey respondents thought that student management work was not important. In this paper, by using the advantages of big data and the Internet under student management in higher education institutions in a human-centred context, the professional quality of student management teams and managers has been enhanced, and the level of student management in higher education institutions has also been improved.

## **KEYWORDS**

institutionalised management model; people-centred; management philosophy; professional quality; big data

## **1. INTRODUCTION**

The new situation brings new challenges. The rapid development of the level of science and technology and the diversification of social value orientation bring great challenges to the education of higher vocational colleges and universities[1-2]. The comprehensive quality of graduates from higher education institutions is constrained by the level of student management in higher education institutions[3]. The knowledge and skills of graduates from higher education institutions cultivated by backward management fail to meet the requirements of society, resulting in the career path of graduates from higher education institutions being repeatedly troubled, their personal development prospects being hindered, and their employment treatment and social evaluation being significantly lower than those of non-vocational education schools, resulting in high employment rates and low satisfaction rates [4-5]. In addition, the rapid popularity of the Internet and smart phones, various types of information on the Internet are mixed, and students in higher education institutions do not have strong discriminatory ability and are easily influenced by negative information [6]. Thus, the concept emerges that in order to improve and enhance the quality and level of education in vocational universities nationwide, it is necessary to fully combine the teaching system, student characteristics and management characteristics of vocational universities at the current stage, to analyse the current problems of student management in vocational universities as an entry point, and to deeply integrate the concept of people-oriented management ideas [7]. Through the innovation of management system mechanism and method, we can build a scientific and effective student management system and perfect measures for student management, improve the scientific and rational nature of the student management system of vocational universities, so that students can learn and grow in a healthy way[8].

## **2. THE CURRENT SITUATION OF STUDENT MANAGEMENT IN HIGHER EDUCATION INSTITUTIONS**

### **2.1 CUMBERSOME AND INEFFICIENT STUDENT ADMINISTRATION**

The current management of students in higher education institutions is very complicated and involves many levels, both in the process and in the specific implementation, which is not a simple matter, and is a source of difficulty and pressure for school managers. With the expansion of universities and the increase in the number of students, the traditional management model is no longer able to cope with such a huge workload, and it is difficult for managers to grasp the overall situation of students, nor can they dynamically follow up the progress of their studies and pay attention to their psychological and emotional changes. The management of students without a grasp of the students' learning situation can easily reflect the strong subjectivity of the



management and the school, and the management measures formulated are very unsuited to the students' needs, making it difficult to attract students' approval and make them cooperate and implement them, which affects the efficiency and quality of the management.

## **2.2 STUDENTS ARE MORE DEPENDENT NOT INDEPENDENT ENOUGH**

Although China's new curriculum reform and quality education have been implemented for more than 10 years, the general environment of examination-based education has not really changed, and many students in primary, junior and senior secondary schools are still receiving education aimed at improving their examination results. After entering university, students' learning environment and living environment, learning mode and life mode will be greatly changed, many students think that university is no longer as heavy as in the past will face the heavy burden of coursework, gradually relax their own study requirements, coupled with the colorful university life, and the Internet is flooded with students' lives, facing the massive amount of online information, students are easily attracted to it. Most of the university students lack sufficient social experience and experience, and cannot distinguish the information on the Internet correctly, and lack good self-control and self-management ability. The management capacity and energy of tutors and class teachers are limited, and the management of students depends largely on their self-discipline and self-awareness.

## **2.3 DATA MANAGEMENT HAS HIDDEN RISKS**

The organic integration of big data and current student management in higher education institutions requires schools to strengthen the introduction, development and use of big data. But while the integration of big data and the internet has brought many positive effects on the efficiency and quality of management work, it has also brought negative effects. It has also brought negative effects. Information on the internet is complex and complicated, and students are not aware of the pitfalls when searching for and collecting information or communicating and sharing it. Lack of awareness of online pitfalls and prevention can easily lead to data omissions or fraud. The problem of lost student data and information can make it more difficult for higher education institutions to manage their students, and the existence of network security risks can also have a negative impact on the implementation of other aspects of the school's work.

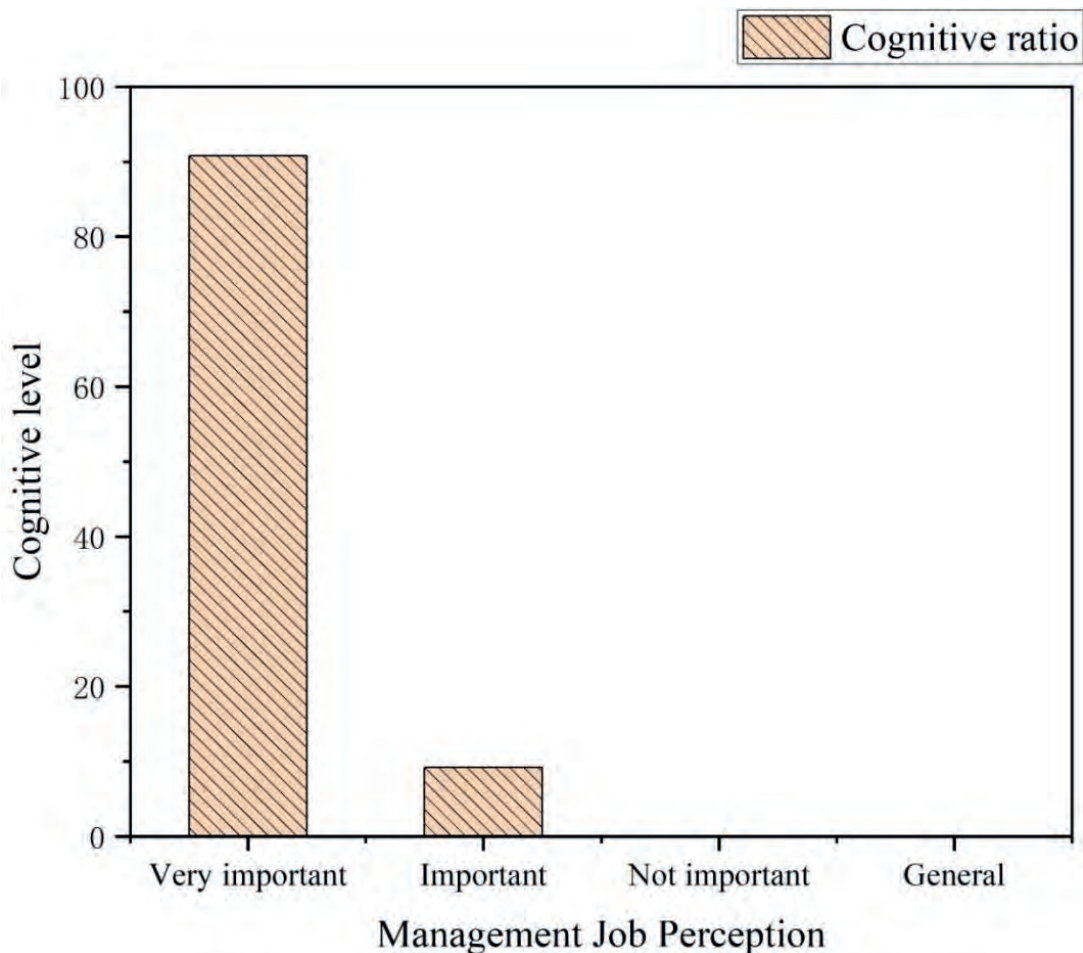
## **2.4 THE CONCEPT OF INTELLIGENT STUDENT MANAGEMENT IN HIGHER EDUCATION INSTITUTIONS IN A HUMAN-CENTRED CONTEXT**

The traditional management system of higher education institutions is inflexible and based on negative incentives, and long-term institutional constraints have led to a lack of self-management awareness among students. In the new era, higher vocational schools can practise humane management in four ways: optimising the management

system, innovating the management model, establishing a "people-oriented" education concept and establishing a multi-dimensional management evaluation system.

#### 2.4.1 MANAGEMENT PHILOSOPHY

All those involved in student management consider student management to be "very important" or "important" in the running of the school, with 90.77% of respondents choosing very important and no respondents considering student management to be unimportant. No respondents thought that student management was not important. It is undeniable that student management is a fundamental part of the school's role in teaching and educating people, and an important reflection of the effectiveness of the school's work as shown in Figure 1.



**Figure 1** Survey on the perceived importance of student management

### 3 CHANGE MANAGEMENT PHILOSOPHY

To do a good job on the current scientific management of higher vocational college school students, it is necessary for college leaders and managers to update their own management concepts, break through the traditional management mode of thinking,

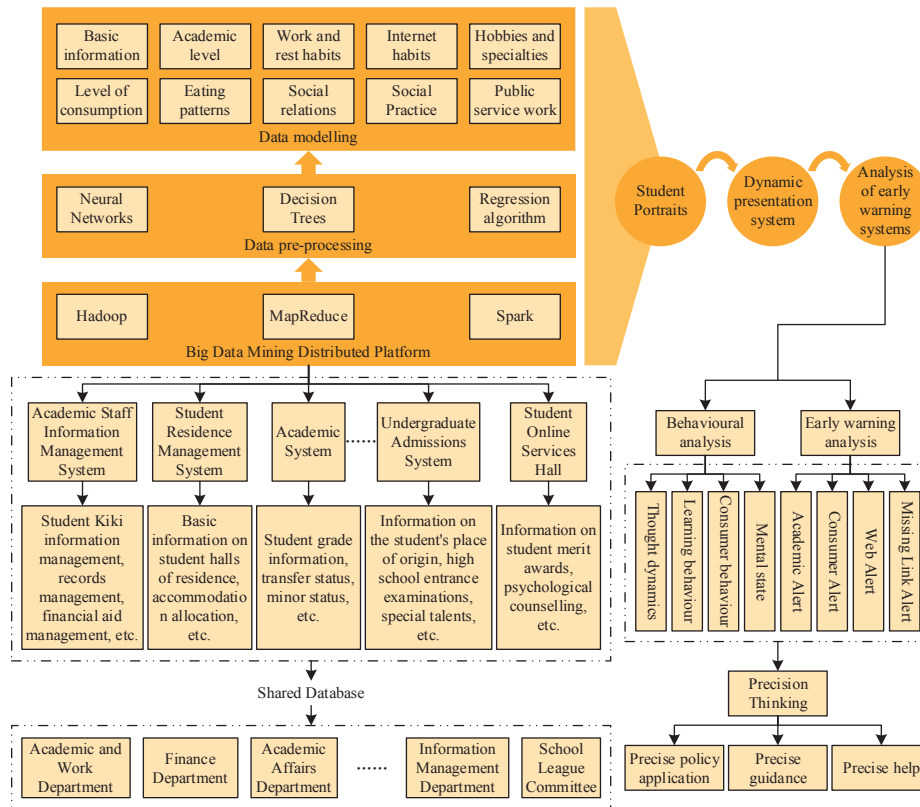
committed to cultivating excellent talents for society in the context of people with big data technology and the Internet as a bridge, the management of students and changes in social life closely combined, adhere to keep pace with the times always pay attention to changes in social employment needs, pay attention to Talent training objectives, while establishing talent training objectives, optimize management content, innovative management tools, to implement the educational management of students to provide effective decision-making and basis. The integration of big data technology and the Internet in the context of human beings not only promotes the transformation of the thinking of higher vocational college school managers, but also promotes their professional growth. In order to give full play to the advantages of big data, higher education school administrators must strengthen lifelong learning and constantly improve their information literacy to ensure that student management is put into practice and achieves the desired results.

### **3.1 GUIDING INTELLIGENT STUDENT MANAGEMENT IN A HUMAN-CENTRED CONTEXT**

Under the background of people-oriented, the first impact on student management in universities is the management concept. In order to effectively cope with the challenges faced by the management concept, higher education institutions should actively cultivate managers' Internet thinking, lead them to practice Internet thinking, and actively respond to the impact of the rapid development of the Internet on student management at the level of ideology.

### **3.2 INTELLIGENT MANAGEMENT OF STUDENTS IN HIGHER EDUCATION INSTITUTIONS IN A HUMAN-CENTRED CONTEXT**

Student management in higher vocational college schools should actively respond to the current changes with big data thinking in the context of people-oriented, quantify student education and management services in higher vocational college schools, cultivate big data awareness, enhance sensitivity to data information; improve data positioning and collection ability, data analysis and interpretation ability, data reflection and decision-making ability, through active collection, collation of data information and scientific modelling, comprehensive analysis, in-depth By taking the initiative to collect and collate data and information, as well as scientific modelling and comprehensive analysis, we can dig into the relevance of data and information of management and service objects, so as to enhance the foresight and foresight of education work and open the door of intelligent management with big data thinking. The practical innovation of using big data thinking to carry out ideological and political education and management services in the management of students in higher vocational colleges and universities, and the construction of a wisdom system is shown in Figure 2.



**Figure 2** The path diagram of accurate thinking and government research based on students' big data

#### 4. CONCLUSION

Under the background of the new era, in the process of continuous reform and deepening of education, student management in higher education institutions is facing many challenges and the transformation is imminent. Based on the advantages of big data and the Internet, the leaders and managers of higher education institutions must take a positive and open attitude towards the application of big data technology in the management of students in higher education institutions, based on the actual situation of schools and the training requirements of students, always adhere to the concept of people-oriented, adhere to the service of students By giving full play to the advantages of big data technology, we can improve the shortcomings of traditional student management in higher education institutions. In an era of globalised economic, political and cultural development, the wisdom of student management in higher education institutions in the context of human-centredness has unparalleled advantages, expanding the student management team and improving the professional quality of management staff, as well as raising the level of university management.

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# CAREER PLANNING AND EMPLOYABILITY ENHANCEMENT OF UNIVERSITY STUDENTS IN THE CONTEXT OF BIG DATA TECHNOLOGY

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## ABSTRACT

The course on career planning and employability for university students is a new course that has been developed in line with the practical needs of social development. The information-based teaching in the context of big data technology can realize the efficiency of classroom teaching content, and also emphasizes the use of real and reliable information as the basis for teaching. Fourteen per cent of university students believe that it does not matter whether they plan or not. This paper enables students to form correct career goals and life ideals through online learning under big data technology, gives full play to the initiative of teachers and students, promotes changes in the career guidance mode of schools, enables students to complete career planning more efficiently and with higher quality, and lays the foundation for the improvement of career planning and employability of university students.

## KEYWORDS

career planning; employability; big data technology; information-based teaching

## 1. INTRODUCTION

In recent years, the group of college graduates has been facing an increasingly severe employment situation and employment environment [1-2]. However, from the present point of view, many universities have not devoted enough attention to career planning guidance for university students, and seldom popularize relevant knowledge or skills to students in the course of teaching, which has led to many university students lacking employment preparation when they enter employment and finding it difficult to adapt to the workplace environment [3]. At present, how university students can establish an advantage in the fierce competition in the job market has become a problem that cannot be ignored [4]. With the continuous deepening of the reform of the

economic system, it has brought a brand new challenge to the career planning and employment guidance work of college students, and also provided many good employment opportunities for students [5-6]. Therefore, in view of the current problems in society, universities, families and individual students, it is necessary to effectively improve the methods and ideas of career guidance and career planning, and guide students to establish correct employment concepts and put themselves into social work with a healthy and upward attitude[7-8].

## **2. CAREER PLANNING AND EMPLOYMENT STATUS OF UNIVERSITY STUDENTS**

Career planning for university students is to plan and think about their future career direction and development goals during their study and life, and to work out an action plan to achieve their career goals. Employment of university students With the increase in the popularity of higher education, the number of university students is increasing year by year, and the competition in the employment market is becoming increasingly fierce, leading to increased difficulties in employment. The structural imbalance in employment is manifested by the serious phenomenon of high level jobs and low level jobs, and many highly educated talents can only work in low income jobs, making it difficult to realise their career aspirations. Some university students have an incorrect concept of employment, believing that high education can be exchanged for high salary, ignoring the importance of work experience and practical ability, leading to the situation that university students are not able to achieve high but not low. There are also many college students in the job search process, due to the lack of job search skills, such as resume making, interview skills, etc., resulting in poor job search results, it is difficult to find a satisfactory job.

### **2.1 CURRENT STATUS OF CAREER PLANNING EDUCATION FOR UNIVERSITY STUDENTS**

According to the market research on the currently existing career planning-related APPs, learning websites and WeChat applets, it can be found that there are more career planning-related platforms in China, as shown in Table 1. It can be seen that there are fewer career planning platforms of public interest, and most of them are profit-oriented. Secondly, the career planning resources on these platforms lack systematicity. The recommended resources do not have the advantage of personalised learning, so a public interest learning resource recommendation platform designed for the purpose of promoting career planning knowledge is in demand for the university student market.

**Table 1:** Comparison of features and functions of career planning-related platforms

Platform Name	Features	Is there a resource recommendation function
Thousand Job Crane	You can pay for personality tests and interest tests, etc. There are related courses that require payment	No
Bantam career	There are modules for students, all courses, career tests, career tips, etc.	Yes, but not based on personal characteristics, but on the overall content
Mileage ask deer	After logging in, you can choose a number of test preparation goals (selecting subjects for senior high school, volunteering, college planning, etc.), and each goal you choose has a corresponding paid course	Yes, we recommend courses based on the preparation goal you selected when you logged in.
Gleaning Planning	There are modules for education, career, skills and interests, and you can take career interest and personality tests	Yes, the recommended content mainly includes today's weather, hot movies, holidays, etc.
The point	There are modules for career matching, resume scoring, assessment area, route map, etc.	No

## 2.2 INADEQUATE PREPARATION FOR CAREER PLANNING

Career preparation is considered to be the foundation for one's entry into the workplace, but the actual situation shows that university students generally lack ideological preparation for career planning. Many university students still maintain their original study habits after entering university, i.e. studying for the sake of studying, lacking clear study goals. Some students also think that they can rest easy after entering the university of their choice, imagining that they will get a satisfactory job after graduation, which eventually leads to slackness in thinking and laziness in behaviour.

### 2.2.1 CAREER GUIDANCE IGNORES INDIVIDUAL STUDENT DIFFERENCES

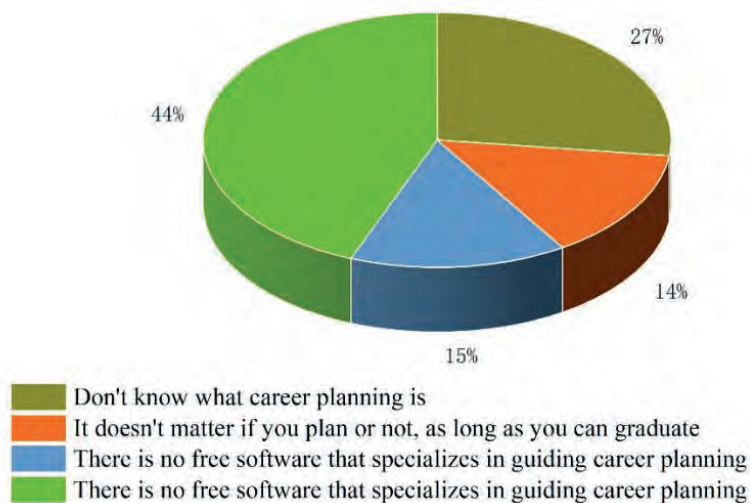
Career guidance is about the effect of students' career planning, but from the current situation of teachers' career guidance, it is not uncommon to ignore students' individualized differences. Currently, university teachers in career guidance will place students in the direction of choosing a career in an industry related to their major. For example, teachers of planning majors will introduce information about well-known advertising companies in the region in their career guidance. This is followed by the introduction of supporting industries or industries that require less professional skills. In the above career guidance, students' individual aspirations are easily overlooked, such



as students' personality interests and hobbies can be an important factor in employment.

### 2.3 ANALYSIS OF THE RESULTS OF A SURVEY ON CAREER PLANNING FOR UNIVERSITY STUDENTS

As shown in Figure 1, 44% of university students did career planning because they did not have professional guidance, 27% did not know what career planning was, 15% did it because there was no software specifically to guide them in doing it, and 14% thought it did not matter whether they planned or not, as long as they could graduate. As you can see, the main purpose of career planning for most of those who have done it is to make their university career more planned, and there are very few people who are forced to do it. In the survey on the reasons for not doing career planning, most students did it because they did not know what career planning was or they did not think it was important, which shows that university students' awareness of career planning is weak and they need to be provided with a place where they can study at any time.



**Figure 1** College students' perception of career planning

### 3 ONLINE LEARNING IN THE CONTEXT OF BIG DATA TECHNOLOGY

Online learning in the context of big data technology is equivalent to networked learning, a way of learning in which learning communities share multimedia teaching content designed by course developers and experts on online learning platforms, and can engage in online discussions and exchanges with the technical support of big data. Online learning is summarised as changing the teacher-student relationship in

traditional teaching and the role of teachers in classroom teaching through the Internet, through big data technology It enables different learning and teaching activities, using the communication mechanism of modern information technology and a diverse learning environment to change the traditional teaching structure and the nature of education. Online learning is highly efficient, low-cost, popular and personalised, trackable and manageable, learner-centred, and allows students to take control of their own learning progress, providing a good learning path for learners throughout their learning and lifelong learning.

### **3.1 BIG DATA TECHNOLOGY AND UNIVERSITY STUDENTS' CAREER PLANNING AND EMPLOYABILITY**

Career planning for university students is a process that takes place throughout their university career, and big data technology can provide continuous learning resources so that learners can study independently at any time. The Big Data technology recommendation platform is based on WeChat applets, which provide an efficient solution to the development of university career planning courses on the online platform based on the advantages of applets that do not require downloading and updating, avoiding the resistance of learners to downloading apps that take up mobile phone memory, and designed with the principle of practical convenience for university teachers and learners. The content of career planning for university students is aimed at university students who, compared to other age groups, have the ability to study independently and have more time to spare, so the platform is recommended through learning big data technology to provide learners with resources they are interested in for study in their spare time. At the same time, in the face of more learning resources and many complex employment information, achieving accurate employment information pushing can save teachers from screening resources to send to learners, and also enable learners to receive learning resources that are more in line with their own interests and characteristics. For career planning education for university students, students are the main body and teachers play a guiding and directing role, encouraging students to fully understand themselves in the learning process, building awareness of the importance of career planning education for university students and making them aware of the importance of career planning.

## **4. CONCLUSION**

In this context, in order to better meet the employment needs of the society, teachers can innovate the working mode around career planning and employment guidance, guide students to form correct career goals and life ideals through methods such as career guidance under big data technology, give full play to teachers' and students' subjective This will give full play to the initiative of teachers and students and

promote the change of the career guidance model in schools, so that students can complete their career planning more efficiently and with higher quality, and lay the foundation for the smooth employment of university students. The application of career planning and employability of university students under the big data technology platform can well meet the personalised learning needs of learners and their demand for career planning learning, as well as the enhancement of employability.

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**INCORPORATION OF INFORMATION TECHNOLOGY FOR TEACHING  
PHARMACOLOGY COURSES IN COLLEGES AND UNIVERSITIES FOR THE  
COMPREHENSIVE EDUCATION MODEL OF POST-COURSE COMPETITION  
CERTIFICATE**

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**ABSTRACT**

In the information technology era environment, education and teaching are also affected by the information technology. In this paper, we construct a framework for informational teaching in pharmacology and build a high-quality teaching resource library suitable for informational teaching. By analyzing the expertise mastery of students who have participated in the informatized pharmacology course. Pharmacology experiments were 97%, drug preparation knowledge learning was 98.5%, drug quality control was 96%, and pharmacodynamics was 97%. It can be seen that the pharmacology course through information technology allows students to better grasp professional knowledge and has some practical significance for improving the quality of teaching pharmacology courses in universities.

**KEYWORDS**

Teaching quality; Pharmacology teaching; Online course construction; Basic medicine; Teaching change

**1. INTRODUCTION**

In the whole life science, pharmacology, as an important bridge between basic medicine and clinical medicine, is not only rich and practical in medicine, but also closely related to other basic and clinical disciplines [1]. Nowadays, pharmacology teaching has been equipped with diversified teaching modes, and the integration of information technology and education has formed the development direction of education informatization, and informatization teaching is the concrete presentation of this development direction [2-3]. Informational teaching design, as the most important part of informational teaching, has also encountered new challenges [4]. The learning style is no longer limited to the teacher's lecture, the activity context needs to be connected with real life, the use of technology needs to be adapted to the development of the times, etc. [5-6]. Teachers are able to effectively build and manage the curriculum, strengthen the interaction between teachers and students, and students are able to acquire the knowledge they need in a purposeful and targeted way, actively constructing or reorganizing their own knowledge system [7]. Students' learning interest, learning ability, creativity, and application ability will be continuously stimulated and improved, and students' independent learning and teamwork ability will be enhanced [8].

This paper discusses the construction and practice of pharmacology network courses in colleges and universities based on information technology for the comprehensive education mode of post-course competition certificate, to broaden and improve the construction level of

network courses, and aims to provide reference significance for the exploration of the comprehensive education mode of post-course competition certificate of pharmacology.

## **2. ANALYSIS OF THE CURRENT SITUATION OF COMPREHENSIVE EDUCATION OF PHARMACOLOGY COURSE TEACHING AND POST-COURSE COMPETITION CERTIFICATE IN COLLEGES AND UNIVERSITIES**

### **2.1. COMPREHENSIVE EDUCATION MECHANISM OF “POST-COURSE COMPETITION CERTIFICATE**

#### **2.1.1. THE CONNOTATION OF THE COMPREHENSIVE EDUCATION MECHANISM OF “POST-COURSE COMPETITION CERTIFICATE**

In the concept of “post, class, race and certificate”, “post” means the enterprise job group and its core tasks corresponding to the university majors, which is the professional core quality that the employees must have to complete the corresponding job tasks. “The “course” refers to the development of professional training program of higher vocational colleges and universities, which is manifested in the setting of professional curriculum system, especially core courses, including professional curriculum structure and curriculum mode, from the specific professional core qualities corresponding to the aforementioned enterprise job groups. The “competition” is the vocational skills competition, and the “certificate” is the vocational skills level certificate, which is the “X” certificate piloted in China at present. Among them, the curriculum system is the core and carrier of integration, which is the setting of the core curriculum of the profession.

#### **2.1.2. CHARACTERISTICS AND PROBLEMS OF PHARMACOLOGY COURSES**

Pharmacology is a discipline that takes the basic theory of medicine as its guide, applies modern technology and pharmacological methods, and takes the effects of medicine on various functions of the body and the principles and mechanisms of action as the focus of teaching.

Based on the characteristics of the pharmacology curriculum, there are more pharmacology experimental projects, but students often do not pay attention to the experimental process, are not active and involved enough, and lack a rigorous research attitude. Contemporary college students grow up in an environment full of information technology and are able to manipulate various multimedia and network information resources quickly and skillfully. Therefore, the traditional teaching mode is usually difficult to make students interested, and only by using network resources and constructing a reasonable curriculum system can we re-invigorate students' interest in learning and participation in class, thus improving the quality of teaching.

### **2.2. THE NEED FOR ONLINE COURSE CONSTRUCTION AND COURSE DEVELOPMENT**

#### **2.2.1. CULTIVATING STUDENTS' INTERNET THINKING WITH “INTERNET+” EDUCATION AS A MODEL**

Compared with traditional teaching methods, contemporary college students are more interested in modern education methods and online teaching methods. Therefore, teachers can make full use of “Internet+” education mode in the teaching process, which can make students deeply experience the changes of “Internet+” on traditional teaching methods, extend teaching time and space, expand teaching contents, enrich teaching resources, adopt online and offline The hybrid teaching mode activates the traditional classroom through discussion, voting and testing, strengthens process learning, enhances students' enthusiasm and participation in class, and helps teachers to analyze students' learning in multiple dimensions, adjust teaching methods and solve difficult problems in time.

## 2.2.2. THE NEED FOR ONLINE COURSE CONSTRUCTION

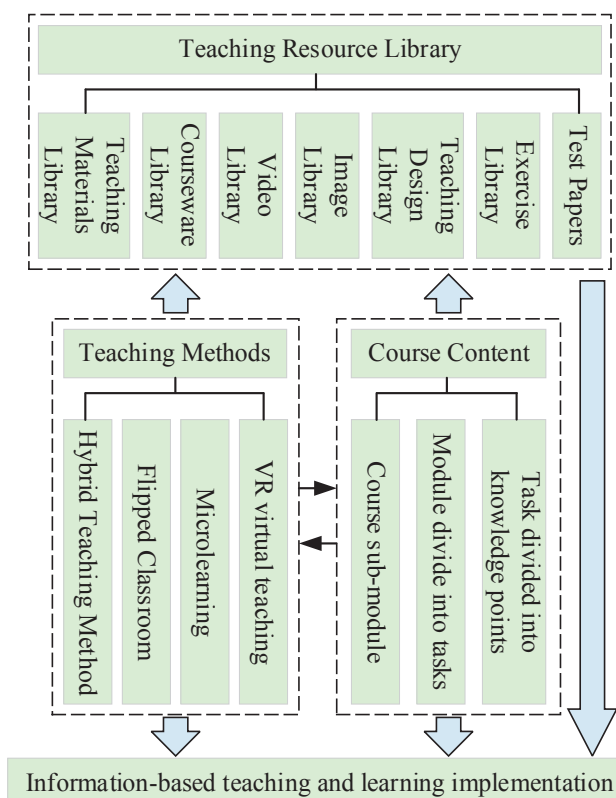
Pharmacology covers a wide range of knowledge, rich in content and information, and requires more knowledge points to be learned and mastered, thus affecting students' learning initiative and enthusiasm. The traditional teaching mode is relatively single compared to modern teaching needs, and students are less interested in learning and less efficient in the learning process. The online course platform belongs to the important interaction platform of learners and learning resources, which has significantly improved the effect and efficiency of students' knowledge acquisition, so it is significant to build online courses.

## 3. RESEARCH ON THE INTEGRATION OF INFORMATION TECHNOLOGY INTO THE TEACHING OF PHARMACOLOGY COURSES IN COLLEGES AND UNIVERSITIES

### 3.1. A STUDY OF THE FRAMEWORK FOR TEACHING INFORMATICS PHARMACOLOGY

Combined with the current situation of information-based teaching in pharmacology to analyze the integration of information technology into the whole process of teaching pharmacology courses, optimize course content and structure, improve teaching strategies, enhance teaching effectiveness, and improve the quality of professional training.

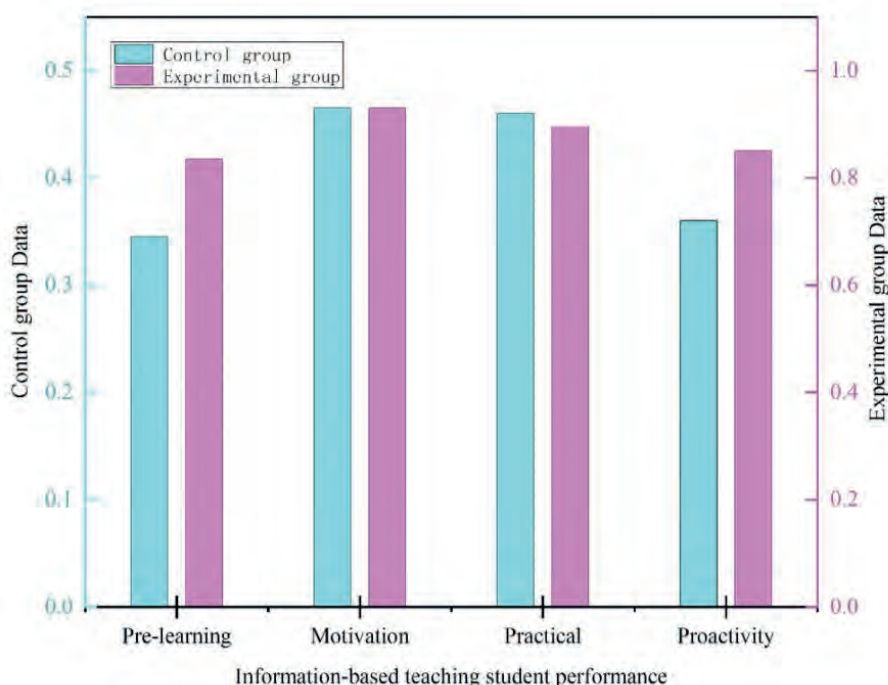
Specifically, the informatization teaching framework of pharmacology profession is shown in Figure 1, and its core problem is to solve "the problem of how to implement informatization teaching", and its focus is to solve "what to teach" and "how to teach", and the reform of teaching methods and course contents. The core issue is to solve the problem of "how to implement information-based teaching", which focuses on "what to teach" and "how to teach", and the reform of teaching methods and course contents. The framework model is summarized as follows: according to the needs of teaching content integration and teaching methods, build a high-quality teaching resource library suitable for informatization teaching, ensure the effective implementation of teaching methods, and finally evaluate the teaching effect through the new evaluation mode.



**Figure 1.** Framework for informational teaching of pharmacology

### **3.2. RESEARCH ON TEACHING PHARMACOLOGY COURSES IN UNIVERSITIES BASED ON INFORMATION TECHNOLOGY**

In order to investigate the effect of teaching pharmacology courses in colleges and universities based on information technology on improving students' classroom participation. In this study, the students' classroom participation was analyzed through the information technology on the learning situation and learning effect of the students in the experimental group and the comparison group, and the effect of information technology on classroom participation is shown in Figure 2. The classroom participation of the experimental group was significantly higher than that of the general class. It shows that the information technology teaching reform is conducive to enhancing students' learning enthusiasm and initiative. Students were more interested in information technology teaching, and since the pre-study and post-study review rates and interaction rates of students in the experimental group were higher, it showed that the information technology teaching reform helped students develop good learning habits.



**Figure 2.** Study of student engagement in the classroom

### **3.3. FEASIBILITY STUDY OF TEACHING INFORMATION TECHNOLOGY COURSES ON TEACHING PROFESSIONAL KNOWLEDGE**

In order to investigate the help of information technology for teaching expertise in pharmacology courses, students who participated in the information-based pharmacology course were tested for their expertise, and the feasibility of information-based pharmacology teaching for teaching expertise is shown in Table 1. Students who participated in the informatics pharmacology course had a high level of expertise. 97% for pharmacology experiments, 98.5% for drug preparation knowledge learning, 96% for drug quality control, and 97% for pharmacodynamics. It can be seen that it is feasible for students to better master their professional knowledge through pharmacology courses with information technology.

**Table 1.** Degree of students' expertise in pharmacology

Expertise	Mastery level
Pharmacological experiments	97%
Knowledge of drug preparation	98.5%
Drug quality control	96%
Pharmacodynamics	97%

#### 4. CONCLUSION

Under the environment of "Internet+", the efficient and fast characteristics of information technology have made the application of information technology penetrate into all aspects of national economy and social development. Informatization reform of education is an inevitable trend. Therefore, the teaching reform strategy of information technology in vocational education is an inevitable choice. Due to the epidemic, the importance of informatization of its education is once again reinforced for education all over the world. More teachers and students deeply appreciate the importance of informatization in education.

It can promote the reform and innovation of pharmacology teaching by exploring new ideas of pharmacology curriculum construction through information technology, so that students can have a broader space and resource support in the process of self-learning, and finally achieve to improve the learning effect of clinical medicine students, cultivate students' innovation ability and practical ability, so that they can have a solid theoretical foundation in future clinical practical work and become excellent medical professionals delivered by the school to the society.

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# A STUDY ON THE EFFECT OF EXERCISE AND NURSING CARE ON THE ALLEVIATION OF OSTEOPOROSIS PROBLEMS IN ELDERLY DIABETIC PATIENTS BASED ON BIG DATA ANALYSIS

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## ABSTRACT

To investigate the effect of exercise and care on the improvement of osteoporosis problems in order to propose a comprehensive clinical physical therapy program. In this paper, we explored the role of big data in the study of diabetic complications by using data mining methods, combined with correlation analysis and regression analysis to uncover the factors influencing osteoporosis in elderly diabetic patients. And based on this, the effect of exercise and care on the alleviation of osteoporosis problem was explored. For the dependent variables of osteoporosis, the regression coefficients of ALB, LYM, and NLR were -0.51, 0.25, and 0.22, respectively, and the increase of these indicators could increase the occurrence of osteoporosis.

## KEYWORDS

data mining; correlation analysis; regression analysis; osteoporosis; diabetic patients; comprehensive physical therapy

## 1. INTRODUCTION

Osteoporosis is a bone disease characterized by a decrease in the amount of bone tissue per unit volume [1]. The high prevalence of osteoporosis is in the elderly. Patients with osteoporosis may present with bone pain and shortening of the bone body [2-3].

Older patients with type 2 diabetes have skeletal muscle atrophy due to insulin resistance, abnormal release of inflammatory factors triggering abnormal skeletal muscle signaling and increased protein catabolism [4-5]. Motor unit loss is associated with loss of innervation or inadequate compensatory reinnervation of muscle fibers. If the denervated muscle fibers do not acquire new innervation, skeletal muscle cells atrophy, die, and are subsequently fatty deposited or replaced by other non-contractile tissues [6-7]. Myosatellite cells are involved in repair after skeletal muscle injury, and studies have found a decrease in the number of regenerating fibers and myosatellite cells in skeletal muscle in patients with type 2 diabetes mellitus A. There is also a conversion of myosatellite cells into adipocytes, which eventually causes skeletal muscle atrophy [8]. It has been suggested that comfort care for elderly patients with osteoporosis can improve their quality of life [9]. This study focused on the clinical effects of exercise and care on elderly patients with osteoporosis by studying the factors influencing osteoporosis.

## **2. BIG DATA-BASED INFORMATION MINING FOR DIABETIC PATIENTS**

### **2.1 THE USE OF DATA MINING IN DIABETES COMPLICATIONS**

#### **2.1.1 DATA MINING FOR BIG DATA ON MEDICAL VISITS**

Data mining (DM) is an all-round research inside a huge amount of data material to discover unknown patterns and valuable knowledge. Data mining mainly includes association rules, clustering analysis, data summarization and regression analysis. Data summarization is to summarize the basic characteristics of data in multiple dimensions and levels to discover the unknown laws. Association rules mainly analyze the interdependence and interrelatedness of things, as well as predict the occurrence and development of unknown things.

In recent years association rules have been gradually introduced into the research of Chinese medicine, which is now mostly focused on the prescription dispensing rules, the discovery of medication characteristics, the association between symptoms and signs, and the experience inheritance of famous and old Chinese medicine practitioners. Cluster analysis, also known as cluster analysis, is a multivariate statistical analysis method for classifying samples with similar or similar characteristics, which is to classify a large number of samples or data according to reasonable characteristics, without any pattern or a priori knowledge for reference. At present, cluster analysis is mainly used in TCM clinical research on TCM evidence, basic TCM research, and prescription and medicine analysis research. The general trend of TCM research is objectification, standardization and quantification, of which quantification is a very important aspect. The Bayesian network structure model is a directed acyclic graph, in which the nodes represent the indicators or variables to be examined, the directed edges represent the probabilistic correlations among the variables, and the probability set gives the conditional probability of each variable when conditioned on its parent node, which can reveal the complex relationships among numerous symptoms and between symptoms and symptoms, and quantitatively determine their diagnostic value.

Association rule analysis is a common method in data mining, mainly from the number is a common method in data mining, mainly from the data set to discover frequent data sets, so as to find some interesting combination of laws.

### **2.1.2 The evolution of data mining applications**

In recent years, in the context of big data and evidence-based medical research gradually, more and more researchers have combined big data research mining with Chinese medicine evidence and evidence element research. By using literature collation or data mining of clinical data information, we can visualize the distribution pattern of disease symptoms and evidence elements, and study the combination of disease and evidence at different levels and dimensions of research subjects, which can reveal the pattern of disease development more clearly and standardized, and provide support for clinical decision-making. Diabetes mellitus has a complex pathogenesis, diverse clinical manifestations, complications throughout the body, and numerous concomitant diseases because it mostly occurs in elderly patients. It can be said that diabetes and other systemic diseases are a closely linked network system, but there is a lack of research on the multi-level pathology-evidence combination of diabetes and its complications based on the massive clinical treatment data.

## **2.2 GERIATRIC DIABETES AND OSTEOPOROSIS**

### **2.2.1 OSTEOPOROSIS**

Osteoporosis is a disease of bone metabolism characterized by decreased bone mass and density, damage to bone microarchitecture, decreased bone calcium, and massive bone loss, leading to increased bone fragility and fractures, and includes both primary and secondary categories. Primary osteoporosis is a physiological degenerative lesion that occurs with ageing. Secondary osteoporosis is mostly caused by various diseases. With the deepening of aging in China, the incidence of osteoporosis is increasing, especially in postmenopausal women and elderly men. Patients with osteoporosis are at significantly increased risk of falls and fractures and have increased mortality.

### **2.2.2 DIABETIC OSTEOPOROSIS**

There is a strong relationship between type 2 diabetes and osteoporosis, with 2/3 of diabetic patients experiencing a reduction in bone density and the incidence of diabetic osteoporosis has reached 60%. Approximately 40-66% of diabetic patients develop osteoporosis during the course of the disease. Patients have atypical clinical symptoms, mostly with fractures as the first symptom, and are at increased risk of falls, fractures and death, which significantly shorten the life expectancy of diabetic patients. the risk of fracture is significantly higher in patients with T2DM, considering that it may be because they have lower cortical bone density and lower bone strength although they have higher bone trabecular density. T2DM increases the risk of fracture 13-fold, but the underlying mechanisms are not fully understood.

### 3. THE EFFECT OF EXERCISE AND CARE ON THE RELIEF OF OSTEOPOROSIS PROBLEMS

#### 3.1 ANALYSIS OF FACTORS INFLUENCING OSTEOPOROSIS IN ELDERLY DIABETIC PATIENTS

After data mining the diagnostic information of elderly diabetic patients, this paper investigates the influencing factors of their osteoporosis problem based on correlation analysis. The results of correlation analysis of factors influencing osteoporosis in elderly diabetic patients are shown in Table 1. The correlations of height, weight, BMI, HDL-C, LYM, NLR, and ALB with the occurrence of osteoporosis in elderly patients with type 2 diabetes were statistically significant, with P values less than 0.05. Among them, height, weight, BMI, and ALB were negatively correlated with the occurrence of osteoporosis, and the increase of their indexes could inhibit the occurrence of osteoporosis. HDL-C, LYM, and NLR were correlated with the occurrence of The correlation coefficients were 0.16, 0.18 and 0.205, respectively, and the increase of their indexes could promote the occurrence of osteoporosis.

**Table 1** Correlation analysis of influencing factors of osteoporosis

Factor	Ht(cm)	Wt(kg)	BMI(kg/m <sup>2</sup> )	ALB(g/L)
r	<0.001	<0.001	0.03	0.045
P	-0.42	-0.28	-0.25	-0.31
Factor	HDL-C	LYM	NLR	Ca
r	0.16	0.18	0.205	-0.23
P	0.035	0.028	0.034	0.16

According to the results of the correlation analysis, regression analysis was performed on height, weight, BMI, HDL-C, LYM, NLR, ALB and the occurrence of osteoporosis in elderly patients with type 2 diabetes. The results of the regression analysis are shown in Table 2. The intensity of the effects of osteoporosis in elderly type 2 diabetic patients were ALB, LYM, NLR, HDL-C, height, weight, and BMI from highest to lowest, respectively. the regression coefficients of ALB, LYM, and NLR were -0.51, 0.25, and 0.22, respectively. it can be seen that weight, height, BMI, and ALB were negatively correlated with osteoporosis, and their increase could reduce the occurrence of osteoporosis , NLR, LYM, HDL-C were positively correlated with osteoporosis, and their increase could increase the occurrence of osteoporosis.

**Table 2** Results of regression analysis of osteoporosis occurrence

Dependent variable	Argument	$\beta$	Wals	P
Bone mass condition	BMI	-0.05	0.01	0.01
	Ht(cm)	-0.14	3.17	0.03
	Wt(kg)	-0.1	0.52	0.01
	LYM	0.25	0.23	0.01
	HDL-C	0.16	1.53	0.001
	ALB(g/L)	-0.51	1.87	0.03
	NLR	0.22	0.31	0.03

### **3.2 EXPLORATION OF EXERCISE AND CARE FOR THE RELIEF OF OSTEOPOROSIS PROBLEMS**

Exercise can reverse osteoporosis and also alleviate the process of losing, bone mass due to aging, thus maintaining the normal shape of bone. The mechanism is that exercise increases blood flow to the bone cortex, resulting in increased blood calcium transport to the bone and increased transformation of osteoclasts to osteoblasts, which promotes bone formation. Exercise also produces stress on bone through muscle activity, and increased skeletal stress causes bone to generate negative pressure potential, making it easy to bind cationic calcium ions and promoting osteoblast proliferation and differentiation. Exercise promotes the secretion of sex hormones and increases bone calcium content. Exercise can also increase bone mass while increasing the use of blood calcium by bone tissue. In addition, frequent exercise outdoors can receive sufficient sunlight, which increases the concentration of vitamin D in the body, improves gastrointestinal function and calcium and phosphorus metabolism, and also promotes calcium absorption in the body.

### **4. CONCLUSION**

In this paper, we mined the diagnostic pathology information of elderly diabetic patients based on the data mining method under big data, and mined the factors influencing osteoporosis in elderly diabetic patients using correlation analysis and regression analysis. HDL-C, LYM, and NLR were positively correlated with the occurrence of osteoporosis, and the correlation coefficients were 0.16, 0.18, and 0.205, respectively, and the occurrence of osteoporosis was positively correlated with the above indicators were positively correlated. Nurses providing targeted exercise instruction according to the symptoms of primary osteoporosis patients is an effective means to improve the symptoms of osteoporosis such as bone mass and low back pain in elderly diabetic patients, which can achieve a complementary effect with medication. Comfort care for elderly patients with osteoporosis can provide them with a comfortable treatment environment, improve the effectiveness of their treatment and care, improve their health status, and enhance their quality of life.

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# ANALYSIS OF THE DILEMMA OF OPTIMIZATION AND DEVELOPMENT OF UNIVERSITY ENGLISH TEACHING MODE IN THE INTERNET ERA

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## ABSTRACT

In the Internet era, the online and offline deeply integrated teaching mode has become an important development direction in the new round of reform of university English education mode. In this paper, an experiment is constructed to test whether the Internet-based scaffolding teaching mode can alleviate students' reading anxiety, and the experimental data are analyzed. The average reading anxiety score of the experimental group before the experiment was 79.82, and that of the control group was 78.51. The mean reading anxiety score of the experimental group after the experiment was 61.07, while that of the control group was 73.27. It shows that the application of Internet-based scaffolding teaching mode has certain feasibility and practicality in the optimization of college English teaching mode.

## KEYWORDS

Internet era; Scaffolding teaching model; Reading anxiety; Teaching model optimization; Education model reform

## 1. INTRODUCTION

In the Internet era, the difference between language teaching and traditional foreign language classroom teaching is that the application of Internet technology in foreign language teaching is not limited to basic educational teaching tools, but covers a wider range of areas [1-2]. Modern Internet technology is used as an organic carrier of teaching contents, and the deep integration of Internet technology and teaching is carried out [3]. On the other hand, teachers make efforts to create a quality teaching curriculum for college English, so that students have more access in the classroom [4-5].

According to the students' emotional needs in the learning process, teachers should teach them in layers according to their different cognitive levels and emotional characteristics. For those students with weaker foundation, less interest in learning and lower self-identity, teachers have to provide targeted training and guidance. [6-7]. For students' English anxiety, teachers should design questions to help students understand and master the reading content according to their cognitive level and reading level. For those students who have a weak foundation, teachers can reduce the reading difficulty and set simple questions for them to help them comprehend and master English. [8].

In the current social and historical context, this paper aims to re-examine college English teaching, explore the changes brought about by the introduction of Internet technology into college English teaching, and how to achieve an organic combination of teaching and learning in the new environment, how to deal with the teacher-student relationship, how to build a



teaching model that combines Internet technology with the classroom, and how to solve the dilemmas faced in the development of the college English teaching model.

## **2. INNOVATIVE CHANGES IN THE ENGLISH TEACHING MODEL**

### **2.1. EXPLORATION AND STATUS OF UNIVERSITY ENGLISH TEACHING MODEL**

#### **2.1.1. TEACHING MODE INTERNET OPTIMIZATION**

The introduction of computer network technology into university English teaching has led to radical changes, which represents a further deepening of English teaching reform in universities..

Evaluating college English courses in three aspects: language knowledge, language skills and language application, not only detects the actual level of students, but also identifies the problems of students in the process of language learning, and provides feedback and guidance for college English teaching in order to improve teaching and improve the quality of teaching, college English education has traditionally received attention from all parties, including the state, society and the education sector, especially since the reform and opening up, China's college English has undergone a series of reforms and made progress.

With the increasing importance of Level 4 and 6 exams in the society, English teaching at university has gradually deviated from its teaching focus, and the one-sided pursuit of test scores and passing rates has led to criticisms such as "education for the test" and "English as a subject". At the same time, due to the massive expansion of higher education, the number of students receiving higher education has increased dramatically, while there is a relative shortage of teachers, weak faculty, and the supporting facilities cannot keep up, and it is difficult to find a matching model and method for teaching in a short period of time. According to the characteristics and rules of college English, the teaching mode of college English has been optimized and deepened to improve the quality of teaching to actively and orderly promote the development of college students' English ability, and these adapt to the requirements of cultivating talents in the new century.

#### **2.1.2. THE CURRENT SITUATION OF EXPLORING UNIVERSITY ENGLISH TEACHING MODE**

The "Internet" has been one of the hot topics of attention in recent years, and people hope to use the convenience of Internet technology to optimize the industry. In the face of the opportunities and challenges brought by the Internet information era, the education industry has seized the opportunity to reform and explore and actively make full use of Internet technology to realize personalized teaching.

The lack of proper knowledge and understanding of the teacher-oriented situation is the main reason for the delay in promoting the new teaching mode of college English. Some teachers use multimedia tools such as PPT too much in the classroom, lacking effective communication with students, and some teachers unilaterally pursue the "student-centered" form, ignoring the teaching of language knowledge. Teachers have not managed to deal with the organic combination of teaching and exploring both with the Internet as the core of college English, which is the current problem of college English.

## **2.2. THE DILEMMA OF DEVELOPING ENGLISH TEACHING MODEL BASED ON THE INTERNET**

### **2.2.1. DISSONANCE BETWEEN REGULATIONS, PLANS AND ACTUAL OPERATIONS**

Although the curriculum of college English in most colleges and universities has changed significantly from the previous one, setting up different types of classes to promote the

strengthening and development of students' English skills in various forms, the organization and teaching practice of each class type are not satisfactory.

There is also a certain dissonance between different class types in terms of teaching methods and formats. In the reading and writing class or reading and writing translation course, although the teacher uses a variety of teaching methods and forms with the help of modern Internet technology such as computer network, such as three-dimensional, interactive and collaborative teaching methods. The specific organization form also adopts such as discussion, debate, dialogue, etc., and the teaching process also presents the characteristics of video, audio and other vivid images. On the surface, it seems that university English classes have got rid of the original dull teaching atmosphere, increased the opportunities for students to participate, and provided conditions for improving students' application ability, but the courses are still mainly focused on knowledge transfer, with a preference for the explanation and practice of words and sentence patterns. It is worthwhile to rethink the root of the problem and make practical solutions.

### 2.2.2. DISSONANCE BETWEEN TEACHING CONTENTS AND TEACHING OBJECTIVES AND REQUIREMENTS

The inclusion of English level test content in English language teaching is a current trend in English language development. According to the data analysis of the existing situation, the analysis of the proportion related to the inclusion of English level test content in the classroom is shown in Table 1. Only 3% of teachers never teach content related to the Level 4 exam, while 38% of teachers always teach content related to the Level 4 exam. With such factors, the teaching contents chosen by teachers and the learning contents chosen by students largely reflect the tendency of exam-oriented learning, which to a certain extent restricts the overall development of students' language ability and thus makes it impossible to achieve the teaching goal of cultivating students' comprehensive English application ability, especially listening and speaking ability, and thus creates a serious dysfunctional phenomenon.

**Table 1.** Proportion of four levels of content taught in university classrooms

	<b>Always</b>	<b>Frequently</b>	<b>Sometimes</b>	<b>Occasionally</b>	<b>Never</b>
Number of people	76	48	34	36	6
Proportion	38%	24%	17%	18%	3%

## 3. RESEARCH ON THE APPLICATION OF UNIVERSITY ENGLISH TEACHING MODEL

### 3.1. INTERNET-BASED SCAFFOLDED TEACHING MODEL IN ENGLISH TEACHING APPLICATION

Scaffolding is a conceptual framework provided by the teacher based on the students' current learning level is used to help students complete the progressive understanding and construction of knowledge. With the help of the teacher's guidance, students finally complete the meaningful construction of knowledge.

To test how effective the Internet-based scaffolding model is in practice on students' reading anxiety and reading achievement, i.e., whether it can alleviate students' reading anxiety and verify that it can improve students' reading achievement. The collected data were analyzed and discussed as shown in Table 2. A control experiment was constructed by grouping 40 students to analyze the feasibility and practicality of the Internet-based scaffolded teaching model applied to college English reading instruction by comparing and analyzing the reading anxiety scale data of the two groups.

From the test data, it can be seen that the mean reading anxiety score of the experimental group before the experiment was 79.82, while the control group was 78.51. The mean reading anxiety score of the experimental group after the experiment was 61.07, while that of the control group was 73.27. This indicates that the Internet-based scaffolding model is effective in alleviating students' English reading anxiety.

**Table 2.** Descriptive statistics of reading anxiety post-test

		Number of cases	Average value	Maximum value	Minimum value
Experimental group	Previous Tests	20	79.82	84	63
	After the test	20	61.07	87	58
Control group	Previous Tests	20	78.51	82	54
	After the test	20	73.27	90	68

### 3.2. OPTIMIZATION OF TEACHING AND LEARNING MODE WITH INTERNET TECHNOLOGY SUPPORT

The following points are to be achieved under the requirement of Internet system optimization based on university English teaching principles of sustainable development, wholeness, openness and dynamic balance, starting from each Internet factor and the relationship between them, and adopting various measures and strategies, which is a complex process that needs to be promoted in all aspects.

In this process, the first thing to do is to take the concept as the breakthrough, because human behavior is guided by ideas and concepts, the same thing under the influence of Internet subjects holding different concepts will produce different results, sometimes even diametrically opposite, so the optimization the prerequisite and strategy for the establishment of university English teaching system is the change of concept. Teachers should have students in mind in the preparation, organization and reflection of classes, and the selection of teaching contents, organization of teaching activities and teaching methods should be based on students' needs and actual situation. Internet technology should serve students' learning and development and prevent the phenomenon that Internet technology occupies the center of teaching and learning or becomes a mere decoration for teaching. Take advantage of Internet technology and computer networks to create the necessary and good personalized and independent learning environment for students.

## 4. CONCLUSION

Trade, information transfer and cultural exchange between countries highlight the importance of English in the development of the new era. The common problem faced by education systems all over the world is how the teaching model should be transformed in the light of the demands of the times. The English teaching model has new requirements in today's constantly and rapidly developing information and the new English talents require profound changes in the teaching mode, which also brings serious challenges to the traditional teaching mode. In order to promote the development and improve the quality of college English teaching, it is necessary to study and examine the changes and problems that appear in college English teaching in the context of the Internet era, and to study the measures and steps to solve the problems by finding the root causes of the problems.

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# EXPLORING THE INTEGRATION OF RURAL CULTURAL REVIVAL AND DIGITAL MEDIA IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

This paper studies the degree of people's love for rural culture, and the study analyzes users' attention to local history, art, human feelings, and scenery. The data of users' favorite degree of country culture shows that the local history is 79.5%, the country art decoration is 87.3%, the country customs is 73.9%, and the country scenery is 92.4%, among which the attention of country scenery and the favorite degree of country art decoration are relatively high. We will increase the promotion of rural scenery and rural art decorations to attract users' attention and promote cultural exchange and rural culture dissemination. Digital media technology plays an active role in effectively promoting the development of rural agriculture and helping rural modernization.

## KEYWORDS

Rural culture, Rural art arrangement; Agricultural development; Rural modernization; Cultural exchange

## 1. INTRODUCTION

In today's digital age, the dissemination of art and aesthetics is constantly advancing the construction of public space [1]. Since the countryside is not the main carrier of China's economic, cultural, and artistic development compared to the city, the digital construction of rural public space lags behind that of the city, and how to use digital media to enhance the digital construction of rural public space is an important issue to be studied and explored [2].

With the promotion of urban-rural integration construction, the trend of urban residents returning to the countryside has increased, and rural public space and urban public space together constitute the main space for residents' daily life [3-4]. As an extension of public space, rural space has become a new platform for public art creation, expanding the creation area for public art [5-6]. Compared to urban public spaces that carry out a clear division of labor into functional areas, using rural spaces as a carrier of public art can make the presentation area and manner of art richer [7-8]. Farming has always been an important direction for rural development, and using farming landscape as the landing point for public art can combine rural farming culture with modern art [9]. Rural culture, rural values, and people's ideology and lifestyle can be reflected in rural public spaces through digital public art, enabling people to participate in rural cultural construction and public art works to the maximum extent [10].

In this paper, we analyze the integration of digital public space art into rural landscapes, and study the benign interaction between digital art and the environment and humanities as a basis for upgrading and improving the presentation of farming landscapes. The paper studies

the practical operation of digital public space art intervention in rural landscape, seeks the changes brought by digital technology and public art intervention in rural landscape under the influence of digital art, explores the future development trend and creative means of rural landscape design, and provides practical reference cases for the development of rural public space.

## **2. THE CURRENT SITUATION OF REVIVING RURAL CULTURE WITH THE INTEGRATION OF DIGITAL MEDIA TECHNOLOGY IN THE CONTEXT OF DEEP LEARNING**

### **2.1. DIGITAL MEDIA TECHNOLOGY RURAL CULTURAL REVIVAL**

#### **2.1.1. STATUS OF RURAL CULTURE CONSTRUCTION UNDER THE DIGITAL VILLAGE POLICY**

The construction of digital countryside provides the technology and platform for the transformation of rural cultural industry to digitalization. Various parts of China have responded positively to the digital countryside policy launched by the state, coordinating and coordinating the efforts of all parties to promote digital countryside construction as a whole. After years of digital village construction, the digital village policy system has become more perfect, and the construction of rural information infrastructure has been improved. With the popularity of Internet access among the public, cultural exchange through the Internet has become a mainstream trend, and the construction of interconnection infrastructure has provided a broad platform for the dissemination of rural culture in digital form. The digital construction of rural cultural resources plays an important role in protecting outstanding rural cultural resources, reshaping a benign rural cultural ecology, and promoting excellent farming culture.

#### **2.1.2. PUBLIC ART INTERVENTION IN RURAL CONSTRUCTION**

The intervention of public art will become one of the important ways to build rural public space and give feedback to rural construction with rural culture as the entrance. Public art has the characteristics of conveying artistic concepts, intervening in public space, and reflecting cultural status quo, and is a kind of transformation of the surrounding environment by human beings with consciousness, while human history and culture act on public art, public art will also subconsciously react to human cultural concepts.

## **2.2. DIGITAL MEDIA-BASED RURAL CULTURE**

### **2.2.1. RURAL CULTURE VISUAL RECONSTRUCTION MODEL**

The implementation of digital countryside construction, rural culture construction and rural tourism infrastructure construction breaks the previous geographical limitation of urban-rural information interchange and provides technical platform and cultural resources for the digitization of rural cultural resources. The digital transformation of rural cultural resources cannot be separated from the development of digital cultural industry.

The digital culture industry is a comprehensive industry that manufactures, produces, disseminates, and utilizes cultural contents based on digital communication and network technologies and the integration of various media forms. The development of the rural digital culture industry has transformed the input method of “culture going to the countryside” in the city into the external output method of mainly rural digital culture content products, from input to output, so that rural cultural resources break through the limitations and realize the interoperability of urban and rural cultural resources. With the development of rural digital culture industry, the designers’ ability to explore the excellent rural cultural resources and control digital technology has been improved, and a rural cultural visual reconstruction mode

mainly based on “rural culture + digital media technology + design” has been gradually formed, which is to revitalize and display rural culture and disseminate digital products with the help of network platform. The model is to revitalize rural culture and disseminate digital products through online platforms to promote rural culture.

### **2.2.2. COMBINATION OF DIGITAL MEDIA ART AND FARMING ENVIRONMENT**

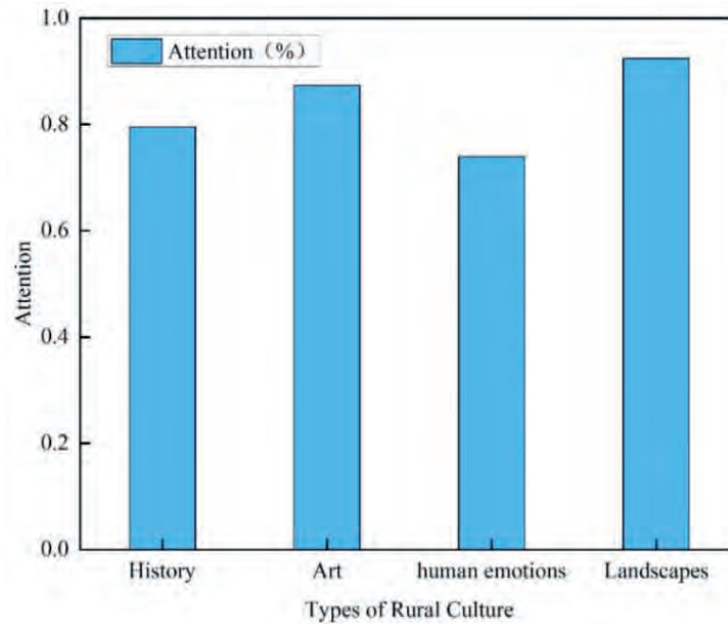
The current rural space renovation project is seriously homogenized and lacks space renovation based on the local rural environment and culture. The government strongly supports the modernization of rural space, but its spatial style is trended by internet popularity and lacks the cultural characteristics of local villages. The combination of digital media art and farming environment uses the regional language of farming environment to enrich rural public space and cultural forms, while exploring the value tendency of using art for the public, enhancing the experience of villagers and tourists in rural space through the newer public art forms, combining policy directions, integrating digital public space art into rural public space construction, and promoting cultural dissemination. The project also aims to integrate digital public space art into rural public space construction and promote cultural dissemination and economic development.

## **3. DIGITAL MEDIA-BASED RURAL CULTURAL REVIVAL DESIGN**

### **3.1. RURAL CULTURE CONTENT APPLICATION DESIGN EXPERIMENT**

In terms of visual reconstruction of rural cultural content products, the reconstruction content mainly takes the form of rural culture combined with rural policy information services, rural tourism services, special agricultural products promotion services, and rural social services. The cell phone software records local history, geography, people and scenery, so as to inherit and pass on culture and promote hometown culture and literature. The public uses the tourism service interface provided by the rural cultural content product cell phone software to conduct cultural exchanges and sales of agricultural products.

In order to understand which aspects of rural culture users pay high attention to, by constructing a study on users' attention to local history, art, human feelings and scenery, the degree of people's love of rural culture is shown in Figure 1. The user's favorite degree of country culture local history is 79.5%, country art ornament is 87.3%, country customs is 73.9%, and country scenery is 92.4%, among which the attention of country scenery and country art ornament favorite degree are relatively high. Therefore, we can increase the promotion of rural scenery and rural art ornaments to attract users' attention, so as to promote cultural exchange and rural culture dissemination.



**Figure 1.** Degree and type of rural cultural favorites

### 3.2. STABILITY ANALYSIS OF RURAL CULTURAL CONTENT PRODUCT INNOVATION

The boost of communication media is the external power of cultural communication, and the visual quality of digital products is the core of cultural communication, which directly affects the communication effect. With the development of information technology, digital media technology is also constantly updated. Applying some new technologies such as VR, AR, 3D modeling technology and digital image processing technology to rural culture communication system can realize the digital transformation of rural culture.

To test the stability of the digital media rural culture communication system based on deep learning. The data processing speed of the rural culture dissemination system is shown in Table 1. Set the user access line to 100 and operate the system at the same time. The system still maintains normal operation and the system performance are in good condition, so the digital media rural culture dissemination system based on deep learning is very stable.

**Table 1.** Stability studies of cultural communication systems

Test content	Test Results	Test pass status
User Permissions	Preventing over-authorization	Test Pass
System Licensing	Agree to authorize	Test Pass
Exporting data	Realization of requirements	Test Pass
Importing Data	Realization of requirements	Test Pass

## 4. CONCLUSION

The future countryside is taken as an important grip of the city's rural revitalization strategy. Starting from ecology, with conservation as the main principle, and insisting that villagers in the countryside take the position of owners to jointly promote a strategic plan to adapt to the development of the countryside, digital artistic empowerment of the farming environment is carried out while ensuring the inheritance of excellent farming culture. Through digital intervention in the farming landscape, highlighting the use of digital technology, advocating digital mindset, understanding the role of digital cognition in the future countryside, and comprehensively enhancing the industry of the countryside, this is an essential step in the development of China's rural revitalization.



Digital media means can be used to apply design aesthetics principles to the visual reconstruction of rural culture, making rural digital cultural content products more innovative, interactive, interesting and artistic, in order to realize the modern reconstruction of rural cultural symbols. Digital products with quality cultural content are more recognized by the public in the process of dissemination and can better stimulate the public's attention to the development of rural culture.

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# STUDY ON THE STRATEGY OF INTEGRATING THE DEVELOPMENT OF CIVICS AND EDUCATION WITH INDUSTRY IN THE INFORMATION AGE

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## ABSTRACT

The information technology era has posed new challenges to the development of the integration of the Civics curriculum and industry-education. In this paper, in order to study the strategy of integrating the development of Civics and Education with Industry in the information age, we analyze the current situation of teaching Civics and Education courses in the information age and discuss the influence of information technology platform on enhancing the articulation of Civics and Education courses. It also studies the teaching effect of the Civics course before and after using information technology. 73.95% of the students are interested in the course, compared with 48.85% before the study, and 87.45% of the students think that the focus of the course is easy to understand, compared with 63.57% before the study. Informatization is the direction of further development of the teaching of the Civics course and the development of the integration of industry and education.

## KEYWORDS

Civics course; Integration of industry and education; Information technology platform; Teaching efficiency; Teaching status

## 1. INTRODUCTION

In the current process of college education and teaching, teachers who can really eat the connotation of thinking and political education and gradually learn to integrate it in the college curriculum [1]. Then they can better help students to form good ideological and moral qualities and pay attention to their own behavior in the process of progressing in ideological and moral cultivation, and gain more progress and development about the ideological and political education [2-3]. Through such a model, students not only implicitly receive the ideological and moral qualities [4]. While actively learning scientific and cultural knowledge for the better development of their own abilities, they can also expand the conditions for the development of their educational abilities and the progress of their educational strengths in the new era by expanding the ideological and political literacy, which in turn promotes the development of students' learning and better lays the foundation for their progress [5].

The teaching mode of industry-education integration is a necessary and important method for colleges and universities to cultivate moral and technical, all-round and high-quality technical talents [6]. Civics course teaching is to strengthen its nurturing function while the course learning, and the two complement each other and promote each other [7-8]. With the demand of society for high-quality talents, it is of great practical significance to improve students' comprehensive literacy [9]. However, there are still many problems faced in the reform of college curriculum Civics under the background of integration of industry and

education, which need further improvement and enhancement. The reform of college curriculum thinking and politics under the perspective of integration of industry and education is of great importance, but at the same time, the reform of college curriculum thinking and politics in higher education institutions faces some problems and needs to take corresponding improvement measures.

## **2. THE DEVELOPMENT OF THE INTEGRATION OF CIVIC SCIENCE CURRICULUM AND INDUSTRY-EDUCATION IN THE AGE OF INFORMATION TECHNOLOGY**

### **2.1. INTEGRATION OF INDUSTRY AND EDUCATION IN THE DEVELOPMENT OF CIVIC SCIENCE COURSES IN HIGHER VOCATIONAL INSTITUTIONS**

#### **2.1.1. IMPROVE THE QUALITY OF EDUCATION AND THE LEVEL OF SCHOOLING**

Colleges and universities should vigorously improve the quality and level of education, implement the concept of industry-education integration at all levels of education and teaching work, realize the adaptation of education to technological progress, changes in production methods and social public services, and promote the upgrading of economic quality and efficiency. The integration of industry-education and the Civic and Political Science curriculum both emphasize the leadership of values and the refinement of professionalism in terms of education objectives, and attach importance to the sustainable development ability of talents, which has become the new mission of the times for education and is constantly empowered and strengthened.

Under the perspective of industry-education integration, the reform of the Civic and Political Science curriculum in colleges and universities is of great significance. It is important to carry out Civic Education through the whole process and all links of talent cultivation, strengthen students' ideological and political education by linking Civic Theory with reality, plant patriotism sentiment, inject red gene and spirit of model workers and craftsmen, strengthen character cultivation and professional ethics education, shape the soul of future talents, and cultivate excellent talents to serve the country and sustainable development in the process of industry-education integration. Therefore, the reform of Civic and Political Science curriculum under the perspective of industry-education integration can significantly improve the quality of college students, realize the innovation of culture and technology, promote industrial restructuring and improve the quality of education.

#### **2.1.2. THE COMPLEXITY OF THE LEARNING ENVIRONMENT IN THE CONTEXT OF INDUSTRY-EDUCATION INTEGRATION**

Under the background of industry-education integration, students' learning environment and living environment are not only concentrated in the campus, but also oriented to the society. Entering a more complex social environment, students will be exposed to more new things, which will have a significant impact on students' cognition and ideas. At this time, students have not yet formed stable values, and are easily influenced by external negative factors, resulting in confusion and lost in the complex society. If the school does not find students' ideological problems in time and take appropriate educational measures, it is easy to produce adverse consequences.

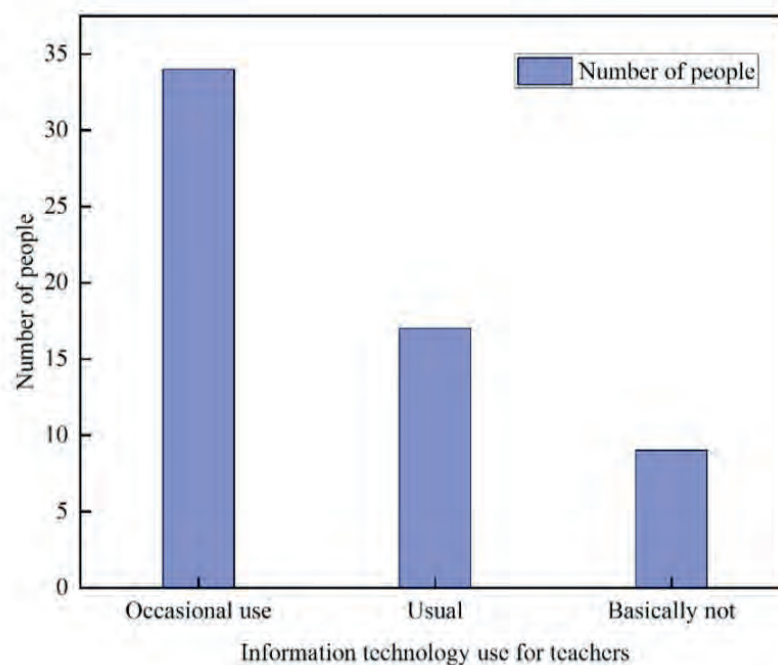
## **2.2. TEACHING IDEOLOGICAL AND POLITICAL COURSES IN THE AGE OF INFORMATION TECHNOLOGY**

### **2.2.1. ANALYSIS OF TEACHERS' IMPORTANCE**

The importance of teachers in higher education is critical to the integration of Civic Studies content into classroom education. Because teachers' attitude determines everything, only when teachers can better integrate the content of Civic Education can they help students form

a good learning experience and gradually guide their development. However, in the process of education and teaching at the present stage, we will find that many teachers in the process of college education do not pay enough attention to the content of Civic Education, and cannot correctly view the important role and significance of Civic Education, which makes it difficult to truly form the strength of education and teaching, and to develop the meaning of connotation value in education and teaching.

In order to understand the teachers' incorporation of information technology in the classroom in the Civics course, the evaluation data of 60 students were collected for analysis, and the teachers' use of information technology in the Civics classroom is shown in Figure 1. Thirty-four students evaluated that teachers only use information technology occasionally, 17 students thought that teachers usually use information technology, and 9 students said that teachers basically do not use information technology for teaching Civics. This means that in the context of the information technology era, although teachers can also be clear about the importance of adding information technology to the Civics course, they still do not pay enough attention to it, which is also something that can affect the effectiveness of Civics education.



**Figure 1.** The importance teachers place on the integration of information technology

### 2.2.2. COMPARISON OF TEACHING EFFICIENCY OF CIVICS COURSES

In the current education and teaching process, we will find that many teachers still adopt boring education mode in the process of education, which cannot better arouse students' interest in learning, nor can they integrate corresponding ideological and political education activities, but simply carry out didactic teaching. The lack of design and attention to the corresponding activities directly leads to the low interest of students in learning.

In order to investigate the impact of information technology on the teaching efficiency of the Civics course in the teaching process, the teaching effect of Civics course before and after using information technology is shown in Table 1. 73.95% of students were interested in the course after the study of teaching the Civics course with information technology, compared with 48.85% before the study, 87.45% of students found the focus of the course easy to understand, compared with 63.57% before the study, and 85.95% of students thought that the learning efficiency was improved, compared with 57.54% before the study. This implies a

relatively strong relationship with teachers taking full advantage of information technology to enrich the content of the Civics course. These Civics education activities are no longer boring for students and are conducive to improving students' understanding of Civics courses, thus improving the efficiency of teaching Civics courses.

**Table 1.** Changes in the teaching effect of information-based Civics courses

	Pre-study	After the study
Courses of interest	48.85%	73.95%
Comprehension focus	63.57%	87.45%
Learning efficiency	57.54%	85.95%

### 3. INFORMATION TECHNOLOGY PLATFORM TO ENHANCE THE ARTICULATION OF CIVICS COURSES

#### 3.1. REFINE THE STUDENT DATABASE

Enhance the whole layout of ideological and political theory course articulation, the most important is to promote the integration of the top-level design of curriculum value objectives. Promote the articulation of teaching contents and form a coherent talent training model. To achieve this, it is necessary to effectively use information technology tools to explore the educational synergy between online platforms and educators to do a good job of curriculum articulation. The student database should be refined, and the existing course value objectives and content settings of ideological and political theory courses for students of different levels and student learning should be fully integrated into the student database, and updated in real time.

It provides a realistic basis for educators to effectively deal with the problems of similar or repetitive course contents in ideological and political theory courses of different levels, and the incompatibility between teaching knowledge content system and students' cognitive development system. Teachers of ideological and political theory courses in colleges and universities should make good use of database information in the teaching process to grasp the progress of students' ideological and political theory course learning and precisely arrange course teaching objectives and contents.

#### 3.2. USING IT PLATFORMS TO ENHANCE STUDENTS' SENSE OF ACCESS

Ideological and political theory courses are an important way to enhance students' ideology, theory and sense of access, and are the main channel to establish moral education and cultivate the soul of people. In the age of information technology, the alienation of teachers and students under the influence of multiple real-life factors is deepening, and it is especially important to enhance the affinity and relevance of ideological and political education work, especially online ideological and political education work, using information technology platforms to discover the social hotspots of students' concerns and confusion, timely responses and answers, to achieve two-way interaction, is an effective measure to enhance the influence of ideological and political theory classes.

With the rapid development of big data and blockchain technology, we can try to explore the big data service with blockchain as the underlying technology and visualize the data while collecting students' thought dynamics extensively. After scientific and reasonable analysis of the obtained data, we can explore the needs of students' thoughts and confusion from the demand side, and provide a reliable and realistic basis for timely and effective communication. In this process, educators must have more solid theoretical knowledge, be problem-oriented, take the initiative to discover the causative factors and logic behind the problems, and give clear and powerful positive answers and guidance in a timely manner.

### **3.3. HIGHLIGHTING THE TEACHING CHARACTERISTICS OF CIVICS COURSES**

Teachers themselves should have high moral cultivation, be able to correct their teaching attitudes and master good knowledge of Civics, so as to help students make continuous progress in their thinking while learning professional courses, become people with high moral character and good moral cultivation, maintain a positive and optimistic attitude towards work, study and life, and take an excellent professional outlook, outlook on life and values as a clear guide on the way to growth.

The premise of ideological and political education value is to adhere to the education of people, ideological and political theory class teaching activities is to contribute to the value of ideological and political education from the theoretical state into the real state of the important driving force, strengthen the ideological and political theory class teaching reform and innovation is an effective measure to enhance this driving force, is also the most direct means to improve the quality and ability of college students.

### **4. CONCLUSION**

Under the perspective of industry-education integration, university curriculum thinking education is still in the exploration period of development, and there are relatively few cases and experiences to learn from. Colleges and universities should be brave to break the traditional teaching mode, explore new paths of development and continuously accumulate reform experience. By improving the curriculum thinking and politics education system, clarifying the content and methods of curriculum thinking and politics, improving the level of thinking and politics of higher education teachers, and building model education of thinking and politics courses. The innovative measures such as highlighting the characteristics of curriculum Civics teaching, closely contacting with enterprises and cooperating with each other to create a new model of curriculum Civics teaching more in line with the actual situation of colleges and universities.

In the context of information technology, the various temptations that students face are increasing, and the Civic Science curriculum is integrated into the education and teaching process. It can help students to identify the correct information among various kinds of information, which is beneficial to their growth. And in the current college political work, only the counselors devote their efforts to help students to avoid the development of various undesirable factors, in order to better form a barrier for students to learn. For students to choose the right path of life, help students to establish a correct world view, outlook on life and values, and promote the formation of students' ideological and moral cultivation.

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# DESIGN OF ENGLISH WEB TEACHING RESOURCE SHARING PLATFORM BASED ON MOBILE WEB TECHNOLOGY

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## ABSTRACT

This paper constructs the design of English online teaching resource sharing platform, elaborates the principles of teaching resource sharing platform development, studies the learning mode of sharing platform, and tests the stability of teaching resource sharing platform. 100 users browse the teaching resource platform with a response time of 1-1.5 seconds, 500 users browse the teaching resource platform with a response time of 3-4.5 seconds, and several illegal users log in to the platform with a recognition time of 5-7 seconds. The response time is 5-7 seconds, the average automatic database backup time is 2 seconds, and the response time of 100-500 users browsing the teaching resource platform is less than 5 seconds, which meets the standard. Therefore, the English network teaching resource sharing platform based on mobile Web technology is helpful to improve the efficiency of teaching resource sharing.

## KEYWORDS

English online teaching; Teaching resources; Development principles; Database; Sharing platform

## 1. INTRODUCTION

With the development of the Internet and computer information technology, the generation, development, acquisition and application of knowledge are undergoing unprecedented and profound changes. And these changes are quietly changing the way of teaching and learning for human beings [1-2]. As one of the fastest innovating, most versatile, and most penetrating high technologies in the world today, information technology is not only profoundly changing the way people live, but also changing the way you and I learn [3-5]. In order to accelerate the construction of education informatization, schools have started to vigorously carry out the construction of network resource platforms, open network resources, and establish network and information resource sharing mechanisms, so as to achieve the great teaching goal of education informatization leading to education modernization [6-7]. The arrival of mobile Web has ushered in new opportunities for educational informatization [8]. Web advocates personalized services, focuses on interaction and uses collective wisdom, and applying this technology to the construction of teaching resource platforms in schools has become an inevitable trend in the current high-quality curriculum platform [9-10]. The English Web teaching resource sharing platform expands the depth and breadth of networked college English learning so as to achieve the most optimal teaching effect.



## **2. RESOURCE SHARING PLATFORM PRINCIPLES AND LEARNING MODEL**

### **2.1. PRINCIPLE OF TEACHING RESOURCE SHARING PLATFORM DEVELOPMENT**

#### **2.1.1. EASE OF USE PRINCIPLE**

As far as the teaching resource sharing platform is concerned, its ease of use is a direct indicator to evaluate the system. We should not let it become a replica of the textbook content, but should fully consider the learning environment and learning preferences of students, summarize the rules of students' online learning through systematic demand research, and develop a system that is easy for students to accept and use in a targeted manner.

#### **2.1.2. USABILITY PRINCIPLES**

The teaching resource sharing platform is not only to pile up teaching resources, but also to be able to make the platform welcomed by everyone, improve the click rate of the platform, and thus enhance the usage rate of the resources. Therefore, usability is a necessary quite a few requirements for the system. Thus, we need to study the majority of teachers and students, what kind of resources they need, what kind of resource presentation forms they need, and implement them in the system with corresponding technologies for their needs.

#### **2.1.3. STABILITY PRINCIPLE**

The teaching resource sharing platform, with basic Web technology development, is a relatively complex resource sharing platform, which not only needs to complete the sharing of common documents, but also needs to solve the problems of automatic document format conversion, multimedia processing technology, and easy browsing of documents. At the same time, the platform needs to face all teachers and students of the university, and also includes visitors from outside the university. When the number of accesses is high, it is easy to cause the access speed of the system to drop and make the service stop or become unstable. Therefore, the system needs to be designed with stability in mind, optimizing the data reading efficiency and improving the stability of the system as much as possible.

### **2.2. STUDY OF SHARED PLATFORM LEARNING MODEL**

#### **2.2.1. SELF-DIRECTED LEARNING MODEL**

The self-directed learning mode is a learning mode in which learners set and accomplish specific learning goals according to their own conditions and needs under the regulation of the overall teaching objectives and the guidance of teachers. This theory is also in line with the individual participation characteristics of the Web platform, which provides students with learning resources and allows them to obtain useful information according to their own needs, while actively seeking answers to their questions on their own. Autonomy.

#### **2.2.2. COLLABORATIVE LEARNING MODEL**

The collaborative learning model is a way of organizing students' learning in small groups, in order to achieve common learning goals. The main modes of collaborative learning are competition, debate, group work, and role-playing. The Web platform allows students to work in small groups on the same topics to develop critical and creative thinking.

#### **2.2.3. DISCUSSION-BASED LEARNING MODEL**

Discussion-based learning mode is a learning mode in which multiple learners acquire knowledge through discussion with certain help. There are four main forms of discussion learning mode in specific teaching practice: problem-based discussion method, experimental discussion method, exercise based discussion method, and random discussion method. On the Internet, a teaching platform, there are two main types of discussion learning modes:

synchronous discussion and asynchronous discussion.

### 3. ENGLISH ONLINE TEACHING RESOURCES SHARING PLATFORM DESIGN AND TESTING

#### 3.1. DATABASE DESIGN

Almost all database systems can be combined with NET platform to provide database support for NET system, including ORACLE, SQL SERVER, ACCESS, MYSQL, etc. The architecture of shared teaching resources system is shown in Figure 1. SQL SERVER is chosen as the database for system development. SQL SERVER can provide powerful data access and data management tasks, and can efficiently pass the data business dynamically through the logical processing layer to the surface layer and present it to users in the form of page data.

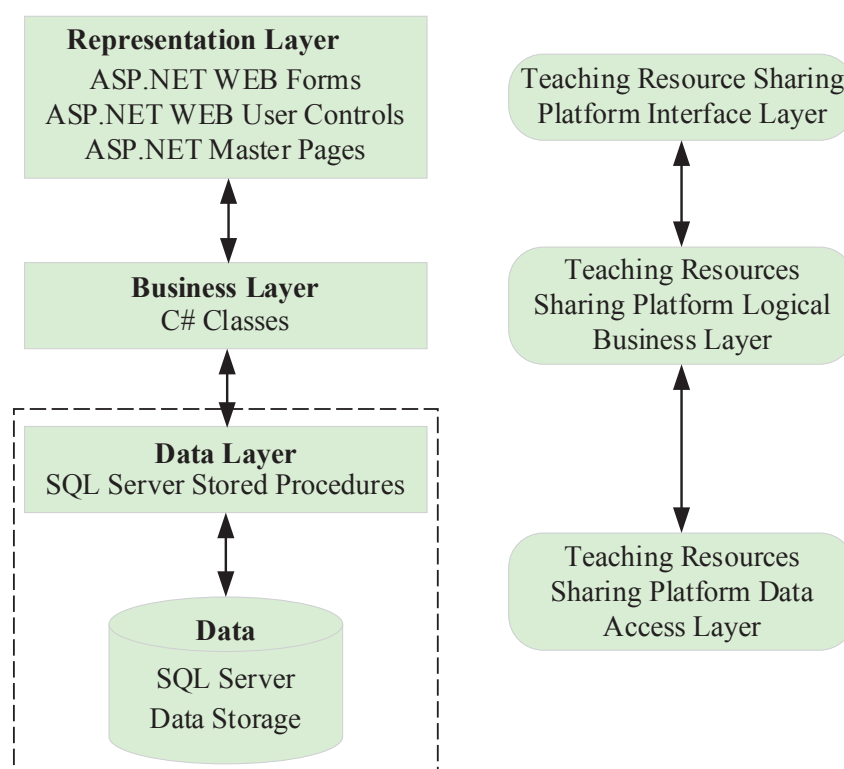


Figure 1. Database system architecture

#### 3.2. PLATFORM STABILITY TESTING

In order to test the stability of the English teaching resource sharing platform, the performance of the teaching resource sharing platform was tested by simulating various functions of the platform as shown in Table 1. 100 users browsed the teaching resource platform with a response time of 1-1.5 seconds, 500 users browsed the teaching resource platform with a response time of 3-4.5 seconds, several illegal users logged on to the platform with a recognition time of 5-7 seconds, and the average automatic database backup time was 2 seconds. The response time of 100-500 users browsing the teaching resource platform is less than 5 seconds, so the platform stability test is passed. It shows that the English network teaching resource sharing platform based on mobile Web technology can meet the requirements of information security and stability.

**Table 1.** Performance test data of teaching resource sharing platform

Test number	Test	Test content	Test results
1	Platform configuration testing	Ability to successfully configure the system in Windows 10	Success
2	Multi-user platform response time testing	Response time for 100 users to view teaching resources	1-1.5 seconds
3	Multi-user platform response time testing	Response time for 500 users to view teaching resources	3-4.5 seconds
4	Platform Security Testing	Multiple illegal users logged into the platform to identify the time spent	5-7 seconds
5	Platform data backup test	Set the average time for automatic database backup	2 seconds

#### 4. CONCLUSION

Based on mobile Web technology, the English online teaching resource sharing platform takes the Internet as the base to integrate polymorphic course resources, diverse forms of teaching communication, diverse interpersonal interaction and communication activities, diverse teaching media technologies and diverse evaluation methods with the university English course to create an ideal English teaching environment that supports “independent exploration, multiple interactions, contextualization, cooperative learning and resource sharing” and construct a new teaching structure model. The new model of teaching structure is constructed by creating an English teaching environment that supports “independent exploration, multiple interactions, context creation, cooperative learning, and resource sharing”. The construction of this model makes up for the shortcomings of single online teaching and traditional classroom teaching, expands the classroom teaching space, broadens students’ access to education and information, and gives students more autonomy in learning.

#### 5. ACKNOWLEDGMENTS

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# THE CULTURAL SYNDROME BEHIND THE METAVERSE ELEMENTS IN FILM AND TELEVISION WORKS

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## ABSTRACT

This paper explores the cultural syndrome behind metaverse from the metaverse elements in film and television works. The metaverse elements are widely used in film and television works, including the creation and exploration of metaverse and many other aspects. In the metaverse, the cultural symptoms are mainly expressed in the use of cultural symbols, the presentation of cultural conflicts, and the construction of cultural identity. The results show that the health culture meta-universe has about 10%~35% improvement in stage evolution compared with the traditional meta-universe with the support of 5 major technologies. This study is of great theoretical and practical significance to deeply understand the influence of metaverse elements on cultural syndromes and to promote the construction and development of healthy cultural metaverse, and provides new ideas and perspectives for research in the field of culture.

## KEYWORDS

film and television works; metaverse elements; cultural syndrome; cultural symbols; cultural conflict; stage evolution

## 1. INTRODUCTION

As a new concept that has emerged in recent years, metaverse has attracted a lot of attention and research in various industries [1-2]. As a virtual, digital "second world", metaverse can be regarded as a community with its own special rules and culture, which contains many cultural factors and social phenomena [3-4]. As a popular cultural vehicle with wide distribution and influence, film and television works are constantly exploring and exploring the cultural symptoms and connotations behind the metaverse [5]. Literature [6] proposed the concept of "metaverse thinking" and pointed out that metaverse, as a digital, user-centered and diverse virtual community, plays an important role in cultural innovation and dissemination. The paper [7] analyzed the

connotation and components of metaverse culture and proposed the multiple characteristics of metaverse culture in the process of intermingling traditional and digital cultures.

This paper will first introduce the application of metaverse elements in film and television works, including two aspects of metaverse creation and exploration more. Secondly, it will analyze the expressions of metaverse elements in film and television works, which include cultural symbols, cultural conflicts and cultural identity in the metaverse. On this basis, the connotation characteristics and evolutionary stages of the health culture metaverse will be proposed, and the important position of the health culture metaverse in promoting global cultural innovation and development will be discussed.

## **2. META-UNIVERSE ELEMENTS IN FILM AND TELEVISION WORKS**

### **2.1 THE APPLICATION OF METAVERSE ELEMENTS IN FILM AND TELEVISION WORKS**

#### **2.1.1 CREATION AND EXPLORATION OF METAVERSE**

In film and television, the metaverse is often seen as a fictional world, and the creation and exploration of this world has become an important element in film and television. For example, in the movie "Top Gun", the protagonist Wade is searching for the hidden level in the game "Resurrection Beetle", and needs to solve the puzzle by understanding the author Harry Mason and thinking about him. This process not only shows Wade's wisdom and courage, but also gives the audience an in-depth understanding of the creator of the meta-universe and the cultural elements behind it. In the movie Avatar, the protagonist Jack enters the metaverse of Pandora and has a series of adventures and battles with the local Nami people. This process not only gives the audience a glimpse of a new world, but also makes them think deeply about issues such as human beings and nature, technology and culture.

Therefore, the creation and exploration of metaverse is not only an important element in film and television works, but also an important topic that can provoke the audience to think and explore.

#### **2.1.2 THE CULTURAL SYNDROME OF THE METAVERSE**

However, the creation and exploration of metaverse in film and television can also lead to some cultural symptoms. For example, the meta-universe "Oasis" in the movie "Top Gun" is full of various cultural elements, but it is a world controlled by the rich, and the poor are often unable to enjoy it. This cultural symptom suggests the problem of the gap between the rich and the poor and class solidification in the real society. For example, in the movie "Guardians of the Galaxy", the protagonist Peter Quill enters the

meta-universe of "Novak" and has a series of adventures and battles with Rocket Raccoon and other alien races. However, in this meta-universe, alien people are often regarded as "alien" and "inferior creatures", and this racial discrimination also suggests the racial problems in the real society.

Therefore, the creation and exploration of metaverse not only can show the cultural elements in film and television works, but also may trigger the audience to think and reflect on the problems in the real society.

## **2.2 REPRESENTATION OF METAVERSE ELEMENTS IN FILM AND TELEVISION WORKS**

Virtual reality technology is one of the important expressions of metaverse elements in film and television works. Through the virtual reality technology, the audience can feel the virtual world in the film and television works immersively. For example, the virtual reality game world "Oasis" in the movie "Top Gun" is presented through virtual reality technology. The audience can put on the VR headset and enter the virtual world in the film to experience the amazing scenes and plots depicted in the movie. In addition to movies, virtual reality technology is also widely used in TV series, animation and other film and television works. For example, the game scenes in the TV series "All in One" are presented through virtual reality technology, allowing the audience to feel the realism of the game world. The use of virtual reality technology not only enhances the visual effect of film and television works, but also expands the narrative space of film and television works, allowing the audience to better understand and experience the plot and characters in the film.

## **2.3 THE CULTURAL SYNDROME OF METAVERSE ELEMENTS IN FILM AND TELEVISION WORKS**

### **2.3.1 CULTURAL SYMBOLS IN THE METAVERSE**

Cultural symbols in the metaverse are a common element in film and television productions. These symbols can be cultural heritage from real life or fictional cultural elements. For example, in the movie Star Wars, the Jedi's costumes and lightsabers are a cultural symbol, and they symbolize the glory and power of the Jedi. And in the movie Avatar, the exotic plants and animals are a fictional cultural element, which represent the ecosystem and culture on the planet Pandora.

### **2.3.2 CULTURE CLASHES IN THE METAVERSE**

Since the cultural symbols in the metaverse come from different cultural backgrounds, conflicts between them are inevitable. For example, in the movie Star Trek, the cultural differences between humans and alien races lead to a series of conflicts and misunderstandings. These conflicts not only drive the development of the

story in the plot, but also reflect the real-life cultural conflicts and challenges of multiculturalism.

### 2.3.3 CULTURAL IDENTITY IN THE METAVERSE

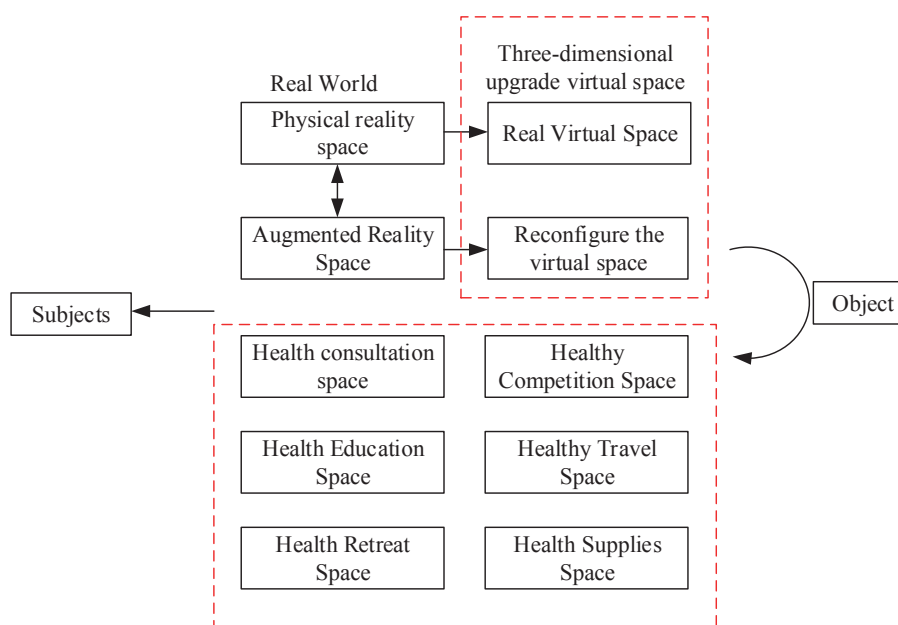
At the same time, cultural symbols in the metaverse can be a way for people to identify with their own cultural identity. For example, in the movie "Black Panther", the cultural symbols of Wakanda symbolize the cultural heritage of Africa and black pride. These symbols not only make the audience feel the unique charm of black culture, but also make the black audience feel their own identity and pride.

## 3. THE CONNOTATION CHARACTERISTICS AND EVOLUTION OF HEALTH CULTURE METAVERSE

### 3.1 THE INNER CHARACTERISTICS OF THE HEALTH METAVERSE

(1) A healthy interactive space with a fusion of real and imaginary links

Health Culture Meta-Verse is a new type of health space that integrates real health space and virtual space. Its spatial form of linking and fusing virtual and real expands the interaction space of users' health activities, and gradually develops various health forms under the impetus of new technologies, thus realizing the interaction, integration and symbiosis between the real world and virtual space. In the health metaverse, labor and capital are combined with data of the main production factors, triggering significant changes in the space of health supply and demand activities and ways, thus expanding the perspective of displaying health practice forms and basic forms. The core features of the health culture metaverse are shown in Figure 1.



**Figure 1** Core features of the health culture meta-universe



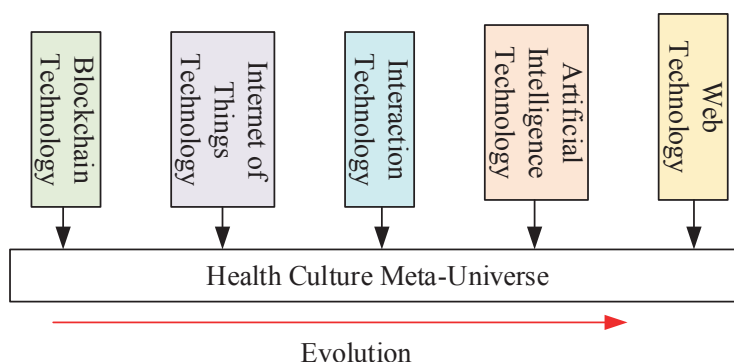
(2) Immersive experience space with somatic activity as the core

The basic means of health promotion is somatic activities, and the realization of health is accomplished through relatively independent somatic activities. The health metaverse builds a field with characteristics such as deep immersion and high realism, and realizes a new experience for users by establishing a health virtual space.

The immersive experience space extends the sensory experience of users. Relying on intelligent interaction technology, Health Metaverse creates a 3D upgraded space that is more immersive and interactive compared to the real world, providing people with a more free and expansive space.

### 3.2 STAGES OF EVOLUTION OF THE HEALTH CULTURE METAVERSE

With the continuous evolution and promotion of digital technology, the virtual reality of health meta-universe, the integration will also be continuously promoted according to different development stages such as digital twin, virtual native and virtual symbiosis. The technological reliance and stage evolution of the health culture meta-universe construction are shown in Figure 2.



**Figure 2** Technical support and stage evolution of health culture metaverse construction

(1) Digital twin stage, the real world, health activities, objects, people, scenes and other elements can be completely mirrored in the virtual world health space through virtual simulation technology, to achieve the digital simulation and dynamic presentation of all elements in the real health space.

(2) In the virtual native stage, the virtual health space of the health metaverse is a new virtual health space that is different from the real health and exists independently. The virtual imaginary world in this space is stimulated to expand the spatio-temporal system, and a large number of virtual entities beyond reality are derived.

(3) The stage of virtual-real symbiosis, in which the real health space and the virtual health space achieve deep integration and symbiosis and interactive linkage.

#### 4. CONCLUSION

This study systematically explores the cultural symptoms behind the metaverse elements in film and television works, analyzing the expressions and the cultural meanings represented by the cultural symbols, cultural mid-emergence, cultural identity and cultural innovation in the metaverse. Through the study, it is found that the reference and representation of metaverse elements in film and television works is not only to enhance the audience's entertainment and aesthetic experience, but also a way of cultural integration and transmission, which is an important form of modern cultural communication.

#### FUNDING

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# ANALYSIS OF THE PRACTICAL EXPERIENCE OF INDUSTRIALIZATION OF INTERNATIONAL EDUCATION IN AUSTRALIA BASED ON KNOWLEDGE MAPPING IN THE CONTEXT OF THE NEW CROWN EPIDEMIC

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## ABSTRACT

This paper firstly introduces the semantic network and the way of constructing knowledge graphs, as well as the application in the field of education. Then it focuses on analyzing the application of knowledge graph in the practice of international education industrialization in Australia, including the construction of knowledge graph in Australian education field and the application of knowledge graph in international education market. Finally, the advantages and application experiences of knowledge mapping in the practice of international education industrialization in Australia during the pandemic period of COVID-19 are summarized. The results show that knowledge mapping is effective in improving the efficiency of utilizing education resources and promoting the collaborative development of education industry in Australia. This paper provides valuable practical experience for practitioners in the international education field.

## KEYWORDS

knowledge graph; semantic web; international education; Australia; industrialization of education; application experience

## 1. INTRODUCTION

The outbreak and global spread of the new crown epidemic has brought unprecedented challenges to the international education industry [1-2]. In this context, how to improve the efficiency and competitiveness of the international education industry by means of information technology has become an urgent problem [3]. Knowledge graph, as a new type of data structure and information processing, is widely used in various fields [4]. In recent years, the application of knowledge graphs has received increasing attention. In the field of education, the application of knowledge graphs can help build educational knowledge systems and improve the efficiency of information sharing and utilization [5-6]. And in the international education industry, the application of knowledge graphs has become more and more common [7]. For example, educational institutions and technology companies in the United States have joined forces to create a knowledge graph called the Learning Opportunity Graph, which

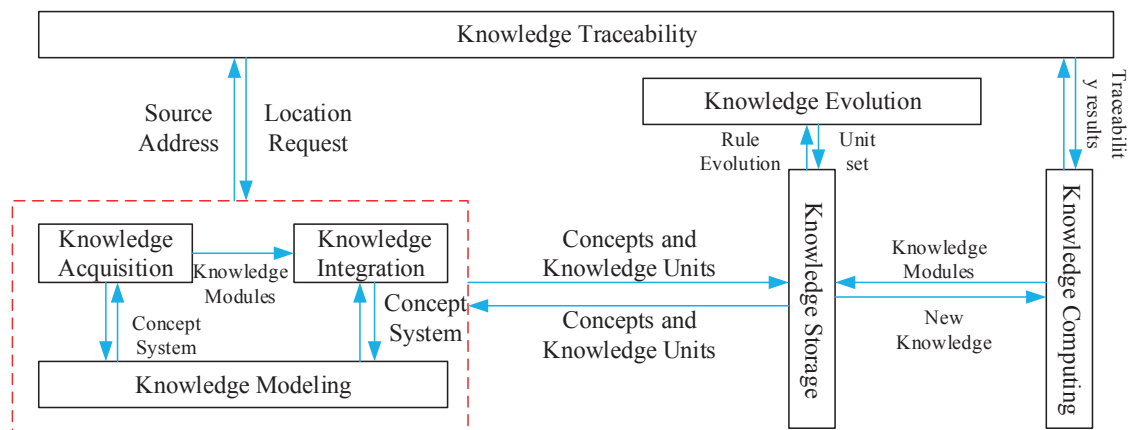
aims to provide better learning resources and a more comprehensive learning experience [8]. This paper first introduces the construction of knowledge graph and its application in the field of education. Then, it specifically analyzes the application of knowledge graph in the practice of international education industrialization in Australia, including the construction of knowledge graph in Australian education field and the application of knowledge graph in Australian international education market , which was affected seriously especially during the period of COVID-19. Finally, the experiences and advantages of knowledge mapping in the practice of international education industrialization in Australia are summarized, and useful inspirations and references to the international education industry in other countries and regions are proposed.

## 2. KNOWLEDGE GRAPH

A knowledge graph is a semantic network for representing entities, concepts, and relationships among them, which helps machines understand and reason out the meaning of human linguistic expressions. The essence of a knowledge graph is a structured, semantic, computable knowledge base that encodes and stores various types of entities and concepts and the relationships between them.

### 2.1 CONSTRUCTION OF KNOWLEDGE GRAPHS

The construction of the knowledge graph requires acquiring and integrating data from multiple data sources, including structured data, semi-structured data and unstructured data. The process of building the knowledge graph is shown in Figure 1. By semantic analysis and association mining of these data, they can be transformed into nodes and edges of the knowledge graph to form a complete knowledge network.



**Figure 1** Structure of knowledge graph construction process

The knowledge graph is composed of three main components: entities, attributes and relationships.

Entities are the nodes in the knowledge graph, which can be things, concepts, people, etc. Each entity has a unique identifier to distinguish different entities.

An attribute is a characteristic or property of an entity, for example, a person entity can have attributes such as name, date of birth, nationality, and so on. Attributes can be used to describe and classify entities.

Relationships are the connections between entities, for example, person entities can have kinship relationships, work relationships, and so on. Relationships can be used to establish connections and reasoning between entities.

These three components interact with each other to form the base structure of the knowledge graph. In the knowledge graph, entities, attributes and relationships are presented graphically for easy visualization and analysis.

## **2.2 KNOWLEDGE GRAPH APPLICATIONS IN EDUCATION**

In the field of education, the application of knowledge mapping is mainly reflected in the following aspects:

### **(1) Student knowledge modeling**

Students' learning experiences and knowledge points are modeled to form a knowledge map of students, so that teachers and students can understand students' learning and knowledge level for better teaching and learning.

### **(2) Course recommendation**

Through the analysis of students' knowledge map, courses and teaching materials suitable for their knowledge level and learning needs will be recommended to improve students' learning effectiveness.

### **(3) Teaching resource management**

The teaching resources are associated with knowledge points to form a knowledge map of teaching resources so that teachers can better manage and utilize teaching resources.

### **(4) Educational Assessment**

Through the analysis of students' knowledge map, students' learning effects can be assessed effectively, providing teachers with more targeted teaching suggestions to improve teaching quality.

## **3. ANALYSIS OF THE PRACTICAL EXPERIENCE OF INDUSTRIALIZATION OF INTERNATIONAL EDUCATION IN AUSTRALIA DURING THE PEIROD OF COVID-19**

### **3.1 THE APPLICATION OF KNOWLEDGE GRAPH IN THE PRACTICE OF INDUSTRIALIZATION OF INTERNATIONAL EDUCATION IN AUSTRALIA**

#### **3.1.1 CONSTRUCTION OF A KNOWLEDGE MAP IN AUSTRALIAN EDUCATION**

The construction of knowledge graph in the field of education in Australia mainly includes three aspects: data acquisition, data processing and knowledge graph construction. In the data collection stage, data need to be acquired from various educational institutions, government departments and other related organizations,

including student information, educational resources, educational policies, etc. In the data processing stage, the collected data are cleaned, integrated and processed to ensure the accuracy and usability of the data. In the knowledge graph construction stage, the processed data need to be mapped to build a knowledge graph in the field of Australian education.

### **3.1.2 APPLICATION OF KNOWLEDGE GRAPH IN AUSTRALIAN INTERNATIONAL EDUCATION MARKET**

In the Australian international education market, knowledge graph is mainly applied in the following three areas: education resource integration, intelligent recommendation for students and education policy development. In the area of education resource integration, knowledge graph can integrate the education resources of various educational institutions to improve the efficiency and accessibility of resources. In terms of intelligent recommendation for students, Knowledge Graph can recommend the most suitable schools and courses for students based on their interests, learning abilities and other information. In terms of education policy making, the knowledge graph can provide in-depth analysis of the Australian education market and provide strong support for policy making.

## **3.2 PRACTICAL EXPERIENCE OF KNOWLEDGE MAPPING IN THE INDUSTRIALIZATION OF INTERNATIONAL EDUCATION IN AUSTRALIA**

### **3.2.1 APPLICATION OF KNOWLEDGE GRAPH IN AUSTRALIAN INTERNATIONAL EDUCATION INDUSTRY**

Knowledge graph is a semantic web-based knowledge representation method that can graphically present various entities, attributes and relationships, and automate the reasoning and application of knowledge through techniques such as machine learning and natural language processing. In the Australian international education industry, knowledge graphs are widely used in the following areas:

#### **(1) Student recruitment**

By building a knowledge graph of students, it can match students' needs and backgrounds more accurately, provide more personalized recruitment services for students, and improve recruitment efficiency and quality.

#### **(2) Course recommendation**

By establishing the knowledge graph of courses, the relationship and similarity between different courses can be reasoned automatically to provide students with more accurate course recommendation service and improve their learning experience and effect.

#### **(3) Career Planning**

By building the knowledge graph of careers, we can automate the relationship and development path between different careers, provide students with more personalized career planning services, and help students better plan their future.

### **3.2.2 ADVANTAGES OF KNOWLEDGE GRAPH IN AUSTRALIAN INTERNATIONAL EDUCATION INDUSTRY DURING THE PEIROD OF COVID-19**

As Australia's fourth largest export, the international education industry has been one of the pillars of the Australian higher education economy. In the wake of the COVID-19 pandemic in 2019, the international education industry at Australian universities has been hit hard for several reasons. The number of international students enrolled in Australian universities fell from 46 million in 2019 to 700,000 by 2020, according to statistics from Australia's Department of National Education. Under the pandemic, Australian universities are facing severe enrolment situation and huge economic losses, which will directly affect the development of Australia's national economy, the development of universities and the whole form of employment in Australia.

The application of Knowledge Graph in the Australian international education industry has the following advantages so as to reduce the negative influence from COVID-19:

#### **(1) Accurate Matching**

Knowledge Graph can display various entities, attributes and relationships graphically, thus enabling accurate matching and recommendation of various entities such as students, courses and careers.

#### **(2) Automated Reasoning**

Knowledge graphs can automate the reasoning and application of knowledge through technologies such as machine learning and natural language processing, thus improving the efficiency and quality of educational services.

#### **(3) Personalized services**

The knowledge graph can provide more personalized educational services for students according to their needs and backgrounds, and improve their learning experience and effectiveness.

In summary, knowledge graphs have a wide range of application prospects and advantages in the Australian international education industry, and can provide more accurate, efficient and personalized education services for all parties, including students, educational institutions and enterprises so that it can provide a way to optimize the international education services and reduce the negative influence brought by the pandemic.

## **4. CONCLUSION**

This paper aims to explore the practical experience of Australian international education industrialization based on knowledge mapping in the context of the new crown epidemic. By analyzing the Australian experience, it is found that the application of knowledge mapping in international education during the pandemic period has many advantages, such as improving the efficiency of using education resources, promoting the synergistic development of education industry and improving the quality of

education services. Knowledge mapping can also help forecast trends and changes in education markets and institutions, and provide better strategic decision support for companies and governments. Therefore, this paper suggests applying knowledge mapping to education industries in other countries to improve industrialization and promote the development of the international education sector. Meanwhile, further research should be conducted in the future on how to optimize the construction and application of knowledge graphs to achieve better results.

## FUNDING

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## ABSTRACT

In this paper, we analyze the user behavior in the smart library, process the data through user behavior data conversion, etc., and analyze the overall user behavior in the library, so as to optimize the library user behavior services. 2.04 million people entered the library in the academic year 2021-2022, and 340,000 people entered the library. Of the total number of users, 19,000 checked out paper books and 14,000 reserved seats in the reading room using the seat reservation system, and June and December were the months with the highest number of visits and the longest time spent by students. Based on the characteristics and differences of users' behavior in university libraries, it can provide reference for university libraries to optimize management and upgrade services.

## KEYWORDS

Intelligent library; User behavior; In-library behavior; Behavioral characteristics; Library management

## 1. INTRODUCTION

With the rapid development of cloud computing technology, big data technology and various sensor technologies, the infrastructure architecture of library data centers and user service models have undergone fundamental changes, and data resources have become an important component of library information systems and an important guarantee factor for library service capabilities [1-3]. How to efficiently use big data resources to accurately sense and identify user needs, user information behaviors, user social relationships, library service methods and library business models is a prerequisite for libraries to improve insight into user needs and improve user reading experience, as well as a strong guarantee for libraries to carry out accurate and personalized services for users and improve their own service competitiveness [4-6]. Library users often need to borrow books and journals from the library in the course of their professional courses or research activities, and interdisciplinary or professional cross-learning research has become the norm [7-8]. These borrowing behaviors of users tend to have certain behavioral characteristics, commonalities among user groups, and correlations among borrowed titles [9]. The borrowing data generated by the library information system can be mined deeply through data mining techniques to discover such "hidden correlations" and to promote the service of university libraries in the direction of intelligence [10].

## **2. SMART LIBRARY USER BEHAVIOR PREDICTION DATA**

### **2.1. LIBRARY USER BEHAVIOR DATA PROCESSING**

#### **2.1.1. USER BEHAVIOR DATA CLEANING**

User behavior data cleaning refers to the processing of collected user behavior data, verifying the completeness of the data, filtering out junk data that are not related to user behavior analysis, in order to reduce the adverse effects of data redundancy and noise on user behavior analysis. The data cleaning process is carried out through a combination of technical and manual operations, mainly the correction of spelling errors, the addition of missing data values, the processing of duplicate data in different systems, and the removal of noisy data.

#### **2.1.2. USER BEHAVIOR DATA CONVERSION INTEGRATION**

As the data acquisition for user behavior analysis comes from different databases and data tables, these data may have different data storage formats and types, so the data field types stored in certain data tables need to be modified to achieve the unification of data field formats and types for the smooth implementation of the data mining process. The purpose of data conversion is to convert the data with different structures collected and extracted into integrated and uniform standard data, forming an integrated and uniform standard data collection. In addition, after the first loading of data, it is necessary to monitor the changes of data sources in real time and load the updated required data into the data warehouse.

### **2.2. LIBRARY USER BEHAVIOR SERVICE APPLICATIONS**

#### **2.2.1. USER BEHAVIOR DATA PROVISION SERVICE MODEL**

User personalized service refers to user-centered, data mining technology to mine and analyze user behavior data, obtain library users' information behavior, habits, preferences, characteristics and specific needs of users, and provide targeted and proactive services to meet their individual needs.

(1) To provide targeted information services including information consultation and information result delivery for different users' different information needs.

(2) User preferences found through analysis of user information or user's information demand behavior, so as to achieve proactive, useful information services for users that meet their requirements. Therefore, the behavior, habits, preferences and characteristics of library users are the basis of personalized library services, advanced data mining technology is an important means of personalized library services, and targeting and proactivity are the characteristics of personalized library services.

#### **2.2.2. USER DATA ANALYSIS TO OPTIMIZE RESOURCE CONSTRUCTION**

By using data mining technology to analyze and mine the circulation records and retrieval data of library users, we can count the denial and frequent borrowing sets of resources through classification patterns, and then make targeted additions to information resources. In addition, the utilization rate of resources can be analyzed and the outdated and aging resources can be eliminated in time. In addition, the information retrieval data can be used to obtain library resources as an alternative to purchasing titles. Through the actual needs of users for the purchase of library resources construction to improve the quality of book purchases, enhance the relevance and practicality, reduce the blindness, greatly improve the borrowing rate of books, is to improve the utilization rate of library resources literature, improve the quality of user services is an important link.

### 3. INTELLIGENT LIBRARY USER BEHAVIOR ANALYSIS

#### 3.1. OVERALL USER BEHAVIOR IN THE LIBRARY

In order to study the overall user behavior in the 2021-2022 academic year, based on the statistical analysis of big data technology, the user behavior in each month is shown in Table 1. 2021-2022 academic year, the university library was visited by 2.04 million people, and 340,000 people entered the library. Among all the users, 19,000 of them checked out paper books and 14,000 of them reserved seats in the reading room using the seat reservation system. The average length of stay in the library was 3.06 hours per visit. The month with the highest number of paper books and periodicals checked out was October, with 11,000 loans in one month. The months with the lowest number of loans were February and August, with the number of loans not exceeding 1,000 in each month.

**Table 1.** User access and borrowing behaviour by month of the academic year

Month	Attendance	Length of stay	Average length of stay	Number of books borrowed
1	78498	269169	3.36	6958
2	150	78	0.36	234
3	73195	202995	2.97	5763
4	14859	267211	3.887	7383
5	160893	438620	4.93	6836
6	221605	645281	4.85	4726
7	67381	218621	3.89	2208
8	64268	247226	4.72	628
9	131892	356672	2.98	8517
10	16464	519298	3.16	12723
11	180172	610882	3.69	7632
12	217004	802678	3.06	7184

#### 3.2. CORRELATION BETWEEN USER BORROWING AND SEAT USE BEHAVIOR

The correlation analysis between user borrowing and seat use behaviors is shown in Table 2. In terms of seat use, the correlation coefficients between the library access behavior and seat reservation behavior of college users are both around 0.3, which are very close to each other, but there are differences between the borrowing behavior and seat use behavior. The correlation coefficients between the borrowing behavior and seat-use behavior of science and engineering college users were both significant. Among them, the correlation coefficient between borrowing and seat use was higher in the self-study category. In the humanities and social science faculty, only the social science books were significantly correlated with seat use, while in the medicine faculty, only the self-subject books were significantly correlated with seat use. In general, although the values are different, they are all less than 0.1, and the difference is actually negligible, which is also due to the overall low borrowing volume.

**Table 2.** Correlation between access and borrowing behaviour

Type of discipline	People Behaviour	Self-Subject Borrowing	Social Science Loan
Science and Engineering	Number of visits	0.058	0.059
	Length of time in the library	0.012	0.020
Humanities and Social Sciences	Number of visits	0.018	0.085
	Length of time in the library	0.011	0.021
Medicine	Number of visits	0.089	0.048
	Length of stay	0.062	0.032

#### 4. CONCLUSION

This paper proposes a library mobile user behavior analysis method with big data mining technology, which uses big data mining technology to mine the behavioral preference features of library users, find out the implicit association between feature data, and analyze the behavior pattern according to the degree of association to realize the analysis of user behavior. This method effectively solves the problems of traditional analysis methods, improves the accuracy of behavior analysis results, and provides reasonable technical support for the development of libraries. By analyzing the reading patterns of users, it can provide reference for libraries to reasonably enrich their collections, book acquisition and editing, shelf placement, and business system process optimization, and actively provide more personalized services to users.

#### FUNDING

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# ANALYSIS OF THE DESIGN OF INTERACTIVE COMPOSITION TEACHING PLATFORM OF POPULAR MUSIC IN UNIVERSITIES UNDER THE BACKGROUND OF INTERNET

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## ABSTRACT

This paper discusses the performance of the teaching platform for interactive creation of popular music in colleges and universities based on iOS design, proposes key technologies for platform development, and tests the platform performance by LoadRunner10.0. Under the condition of 3000 concurrent users, the response time of the platform does not exceed 3 seconds, and this response time can meet the time requirement of the teaching platform. For the service of querying some more complicated data, the platform response time cannot exceed 10 seconds. It shows that the interactive composition teaching platform is a teaching platform in line with music majors and can make full use of learners' scattered time to complete learning and practice, which ensures the learning effect and helps improve the teaching effect of music courses.

## KEYWORDS

College popular music; Teaching platform; Music majors; Response time; Music course teaching

## 1. INTRODUCTION

Today, with the rapid development of information dissemination, the traditional classroom teaching model can no longer meet the needs of students, so the emergence of the Internet platform as a medium makes the "classroom" flexible [1-2]. Throughout the present, excellent music needs to be known, and with the help of the Internet platform, we can make our teaching activities richer and education more progressive [3-4].

The iOS-based music teaching platform is a comprehensive teaching platform that integrates basic information management, student music assignment management, music practice management, online classroom management, and information notification management by making full use of existing mobile Internet technology and network technology and combining the characteristics of the music major itself on the iOS platform [5-6]. The teaching platform provides professional support for teaching and learning of music majors and offers great convenience to distance learners through cell phone networks [7-8]. This is mainly reflected in the fact that teaching and learning can provide recipients including learning content, learning process, and learning methods, and this diverse learning mode not only satisfies normal classroom learning, but also provides learners with a better learning effect by completing practice or examination operations through the platform [9].

## **2. THE CURRENT SITUATION OF TEACHING POP MUSIC COMPOSITION IN COLLEGES AND UNIVERSITIES**

### **2.1. ONLINE MUSIC COURSES**

#### **2.1.1. OPERATION OF THE BUSINESS MODEL**

The unsoundness of the access mechanism for online courses has led to the participation of all types of online courses with varying quality and predictable effects. In the face of profit, many platforms that provide music teaching resources have lost their philosophy and trampled on their principles. Learning content that is not of any quality is put on the platform with a great deal of publicity and sound bites, wasting students' precious learning time as well as money.

Such behavior will cause students to gradually lose trust in online courses, which will be detrimental to the development of online courses, and the benefits brought by online courses mentioned earlier will disappear. It is not conducive to the development of education.

#### **2.1.2. LACK OF CORRECT CONCEPT**

The current network platform has not built out a core value system, and the chaotic phenomenon of network platform construction has affected the development and reform of China's Internet education. Due to the lack of correct concept, the network teaching platform has gradually evolved into a social platform, teaching resources are not fully utilized, and there is a lack of innovation in the construction of the platform. The management of resources is lax and lacks the advantage of overall cooperation. A large number of famous teachers as well as experts' high-quality educational wisdom and ideas are instead drowned by the network. What is valuable but cannot be fully utilized is a waste of resources. In online music teaching, because many teachers do not understand modern distance education theories, they let online teaching resources turn into simple knowledge transfer. In the process of construction of online teaching, educational institutions are obsessed with its quantity and ignore the problem of its quality. There is no prescribed answer to the accurate answer of music knowledge, and a unified standard cannot be achieved.

## **2.2. ANALYSIS OF INTERACTIVE COMPOSITION TEACHING PLATFORM FOR COLLEGE POP MUSIC**

### **2.2.1. BASIC INFORMATION MANAGEMENT FUNCTION MODEL**

Generally speaking, when students start to study music courses, students need to complete registration on the platform through mobile terminals, fill in student-related information, and after filling in the information, the teacher will authenticate and audit the submitted student information in the background, and the student's registration information will be valid only after the audit is passed, and they can log in through the client.

The users of music teaching platform include teachers, students and teaching platform administrators. User information management is the basis of teaching platform management, and user information management includes user information maintenance, user information query and statistics of user information and other operations.

### **2.2.2. FUNCTIONAL MODEL OF STUDENT MUSIC ASSIGNMENT MANAGEMENT**

For a teaching platform, first of all, students need to acquire knowledge through music assignments, which are the basis for students to learn and teachers to teach. Therefore the platform needs to complete the maintenance of music assignments of the system for music assignment management. We know that online learning systems generally use video, audio and other related materials, and this creation teaching platform also belongs to a kind of online learning system. Therefore, music assignments are represented in the form of text descriptions

and file attachments. Teachers can maintain music assignments and upload or delete music assignments, and after teachers upload music assignments, students can browse and query and download assignments in the system. Students find their target course by course category and can also do a direct resource search to achieve this. Management tools can be used to personalize their own course design, and learning tools can also be used to complete learning tasks.

### 3. KEY TECHNOLOGIES AND DESIGN ON IOS PLATFORM

#### 3.1. M-V-C DEVELOPMENT MODEL

The MVC paradigm for iOS is divided into the following categories:

(1) Model is the core data of the program, the class that holds the application data. Model methods provide data through a protocol between data sources and data meanings, and need to implement callback methods triggered by the controller.

(2) Views are components of windows, controls, and other elements that the user can see and interact with. The view component is provided by a subclass of the UIView class and is assisted by its associated UIViewController class

(3) The role of the controller is to bind the view and model and determine how to handle the application logic of user input. The behavior of the controller is implemented through three key techniques: delegation, target operations, and notifications.

#### 3.2. M-V-C DESIGN PATTERN

The goal of MVC is to implement 3 classes of code that are as distinct as possible. Make the 3 modules independent of each other and have good loose coupling of the components. MVC is a design pattern that makes the elements of MVC work independently of each other. The separation of the elements of MVC makes it possible to build maintainable, independently updatable program components.

### 4. TESTING OF INTERACTIVE COMPOSITION TEACHING PLATFORM FOR POPULAR MUSIC IN HIGH SCHOOLS

#### 4.1. PLATFORM FUNCTIONAL TESTING

Through the teaching platform for interactive composition of popular music in colleges and universities, the music assignment management module was tested as shown in Table 1. It shows that the operations such as music assignment maintenance and music assignment query can be completed through both roles of students and teachers. The data addition operation is completely normal, and the data deletion operation gives corresponding prompts to ensure data security.

**Table 1.** Music job management module function test table

Serial number	Test Items	Test Method	Test Method
1	Music assignment information entry	Enter the entry screen, enter some illegal data, test to see if it can be saved, and test to see if it can be saved by entering fewer required items.	Passing the test
2	Music assignment information revision	Select a music assignment information, modify a piece of information, and test whether it can be saved after modification	Passing the test
3	Music assignment information deletion	Can the music job information be deleted correctly, and test whether there is a prompt message before its deletion	Passing the test
4	Music assignment information upload	Complete the attachment upload by selecting the music assignment.	Passing the test

## 4.2. PLATFORM PERFORMANCE TESTING

In order to understand the performance of the teaching platform for interactive composition of popular music in universities, the teaching platform stress test is shown in Table 2. The test tool is chosen to be completed by LoadRunner10.0. Specifically, we can select certain typical services, write test scripts, run them under LoadRunner, and view the performance response of the teaching platform by observing the running results.

By selecting certain typical application system functions and simulating the number of virtual concurrent users, the number of virtual users set is 1500, 2000 and 3000. Under these different test conditions, the service access is concurrently executed and the platform stress test results are viewed under LoadRunner. After testing, the response time of the platform does not exceed 3 seconds under the condition of 3000 concurrent users, and this response time can meet the time requirement of the teaching platform. For the service of querying some more complicated data, the platform response time cannot exceed 10 seconds. Through the performance test of the music interactive creation teaching platform, it shows that the platform provides the maximum number of withstand users can meet the actual requirements.

**Table 2.** Teaching platform system stress test

Serial number	Number of virtual users created	Expected Value	Actual value	Regression test
1	200	200	200	1
2	800	800	800	2
3	1000	1000	1000	3
4	1500	1500	1500	4
5	2000	2000	2000	5
6	3000	3000	3000	6

## 5. CONCLUSION

The current music teaching in colleges and universities must make full use of Internet technology to assist teaching, which can provide a multimedia music world with sound and emotion for college students to learn music. The new age internet platform has had a very profound impact on the teaching activities of music, combining with the traditional teaching model to achieve the best teaching effect. While adhering to the traditional music teaching mode, we actively accept and inject fresh blood to make our teaching activities more dynamic and promote the development of music education in the new era.

Today, with the rapid development of the Internet, the new situation of music teaching activities is full of variety, and the new mode of "online teaching" has emerged. It has broken the traditional single "face-to-face" teaching, and the learners are no longer limited to school students, and the scope of teaching is also more extensive, which also provides sufficient conditions to meet the growing cultural needs of the people. It breaks the limitations of traditional teaching in terms of fixed location and time, making learning more convenient and more conducive to reasonable time arrangement.

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# RESEARCH ON INNOVATIVE INFORMATION MANAGEMENT MODE OF UNIVERSITY EDUCATION IN THE INTERNET ERA

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## ABSTRACT

This paper explores the current problems of the information management mode of college education in the Internet era, puts forward suggestions for innovative information management construction of college education, and conducts research on student learning aspects. There are 78.45% students think that there is no breakthrough of traditional teaching mode, 85.15% students think that the quality of online courses is not high, 63.85% students think that the course content is not attractive enough, 78.20% students think that the course is not focused, and 85.95% students think that the course content is fragmented. The professional level of the current college education management team needs to be improved, therefore, the innovative college education information management mode is an inevitable choice to adapt to the development of contemporary colleges and universities and student management.

## KEYWORDS

University education; Information management mode; Traditional teaching mode; Education management team; Student learning research

## 1. INTRODUCTION

Today, with the continuous development of technology, society has entered the era of information technology, and continues to rapidly develop the education business based on such an era, and the ideology, lifestyle and production methods have undergone profound changes [1-2]. Social development gradually moves toward the direction of realizing personalization, diversity and self-value of human beings, and the competition of enterprises gradually develops into the competition of talents and knowledge [3-4]. The optimization and reconstruction of the education model must be in line with the characteristics of the information technology development period, making full use of the current high-tech information technology to optimize the educational management of the campus, etc. [5]. In order to better meet the requirements of the times, we should focus on students, focus on cultivating their innovation, practical skills and IT literacy, and give them more attention and care, and give them thoughtful care. [6-7]. Higher education student management relies on Internet information technology to build information platforms and other new information technology methods to help teaching and learning, promote educational change, and facilitate the development of education. [8-9].

Universities can achieve digitalization, modernization and intelligence in education management by integrating Internet technology with education, which is one of the key areas for the development of the Internet industry. [10]. To improve the effectiveness of education management, it is necessary to establish an effective management model and adopt a high-

tech innovative management model to get rid of the shortcomings of current university management.

## **2. INNOVATIVE INFORMATION MANAGEMENT CONCEPT FOR HIGHER EDUCATION**

### **2.1. MANAGEMENT OF STUDENT EDUCATION IN HIGHER EDUCATION**

#### **2.1.1. STUDENT EDUCATION MANAGEMENT TIMES REQUIREMENTS**

Taking college students as the main body, using more maintaining scientific and healthy educational management means to promote the overall development of all moral characters such as moral, intellectual, physical, aesthetic and aesthetic, and improve the ability to organize activities, this is the inherent meaning of college student education management and its significance. Student education and management in higher education is not only the management of students' ideological and political education and daily student affairs, but also the assessment and evaluation of students' work, the mastery of skills and methods of student work, and the provision of guidance and services for the overall development of students. Student information management is a comprehensive test of education management in colleges and universities based on the requirements of the era of information technology and talent training, and is the foundation of the era for the training of future national builders.

#### **2.1.2. STUDENT MANAGEMENT MODEL**

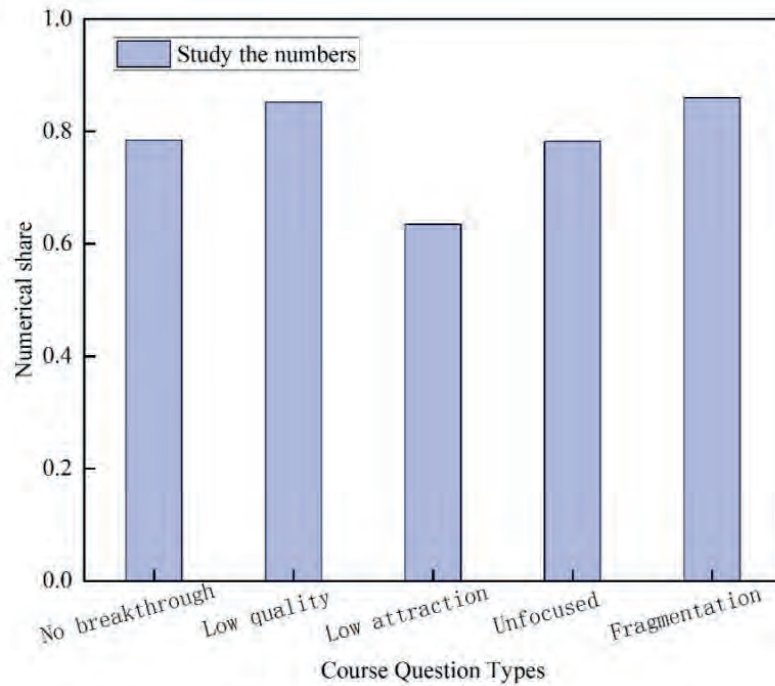
The school uses continuous research on educational objectives to clarify the goals of education, fully uses information technology as a tool to implement education, and builds a more scientific management model and mechanism to achieve a new type of educational management reform in the current education sector. In order to realize the innovative development of college students' education management, it is necessary to test the educational achievements by practical activities, to carry out meaningful research on the model after continuous optimization of changes, to examine the problems in practical application, and to make improvements to promote its relative maturity.

The manager makes a personal "answer" to the development of student management by conducting a comprehensive test of educational goals based on ideological and political education ideas, in order to explore the innovation of educational mechanisms and achieve the continuous development of educational models

## **2.2. MANAGEMENT MODEL INNOVATION ISSUES**

### **2.2.1. TEACHING MODE IN HIGHER EDUCATION**

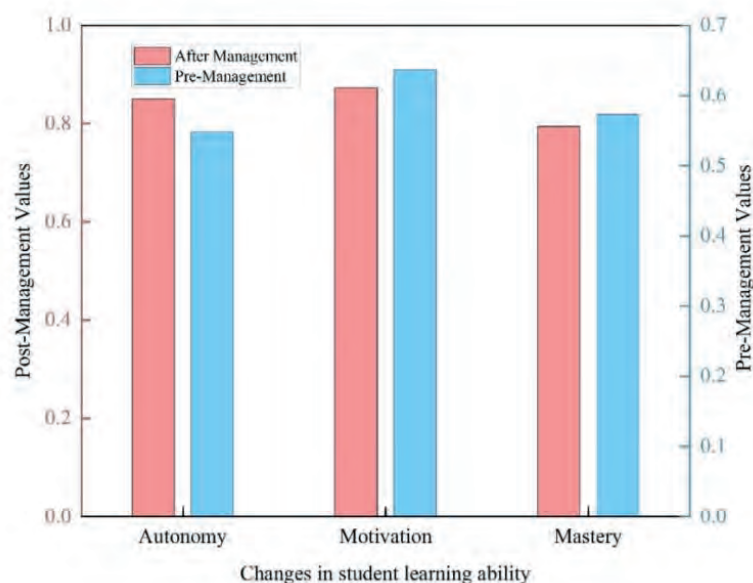
Study the current status of the current model of university education, the main factors of the current problems of university curriculum education are shown in Figure 1. University students' information-based education management in the context of the continuous development of the Internet, 78.45% students think that there is no breakthrough in the traditional teaching mode, 85.15% students think that the quality of online courses is not high, 63.85% students think that the course content is not attractive enough, 78.20% students think that the course is not focused, and 85.95% students think that the course content is fragmented. Through research and analysis, we found that the main reason for the low level of student motivation is the old education model and the lack of attractiveness of classroom teaching to students, resulting in low subjective motivation. It also reflects that the professional level of the current education management team needs to be improved.



**Figure 1.** Study of the main issues of higher education programs

### 2.2.2. THE DEVELOPMENT OF INNOVATIVE INFORMATION MANAGEMENT MODEL FOR HIGHER EDUCATION

Exploring the information management model of university education information based on the foundation of the Internet era for information innovation the changes of students' learning ability under the innovative management mode of education information are shown in Figure 2. Students' independent learning ability is 85% after management, 54.8% before management, learning enthusiasm is 87.2%, 63.7% before management, and knowledge focus mastering ability is 79.4%, 57.3% before management. The students' learning ability has been improved under the innovative information management of college education, these are the advantages of the innovative management mode of information technology in colleges and universities, such as meeting the current needs of students' actual learning, improving the management of university education, and accomplishing the task of talent training.



**Figure 2.** Changes in student learning under the information-based management model

### **3. RESEARCH ANALYSIS OF EDUCATIONAL MANAGEMENT INNOVATION IN HIGHER EDUCATION**

#### **3.1. INFRASTRUCTURE DEVELOPMENT**

The scientific and reasonable top-level design of education information management construction by university administrators is a necessary process of education innovation. It gives full play to the own advantages of each relevant department and each university, and gives full play to the overall benefits to prevent the situation of not sharing information, effective management of basic data and duplicate construction. The work is carried out on the basis of the principles of easy maintenance, scalability, stability and practicality. In order to guarantee the information management of colleges and universities to carry out, in order to achieve the current college platform information sharing and promote the sharing of campus resources, it is necessary to develop a scientific and perfect program as the basis, which requires the information construction as a whole to develop requirements.

Full use of big data technology based on the background of the Internet era to improve the visualization, intelligence and refinement of management. The relevant data is deeply and dynamically mined, the correlation between data is analyzed, and finally presented in the form of reports, which provides solid data support for school leaders' decision-making and finally improves the teaching level and quality of the school in all aspects. Making full use of big data technology in management work is conducive to timely grasp of important information and eventually realize intelligent management.

#### **3.2. INNOVATIVE EDUCATION INFORMATION MANAGEMENT SYSTEM**

In the information technology environment, schools are faced with a more complex environment, which places a higher standard on the way they are managed. For example, the traditional stereotypical management style has been made flexible and varied so that it can be adapted to different external environments. Gradually create a new teaching management style that can be universally adapted and accepted by both students and teachers, so that students can also actively recognize the need for management in the process of receiving it.

In the new technological environment, it seems imperative to reform the educational management system to get rid of the rigid layout of the original educational results and to simplify the information appropriately in order to convey it in the most concise way. Information technology will provide strong technical support when exploring improvements, thus accelerating the pace of educational management system reform. Information technology is widely used in school management organizations, and the users and owners of network information technology in a school are staff and employees. In this context, teachers and trainers need to be equipped with more professional knowledge and skills.

#### **3.3. CLARIFY THE ORGANIZATION OF EDUCATION MANAGEMENT**

The organizational structure can be evaluated in four ways:

(1) It is accountability, which refers to the need for all members of the organization to have a strong belief in serving the organization.

(2) It is adaptability, which means that the organization has to innovate and characterize its own structure in a timely manner according to the changes in the external environment.

(3) It is reactive, which means that the organization has to improve and refine accordingly to the changes or needs from the external environment.

(4) Efficient, which simply means that the importance of efficiency should be taken into account when carrying out relevant work. Not only the quality of the work done, but also the

time taken to complete it, in addition to other factors, such as resource consumption, should be taken into account.

#### 4. CONCLUSION

Educational management in higher education is student-centered and dedicated to enhancing the learning experience of students, and this concept is widely applied from the perspective of teaching and learning process management. Contributing to the discovery of students' potential is the biggest difference between it and the traditional educational management model, based on the way the Internet innovation is at the level of the teaching model that allows universities to change from traditional teaching to a comprehensive teaching model. It allows students to change from passively receiving knowledge to actively participating in it. Among the systems of university management based on the Internet technology, the attendance system and the credit hour system, which are based on two different subjects of teachers and students, have fully improved the quality of teaching and learning management. Moreover, Internet technology brings a more open environment for higher education and helps teachers form a benign competition atmosphere among themselves, which can appropriately enhance the sense of urgency of teaching innovation work and set a good example for learners to recognize the importance of learning, thus building a good foundation for a lifelong learning society.

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# RESEARCH ON THE INNOVATION OF ENGLISH TEACHING IN COLLEGES AND UNIVERSITIES UNDER THE CONDITIONS OF BOTH OPPORTUNITIES AND CHALLENGES IN THE INTERNET ERA

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## ABSTRACT

The dull classroom teaching style in the current context not only fails to meet the development requirements of the times but also wears out the students' desire for knowledge. This paper analyzes the characteristics of current effective teaching and explores innovative ways of teaching English in colleges and universities under the blended teaching model, and examines the differences in the average scores of each question item in the final test of the experimental class through a control study. The overall English scores of the experimental class improved by 11.132 points after the experiment, including the average scores of 2.520, 0.826 and 0.781 in completion and filling, writing and reading. In order to achieve the purpose of improving the effectiveness of college English teaching, we innovate college English teaching and build hybrid teaching based on Internet technology.

## KEYWORDS

Hybrid teaching; Teaching technology innovation; Effective teaching; Classroom teaching mode; College English

## 1. INTRODUCTION

College English education presents a series of challenges and opportunities because of the accelerating pace of development in today's society [1]. With the aim of improving the quality of English teaching and learning, students and teachers work together to discover resources and new ways of teaching English, which is the ideal educational and organic association of the teaching and learning process [2-3]. The quality of teaching is vulnerable to a variety of factors to, the lack of educational resources in English teaching, etc. are the main reasons for the difficulties in the development of teaching innovation [4-5]. In order to make the quality of teaching develop toward a better situation, then it is necessary to create a response to meet the current teaching dilemma by continuously innovating teaching mode and enriching teaching resources in the teaching process as the standard [6-7].

The main feature of blended learning is flexible learning and personalized instruction, which requires that teachers and students work together to create a new learning environment in which online learning and classroom lessons are integrated [8-9]. Blended learning integrates both online learning and face-to-face classroom instruction, and teachers need to conduct a comprehensive review and design of course structure, course content, and resource distribution and configuration.

## **2. OPPORTUNITIES FOR THE DEVELOPMENT OF ENGLISH LANGUAGE TEACHING IN COLLEGES AND UNIVERSITIES**

### **2.1. ENGLISH TEACHING MODE IN HIGHER EDUCATION**

#### **2.1.1. ENGLISH TEACHING CONTENT**

Exploring new ways of English teaching development is due to the continuous development of the Internet in the current information age has brought a considerable impact on the traditional way of teaching English, which is also a good time for universities to change their teaching forms. Since teaching nowadays is all about making students master job skills, English teaching in colleges and universities is mainly based on the demand for English expertise from companies in the talent market.

The English teaching mode in colleges and universities is gradually developing into a diversified trend through the scientific use of technology based on Internet technology. Changes in teaching modes such as online one-to-one teaching mode and distance learning mode are closely related to the development of related technologies.

#### **2.1.2. IT IS CONDUCIVE TO TRANSFORMING THE FORM OF ENGLISH TEACHING**

The active construction of new English teaching resource paths in colleges and universities based on traditional teaching methods with the concept of scientific development is a serious challenge in the context of the development dilemma of English teaching in colleges and universities. In the process of building English teaching resources centered on the enterprise market, college administrators use Internet technology to improve the English teaching resource setting and perfection process so as to meet the teaching needs and future development direction, which is an education resource innovation centered on the premise of meeting the enterprise market and development.

### **2.2. WAYS OF TEACHING TECHNOLOGY INNOVATION IN ENGLISH BLENDED TEACHING MODE**

#### **2.2.1. HYBRID TEACHING**

Blended teaching is a new model with flexible forms and full mobilization of all effective teaching resources, aiming to increase students' interest and initiative in learning. Blended teaching has its characteristics:

(1) Flexible teaching forms, rich teaching resources, high applicability and high efficiency. Fully combine classroom and extracurricular, virtual network environment and traditional classroom, textbook knowledge and various online teaching resources.

(2) Personalized teaching innovation. As a public course, English is a basic course for all college students. The diversification of learning forms allows students to have more independent choices. Teachers can provide students with personalized learning suggestions and objective all-round evaluation of their learning performance according to their English foundation, motivation, and the majors they study, in order to improve their English learning effectiveness. In this way, the evaluation of students' performance in English classes is no longer a single score, but a more scientific and feasible evaluation.

#### **2.2.2. CHARACTERISTICS OF EFFECTIVE TEACHING IN THE CONTEXT OF INFORMATIZATION**

The use of blended learning is becoming more widespread. The way to achieve effective teaching in higher education is based on the current information technology background fully integrated with the characteristics of blended teaching. To achieve effective teaching and



learning one has to aim at fundamental changes in teaching objectives and methods, rather than simply using IT in teaching, which is only a superficial feature. The digital and mobile learning methods are only the superficial characteristics of learning in the informationization era. Achieving effective teaching in the context of information technology requires fundamental changes in teaching goals and methods. Instructional objectives emphasize the development of higher order thinking skills, the teaching methods emphasize student-centeredness, the creation of a learning environment conducive to the construction of meaning, and the advocacy of independent, cooperative, and inquiry learning styles.

### 3. EXPERIMENTS IN BLENDED TEACHING OF ENGLISH IN HIGHER EDUCATION

#### 3.1. ANALYSIS OF VARIABILITY

To test the quantitative study of the effect of blended instruction, Comparative experimental variability analysis in Table 1. The data on the change of the experimental subjects' performance before and after the test were analyzed based on the sample A test. From the data, it can be seen that the variability of test scores between the pre-test and post-test of the experimental class was shown in the four areas of total score as well as completion, Chinese to English translation and writing, and the mean score increased steadily in the pre-test on the basis of the post-test.

The differential performance of "Chinese to English" translation in the experiment is  $\mu \leq 0.01$  the difference level of "Completion and filling" is  $\mu \leq 0.01$ , The highest levels of variability in the experimental class were in "total score" and "writing"  $\mu \leq 0.01$  for "Writing" and "Total score".

The results of the analysis of the difference in scores of the students in the experimental class show that there is an improvement in their performance under the hybrid teaching, and the results of the analysis of the difference in scores of the students in the control class show that there is no difference in their performance under the traditional teaching. This study demonstrates the effectiveness of the blended teaching model in ELT.

**Table 1.** Experimental analysis of pre-post performance variability

Type	Dimensionality	Compare to pre-test results		Comparison of post-test scores	
		Average	Standard deviation	Average	Standard deviation
Experimental Classes	Total Score	76.595	7.510	87.727	5.898
	Gestalt fill in the blank	8.95	3.530	11.47	3.587
	Chinese to English	8.458	0.938	9.174	0.198
	Writing	22.612	2.454	23.438	1.006
Control class	Total Score	76.367	7.606	79.499	7.744
	Gestalt fill in the blank	8.100	4.232	8.200	4.228
	Chinese to English	8.502	1.080	9.016	0.896
	Writing	22.450	2.254	22.710	1.501

#### 3.2. ANALYSIS OF TEACHING EFFECTIVENESS

By analyzing the mean scores of each item in the pre-test and post-test of the experimental class as shown in Table 2, the effect of blended teaching was tested. The overall English scores of the experimental class improved by 11.132 points after the experiment, and the scores of other items improved in descending order: completion, writing, reading comprehension, and Chinese to English translation, with the average scores of completion, writing, and reading improving by 2.520, 0.826, and 0.781 points. This indicates that the blended English teaching has significantly further improved students' vocabulary matching and usage, their mastery of wordiness, and their understanding of phrases.

**Table 2.** Comparison of the mean scores of each question item in the experimental class

	<b>Total Score</b>	<b>Gestalt fill in the blank</b>	<b>Reading Comprehension</b>	<b>English to Chinese</b>	<b>Chinese to English</b>	<b>Writing</b>
Before experiment	76.595	8.95	14.308	9.113	8.458	22.612
After the experiment	87.727	11.47	15.089	9.651	9.174	23.438
Average score difference	11.132	2.520	0.781	0.538	0.716	0.826

#### 4. CONCLUSION

Blended learning is currently receiving a lot of attention from the community, mainly because it is very significant for improving school education, improve students' comprehensive literacy, develop personalized education and cultivate students' core competitiveness. School education is not only about imparting knowledge to students, but also about imparting skills and ideas. Therefore, as an educator, we not only innovate teaching techniques, but more importantly, we convey to students the idea that the development of society requires innovation, and that only by being innovative can we develop and grow.

Blended teaching college English is a new teaching mode that combines network, multimedia technology, database technology and traditional classroom teaching, making full use of the advantages of network and multimedia, so that the learning process can take place both in and out of class, allowing students to fully feel the fun of learning and improve their independent learning ability.

#### ACKNOWLEDGEMENTS

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# EXPLORING THE PRACTICE OF CASE STUDY TEACHING METHOD FOR ENTERPRISE EXHIBITORS IN BIG DATA ENVIRONMENT

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## ABSTRACT

This paper introduces a study on the practical exploration of the corporate exhibitor case teaching method in the big data environment. Firstly, the application and challenges of big data analysis in corporate exhibiting case teaching are described, and then the practical cases, effect evaluation and application scope of the pedagogy are discussed. Finally, the practical teaching design of the enterprise exhibiting case teaching method is given, including teaching objectives, case selection and teaching methods. The results show that the teaching method can effectively improve students' practical and quality abilities, and has promising applications in the big data environment. The findings of this study can provide reference and guidance for the educational practice of enterprise exhibiting case teaching method in the big data environment.

## KEYWORDS

big data; enterprise exhibitors; case teaching method; instructional design; case selection; hands-on skills

## 1. INTRODUCTION

With the continuous development of big data technology, enterprise exhibiting has become one of the important means for enterprises to promote their products, expand their markets and enhance their brand awareness [1-2]. However, the traditional way of enterprise exhibiting can no longer meet the needs of modern enterprises, therefore, how to use the advanced exhibiting case teaching method to improve the effect of enterprise exhibiting in the big data environment has become an important research topic [3-4]. In this context, this study aims to explore the practical application of enterprise exhibitor case teaching method in the big data environment, with a view to providing a more effective promotion method for enterprise exhibitors [5]. The literature

[6] explored the application of big data analysis in corporate exhibiting case teaching, using big data technology to analyze exhibition data to improve students' learning effectiveness and develop their practical skills. The literature [7] explored the evaluation of the teaching effectiveness of the corporate exhibiting case teaching method, including assessing the learning effect of students and evaluating the effectiveness of the teaching method. This paper describes the application and challenges of big data analysis in corporate exhibiting case teaching, and proposes the adoption of a practical exploration approach to address these challenges. Through practical exploration of specific cases, the practical effects of the corporate exhibiting case teaching method are analyzed and its scope of application is discussed. Finally, the practical teaching design of the corporate exhibiting case teaching method is proposed, including the key points of teaching objectives, case selection and teaching methods.

## **2. TEACHING CASE STUDIES OF ENTERPRISE EXHIBITORS IN BIG DATA ENVIRONMENT**

### **2.1 APPLICATION OF BIG DATA ANALYTICS IN TEACHING CASE STUDIES OF CORPORATE EXHIBITORS**

In the big data environment, the teaching of enterprise exhibitors' cases can be improved by big data analysis. First, by collecting data of exhibition exhibitors, such as booth location, exhibit types, display effects, etc., data analysis can be conducted. Find out which companies have more superior booth locations, which exhibits are more popular, etc., so as to provide students with more realistic and accurate exhibiting cases.

Secondly, by analyzing the data of students' behaviors during the exhibition, such as the time of viewing exhibits, the order of visiting booths, etc., we can understand students' learning interests and learning habits, so as to provide teachers with more accurate teaching guidance.

Finally, by analyzing the data of students' learning outcomes of exhibiting cases, such as students' evaluation of exhibits and students' evaluation of the effectiveness of enterprise displays, we can understand students' learning effects and learning outcomes, so as to provide reference for teachers to adjust teaching strategies and improve teaching effectiveness.

### **2.2 CHALLENGES OF BIG DATA ANALYTICS IN TEACHING ENTERPRISE EXHIBITOR CASES**

Although big data analysis has great potential in teaching business exhibitors' cases, it also faces some challenges. First, data collection and processing is costly and requires significant human, material and financial resources. Second, data analysis

requires specialized skills and knowledge, which teachers and students may lack. Finally, data analysis needs to protect students' privacy and personal information, and requires strict compliance with relevant laws and regulations and ethical norms. Therefore, these challenges should be fully considered in the teaching of enterprise exhibit cases, and a reasonable data collection and processing plan should be developed. Take a large education exhibition as an example, which invited several well-known education companies to exhibit. Based on big data analysis, we selected two of them for case study.

The first company was an online education platform that showcased its latest online courses, teaching platform and teaching resources at the exhibition.

The second company is an education technology company that showcased its latest smart teaching devices and teaching software. We conducted a case study by analyzing the exhibits of these two companies at the show, visitors' feedback and related data.

## **2.3 EXPLORATION OF PEDAGOGICAL PRACTICES**

Enterprise exhibitor case teaching method is a method of learning and teaching through enterprise exhibitor cases. In the big data environment, the enterprise exhibitor case teaching method can help students better understand and master the development and application of enterprises in the era of big data and improve their practical and application skills [8].

### **2.3.1 PRACTICAL EXAMPLES OF CASE STUDY TEACHING METHOD FOR CORPORATE EXHIBITORS**

In practice, some representative cases of enterprise exhibitors can be selected, such as a large Internet enterprise's big data application case displayed at a large exhibition. By analyzing the case, students can learn about the strengths and weaknesses of the enterprise in big data application and how the enterprise uses big data to promote business development. At the same time, students can also be guided to think about the challenges and solutions that the enterprise may face in terms of big data application.

### **2.3.2 EVALUATION OF THE PRACTICAL EFFECT OF THE CASE STUDY TEACHING METHOD FOR ENTERPRISE EXHIBITORS**

The effectiveness of the "Case Study Teaching Method for Enterprise Exhibitors" can be evaluated through questionnaires and examinations of students. The results of the survey show that students have a high opinion of the teaching method and believe that it can effectively improve their practical and application skills. The examination

results also show that students' learning effect under this teaching method is significantly better than that of traditional teaching method.

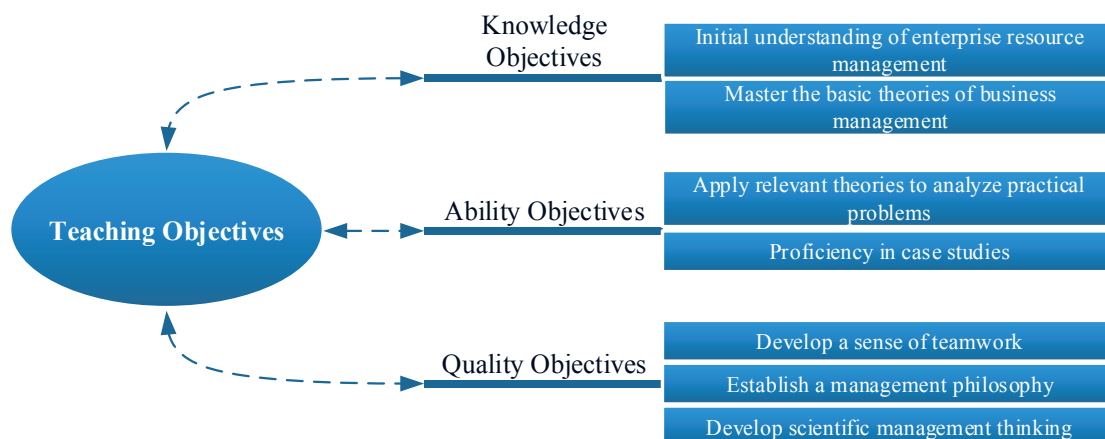
### 2.3.3 SCOPE OF APPLICATION OF CASE STUDY METHOD FOR CORPORATE EXHIBITORS

The "Enterprise Exhibitor Case Teaching Method" is applicable to all kinds of educational institutions and majors, especially those related to big data. It is also applicable to all educational stages, and can be adjusted and improved according to different students' characteristics and course contents.

## 3. PRACTICAL TEACHING DESIGN OF CASE STUDY TEACHING METHOD FOR ENTERPRISE EXHIBITORS

### 3.1 TEACHING OBJECTIVES

According to the basic guiding ideology of vocational education in China, the course focuses on the actual situation of the students, and on the premise of accomplishing the knowledge objectives, the course focuses on cultivating the practical learning ability and quality ability of the students. The main teaching goal is to make students master the basic knowledge of modern enterprise management through the study of modern enterprise management course, so that students can make a solid theoretical foundation for their future practical work in enterprises. The practical teaching objectives of the case study method for enterprise exhibitors designed in this paper are shown in Figure 1. In terms of specific knowledge, ability and quality objectives, this paper believes that they all need to be developed around the fundamental purpose of "practical". The goal of knowledge is to have a solid theoretical foundation when facing the actual modern enterprise management problems. The goal of competence is to have good professional practical ability when solving the actual modern enterprise management problems. The goal of quality is to have a good team consciousness and scientific management thinking when facing any practical problems. Accordingly, the knowledge goal, ability goal and quality goal are designed.



**Figure 1** Practical teaching objectives of the case study method for enterprise exhibitors

### **3.2 CASE SELECTION**

In the practical exploration of the case teaching method for enterprise exhibitors in the big data environment, it is necessary to select suitable cases for teaching first. When selecting cases, the following aspects need to be considered:

(1) High relevance to the current industry: choosing cases with high relevance to the current industry can help students better understand and apply what they have learned.

(2) Large and reliable data volume: Choosing cases with large and reliable data volume will enable students to have a deeper understanding of the actual situation of enterprise exhibitors.

(3) Representative: Choosing representative cases can help students better understand the general rules of corporate exhibiting.

### **3.3 TEACHING METHOD**

After selecting a good case, a suitable teaching method needs to be used for teaching. In the big data environment, the following teaching methods can be used:

(1) Data visualization: Through the way of data visualization, complex data can be made intuitive and easy to understand, which can help students better understand the story behind the data.

(2) Interactive teaching: Interactive teaching can stimulate students' interest in learning and promote students' active learning.

(3) Seminar teaching: Through seminar teaching, students can better understand the problems in the case and improve their analysis and problem-solving ability.

Through the application of the above teaching methods, it can make the enterprise exhibitor case teaching method play a better effect in the big data environment.

## **4. CONCLUSION**

Through the practical exploration of the case study teaching method for enterprise exhibitors in the big data environment, this study finds that the teaching method can effectively improve students' practical skills and problem-solving abilities. Specifically, this study finds that:

(1) The enterprise exhibiting case teaching method can effectively stimulate students' learning interest and enthusiasm and improve the learning effect.

(2) The teaching method can help students better understand the meaning and purpose of corporate exhibiting and enhance their practical skills.



(3) Through the analysis of enterprise exhibition cases, students can gain a deeper understanding of information about the business model, market environment and competitors of enterprises and improve their problem-solving skills.

Based on the above findings, this study suggests that the enterprise exhibiting case teaching method should be widely used in teaching practice and combined with big data technology for teaching innovation in order to improve students' practical skills and problem-solving abilities. At the same time, teachers should guide students to analyze enterprise exhibiting cases in depth and focus on the cultivation of students' practical operation and thinking skills in order to cultivate more competitive talents.

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# INNOVATIVE CHANGES OF ENGLISH TEACHING MODEL IN UNIVERSITIES BASED ON CLOUD COMPUTING MANAGEMENT IN THE PERSPECTIVE OF EDUCATIONAL ECOLOGY

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## ABSTRACT

This paper investigates the ecological English teaching model under cloud computing management, analyzes the ecological English teaching model under cloud computing management, and contrasts the changes in students' learning capacity before and after the innovation of the college English teaching mode. The English communication ability was 78.8% after the innovation and 63.6% before the innovation, the language foundation was 86.2% after the innovation and 51.8% before the innovation, and the English writing ability was 76.3% after the innovation and 63.8% before the innovation. The improvement of students' English-learning skills is aided by the innovation of university English teaching models based on cloud computing management, and the balance of university English teaching ecosystems is aided by innovative shifts in educational ecology perspectives.

## KEYWORDS

Educational ecology; Teaching model innovation; English language learning ability; Innovative change; Teaching ecosystem

## 1. INTRODUCTION

The networked age is significantly affecting many parts of people's life as a result of the slow but steady progress of globalization and the rapid growth of computer network technology [1]. While accepting the computer network environment is a new setting and opportunity, traditional foreign language instruction is confronting innumerable repercussions and obstacles [2–3]. How to ensure that the two resources are integrated effectively, allowing the information age's benefits to fully manifest, the ability of the computer network to adapt to the demands of modern educational development and truly integrate as an organic part of the curriculum has emerged as a key issue to support the modernization of college English teaching and also serves as the subject of research on the present change of the teaching of foreign languages. [4].

In the ecological perspective, traditional college English teaching is an ecologically balanced system, and all ecological factors have been in a relatively compatible and stable state after long-term development and friction [5-6]. However, the integration of information technology with a computer network at its core into college English instruction is obligated to alter the traditional teaching objectives, modes, materials, curriculum, and other elements, and these modifications will inevitably upset the initial ecological balance and result in a number of disorders [7-8]. Teachers must adapt to the new online learning environment in a timely manner, adhere to the "student-centered" teaching philosophy, analyze students' learning needs, direct students' learning, supervise overall activities, and work with students to help them understand

how the focus of classroom teaching activities has changed, as well as how their online independent learning skills have improved [9]. It is encouraged for the instructor and the pupils to grow together. To restore equilibrium to the environment of university English teaching, we support the joint growth of instructors and students.

## **2. INNOVATION OF ENGLISH TEACHING MODE IN COLLEGES AND UNIVERSITIES**

### **2.1. FOREIGN LANGUAGE ONLINE TEACHING BASED ON CLOUD COMPUTING TECHNOLOGY**

#### **2.1.1. ENGLISH TEACHING BASED ON CLOUD COMPUTING TECHNOLOGY**

A uniform format is used to convert several kinds of multimedia teaching resources (such as electronic lesson plans, instructional films for the classroom, and videos of experimental demonstrations, etc.) into streaming media files. They can also be captured in real time on site through audio and video capture devices. To dynamically distribute instructional resources to students in accordance with actual instructional demands, store them in a certain organization to the cloud service end. In order to select the best cloud computing service platform, instructors must be aware of the learning characteristics of students in the "cloud era" in addition to having access to more cloud service resources for teaching. The "cloud era" has changed the way that students learn, and teachers must be aware of these changes in order to select the best cloud computing service platform for their classes. Students will receive individualized on-demand instruction that is more appropriate for them. Using the corresponding "cloud," students may buy services and educational resources from vendors based on their own requirements.

#### **2.1.2. FEATURES OF ENGLISH ONLINE TEACHING WITH CLOUD COMPUTING TECHNOLOGY**

University foreign language instruction aims to improve students' language proficiency, which includes their reading, speaking, listening, and writing skills as well as their comprehension of Western culture. The benefits of sharing resources and having infinite storage space are two advantages of the cloud services made possible by cloud computing.

(1) Resource sharing. Access to streaming audio and video saved on cloud servers is possible at any time and from any location can be accessed from anywhere on the network and at any time from streaming media servers without having to save and carry these media files, as long as the URL and directory storage structure of the cloud server are known.

(2) Students can learn quality teaching resources easily and intuitively. Teaching managers can easily and quickly generate courseware so that teaching and learning can communicate in time, which largely improves the effect of distance learning.

### **2.2. ENGLISH TEACHING MODEL IN UNIVERSITIES UNDER EDUCATIONAL ECOLOGY**

#### **2.2.1. ECOLOGICAL TEACHING MODEL**

The direction of a teaching method's healthy growth is toward an ecological perspective. It is gradually investigated and produced in the teaching practice of the ecological classroom, and at the same time, its growth can help the teaching of the environment. This paradigm applies the idea of "student-centered" education and is inspired by the philosophy of educational ecology. It encourages students' natural, harmonious, and unfettered growth and development under good artificial settings by balancing the ecological positions of various educational components and ecological forces. The model's development seeks to account for objective elements including internal and external constraints on students' learning, individuals'

inherent characteristics, and societal standards. In order for students to realize a classroom ecological environment with independent, free and open, cooperative, and inquiry learning, teachers and students must activate teaching cognition and other organism activities by utilizing the ecological subject's growth of happy emotions and subjective consciousness.

### 2.2.2. ECOLOGICAL FOREIGN LANGUAGE TEACHING MODE UNDER CLOUD COMPUTING MANAGEMENT

The educational model under cloud computing administration involves the integration of technology for cloud computing into the learning and instruction model, adding technology as a new incentive to support teaching and learning activities. The realization of the teaching model assisted by technology is also a result of the application creation of the teaching model in the conditions of modern information technology. By depending on and utilizing cloud computing technology, it relies on and uses a relatively stable structure of instructional activities and a collection of methods for instruction developed under the direction of specific teaching ideas and theories to accomplish the set goals of teaching foreign languages.

The ecological approach to teaching foreign languages is based on educational ecology as a common underpinning principle and is controlled via cloud computing. It is a theoretical teaching method that makes use of a variety of teaching techniques to optimize the presentation of the subject matter being taught in order to meet the predetermined learning objectives. It is the path of logical evolution and optimization of the contemporary foreign language education paradigm.

## 3. DESIGN OF ENGLISH TEACHING MODE IN CLOUD COMPUTING COLLEGES AND UNIVERSITIES UNDER THE PERSPECTIVE OF EDUCATIONAL ECOLOGY

### 3.1. INNOVATION OF ENGLISH TEACHING MODE IN COLLEGES AND UNIVERSITIES

Students are expected to have a high level of learning autonomy and self-discipline in online instruction and independent learning. Table 1 displays the differences in student learning capacity before and after the introduction of a new teaching strategy. Students' learning autonomy was 72.4% after innovation and 55.6% before innovation, students' self-discipline was 55.9% after innovation and 42.9% before innovation, while English communication ability was 78.8% after innovation and 63.6% before innovation, language foundation was 86.2% after innovation and 51.8% before innovation, and English writing ability was 76.3% after innovation and 63.8% before innovation. Among them, the students' language foundation and English communication skills changed significantly. This demonstrates the development of a new English teaching method based on cloud computing management in colleges and universities, which is helpful in enhancing students' English learning skills and recognizes the dynamic role of teachers and students in ecological subjects. Reasonable innovation and optimal allocation were made in the mode's development.

**Table 1.** Changes in students' learning ability before and after the innovation of teaching mode

Type	Pre-innovation in teaching	After teaching innovation
Learning autonomy	55.6%	72.4%
Self-discipline	42.9%	55.9%
English communication skills	63.6%	78.8%
Language Basics	51.8%	86.2%
English writing skills	63.8%	76.3%

### 3.2. TEACHING CONCEPTS AND TEACHER ROLE ORIENTATION

The evaluation of teachers' role orientation is shown in Table 2. 59.7% and 63.1% of instructors were rated as being able to function as direction guides in the classroom and for students' autonomous online learning, respectively, by teachers and students, indicating that more than half of the teachers fully performed their assigned leading duties, designed classroom teaching activities rationally, and mobilized students' main enthusiasm for learning effectively.

**Table 2.** Evaluation of teacher role orientation in educational ecology

Positioning Type	Teacher Evaluation	Student Evaluation
Knowledge transferor	62.7%	72.8%
Requirements analyst	59.5%	69.2%
Student Collaborators	55.3%	64.4%
Orientation guide	59.7%	63.1%
Knowledge trainer	55.3%	54.8%
Motivator	48.4%	49.5%

### 4. CONCLUSION

College English course is an important part of college English teaching, which aims at cultivating students' college English application ability and improving their comprehensive college English skills as its teaching objectives. With its distinctive teaching benefits, educational ecology has been increasingly embraced alongside the modernization and reform of higher education. The term "educational ecology" mostly refers to the teaching process that takes place in classrooms, where students perform interactive learning outside of class and between teachers and students using multimedia and videos, among other things, including question and answer, cooperative learning, extracurricular inquiry, and self-study after class. In this way, the teaching effect of college English classroom can be effectively improved. Because college English is traditionally taught in a teacher-centered, rather outdated manner, most students have a major lack of interest in learning, and there are few teaching strategies used in the classroom, which contributes to the poor quality of college English instruction.

The confines of conventional college English instruction are broken by incorporating the notion of educational ecology into the classroom. Students can continue their education independently before and after class thanks to a platform that was specifically designed for uploading footage of in-class instruction. The variety of teaching strategies used in college English classes also enhances the course material and boosts the effectiveness of instruction.

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# EVALUATING THE UTILITY OF CURRICULUM CIVIC EDUCATION IN UNIVERSITIES IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper discusses the evaluation of the utility of the development of college curriculum Civic Education in the context of big data, analyzes the current situation of college curriculum Civic Education based on big data, and explores the effect of the development of college curriculum Civic Education in the context of big data. The highest average score of students' comprehensive Civic and Political Education assessment is 77.59 in psychological aspect, 73.76 in political aspect, and 82.75 in civic aspect, 68.27 in scientific aspect and 69.45 in humanities aspect. therefore, the development of Civic and Political Education in college courses under the background of big data has a certain promotion effect on students' comprehensive Civic and Political Education, which is beneficial to stimulate students' learning of professional courses The interest of students in professional courses.

## KEYWORDS

Curriculum Civic Education; Utility Evaluation; Civic Education; Comprehensive Civic Literacy; Professional Curriculum

## 1. INTRODUCTION

The current rapid development of global high-tech power, the high degree of integration of new technologies and methods with the construction of college course Civics to promote the innovative development of college education ability has become an important development trend of college education and teaching reform [1-2]. The construction of professional course ideology is an innovative teaching concept of the mutual integration of professional course teaching and ideology education. Because of the rigorous and standardized knowledge of professional courses and the abstract learning content, students are easy to feel boring in the learning process and gradually lose interest in course learning in the long run [3-4]. Adding ideological and political education to the teaching of traditional professional courses, deeply excavating the philosophical thinking, spiritual connotation and value pursuit and other thinking and political elements contained in the professional courses, makes the traditional classroom new vitality, stimulates students' interest in learning professional courses, broadens students' learning ideas, and then improves learning effectiveness [5-6].

Using the advantages of big data technology makes the Civic Science data resources more abundantly accessible, data analysis faster, and information more effective, thus enhancing the accuracy of Civic Science elements into teaching [7]. Civic content is gradually internalized into students' learning drive, enhancing students' spiritual leadership, allowing students to

clarify the direction of learning forward, and shaping students into a new era of talent pursuing comprehensive development of ideas, skills and character [8].

## **2. CIVIC EDUCATION OF COLLEGE CURRICULUM IN THE CONTEXT OF BIG DATA**

### **2.1. CURRICULUM CIVICS CONSTRUCTION IN HIGHER EDUCATION**

#### **2.1.1. IDEOLOGICAL AND POLITICAL EDUCATION IS EXTENDED IN PROFESSIONAL COURSES**

The extension of ideological and political education in professional courses provides a clear direction for curriculum education. Curriculum ideology and politics aims to construct and improve the task of educating people, so that the implementation of the fundamental task of establishing moral education becomes the core of all work in universities. It is worth noting that the extension of ideological and political education in professional courses is not forcibly inculcated, grafted and transplanted, but through the excavation and refinement of humanistic and value elements contained in the courses themselves, to realize the interpenetration and integration of nurturing people and nurturing talents in course education, and the courses and Civic Science and Politics go in the same direction.

The extension of ideological and political education in professional courses is a necessary step for the effectiveness of ideological and political education. The “Curriculum Civic Government” faces the problem of separating knowledge education and value education in the traditional education system and realizes the extension of ideological and political education in professional courses. This extension is the interpenetration of professional education and ideological and political education, the excavation and refinement of the elements of course education, and the formation of consciousness of course education. This extension realizes the growth of the spiritual life of the curriculum, enriches and deepens the connotation of the curriculum education, and makes the curriculum education consciously abandon the adherence to “value neutrality”.

#### **2.1.2. CONSTRUCTING THE CULTIVATION PATTERN OF “THREE COMPREHENSIVE EDUCATION”**

The construction of “Curriculum Thinking and Politics” integrates the whole process of education and teaching, and makes the nurturing links have a cross-cutting nature. The ideological and political education for college students should be implemented in all aspects of talent training and accompany the whole process of students’ growth and success. According to the law of growth, learning characteristics and professional characteristics of students of each major combined with the law of thinking and government work, the students’ talent cultivation plan should be implemented. To strengthen the continuity of the whole process of education, enrich the profound connotation of “three comprehensive education”, establish a hundred flowers of thinking and political education mode and the mechanism of thinking and political education throughout, so that the ideological and political education work in colleges and universities can be progressed and developed. The construction of “Curriculum Civic Politics” needs to improve the ability of global planning and make the education model complete. The construction of “Curriculum Thinking and Politics” needs to be carried out jointly by multiple departments and systems, optimize the top-level design, build up a cross-dimensional and cross-disciplinary collaborative education model, and establish a “Curriculum Thinking and Politics” cultivation pattern.



## **2.2. ANALYSIS OF THE CURRENT SITUATION OF CIVIC EDUCATION IN THE CURRICULUM BASED ON BIG DATA**

### **2.2.1. DIVERGENT VALUES OF PROFESSIONAL EDUCATION AND IDEOLOGICAL AND POLITICAL EDUCATION**

Professional education aims to equip the educated person with the knowledge and skills to perform a specialized job through the transfer of professional knowledge and skills. Ideological and political education consists of two main aspects: on the one hand, it makes the educated person a human being through educational guidance, and on the other hand, it guides the educated person to become a citizen by reconciling personal values with community values.

First of all, professional education is concerned with “training a certain kind of person”. Through the transfer of knowledge and skills, a person acquires the ability to earn a living. Therefore, professional education emphasizes the objective presentation and teaching of professional knowledge and the presentation of facts. As a result of the one-sided pursuit of knowledge transfer in the process of education, it has gradually departed from the dual educational mission of pursuing intellectual truth and forging personality.

Secondly, ideological and political education focuses on the cultivation of people themselves. To make people human and to make them citizens is the dual mission of ideological and political education. In terms of the meaning of life, through education and guidance, the educated person becomes a person with ambitious ideals and firm beliefs, so that human life as an individual tends to be true, good and beautiful.

### **2.2.2. MISPERCEPTION OF CURRICULUM THINKING**

The so-called curriculum thinking politics, that is, the expansion of the influence and impact of thinking politics education. No matter it is a professional basic course, core course or application practice course, the teaching concept of originated from life and above life is emphasized in actual teaching, which coincides with the connotation of thinking politics. In the specific teaching, some institutions fail to truly realize the value of integrating the content of Civic Education with the teaching of professional courses. Even if the serving teachers elaborate the content of Civic Education in the course teaching, it always lacks affinity and relevance, which makes students feel boring and tedious, just like chewing wax, and it is difficult to combine the learning needs and growth characteristics of students to form a synergistic effect, not to mention improving the quality of Civic Education.

## **3. DESIGN OF CIVIC EDUCATION IN COLLEGE CURRICULUM UNDER THE BACKGROUND OF BIG DATA**

### **3.1. RESEARCH ON CURRICULUM CIVIC EDUCATION IN HIGHER EDUCATION**

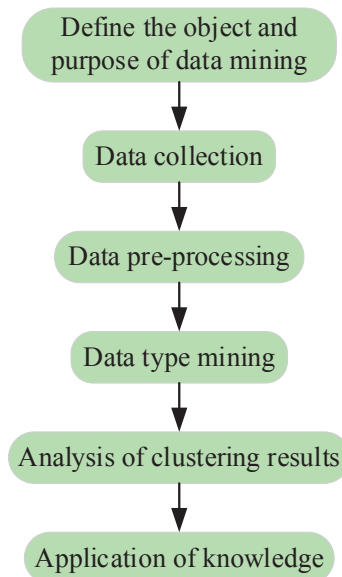
This paper explores the effect of the development of Civic Education in college courses under the background of big data, and the comprehensive Civic Literacy assessment of students is shown in Table 1. Reflecting the measured students' literacy status in psychology, politics, civics, humanities and science, and get their comprehensive quality status of Civics and Politics on average. The highest average score of psychological aspect is 77.59, the highest average score of political aspect is 73.76, while the highest average score of civic aspect is 82.75, the highest average score of science aspect is 68.27, and the highest average score of humanities aspect is 69.45. Therefore, the development of Civic and Political Education in college curriculum under the background of big data has a certain promotion effect on students' Civic and Political comprehensive literacy.

**Table 1.** Average scores of students' comprehensive quality assessment of Civics and Politics

Grade Level	Psychology	Political	Civics	Science	Humanities
2017 Class	73.48	71.74	81.45	67.89	60.45
2018 Class	78.46	68.34	80.63	63.89	68.34
2019 Class	77.59	73.76	82.75	68.27	69.45

### 3.2. EXAMINATION OF CIVIC AND POLITICAL WORK BASED ON BIG DATA

Data mining is a process by which programs are affirmed and is a means to analyze and study data at a deeper level. It is particularly meaningful to apply the technique to the examination system of counselor work appraisal. Data mining analysis of counselor work appraisal is shown in Figure 1. The data mining method of cluster analysis is adopted to process the data information of counselor work effectiveness, which can transform a large amount of data into clustering results, and then make better use of that type of data. These are features that commonly used traditional evaluation systems do not have. Data mining of this data can lead to important conclusions that can have a huge impact on both management and teaching, yielding incalculable benefits and results.



**Figure 1.** Data mining analysis of counselors' work assessment

### 3.3. ENHANCE THE MULTIDIMENSIONAL INTEGRATION OF TEACHING MEDIA

With the continuous development of the new era, the new media has become an important carrier and means of practical teaching of "Course Civics". The construction of "Curriculum Civics" should realize the effective combination and complementary advantages inside and outside the classroom, inside and outside the school, online and offline, and expand and improve the all-round, multi-level and three-dimensional practical teaching media.

Colleges and universities should pay attention to the creation of professional model ideological and theoretical education resources website, learning and education network mutual interaction community, the school 'course thinking politics' construction education microblogging, timely update and push well-known experts and scholars in the field of innovative articles, the relevant system campus WeChat public number and other network new media construction. Guiding students to naturally change from "I want to learn" to "I want to learn", to establish a correct view of the Internet, and to grow up to be the defender of Marxism and the current practitioner of the Internet.

#### 4. CONCLUSION

Ideological and political education is an activity that establishes the Archimedean point of the human spirit and reunites man with his own rational essence. Through educational guidance the values with truth are associated with and carried out in the will and behavior of man, and the essence of man is returned to man to realize the full possession of his essence.

We promote the process of building the knowledge system and ideology system of ideological and political education disciplines, promote the overall level of discipline construction, and accumulate theoretical and practical strength for the full play of the function of ideological and political education. From the doctrinal level, it stimulates the self-reflection of disciplinary theories, explores new disciplinary growth points, improves the construction of disciplinary knowledge and ideological system, clarifies the positioning of the study of “curriculum thinking and politics” in the disciplinary system, and provides a macroscopic knowledge picture for the in-depth development of relevant research. From the practical level, it provides theoretical support and practical reference for the in-depth promotion of “Curriculum Civics”.

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# THE CONSTRUCTION AND PRACTICE OF MUSIC PEDAGOGY SYSTEM FOR PRESCHOOL EDUCATION MAJORS BASED ON OBE CONCEPT

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## ABSTRACT

This paper constructs a music pedagogy system based on OBE concept for preschool education majors, designs a reconstructed OBE concept music curriculum content, and analyzes the changes of students' learning initiative before and after the system construction. Among them, 61.87% of students reviewed music theory knowledge, 46.37% before the construction, 73.65% of students previewed the course in advance, 37.62% before the construction, 73.24% of students completed the after-class homework in time, 53.87% before the construction, and 72.24% of students mastered the key points of the course, 46.36% before the construction. The music pedagogy system of preschool education based on OBE concept plays its proper role in preschool education and is important for the cultivation of preschool education professionals.

## KEYWORDS

OBE concept; Preschool education major; Music pedagogy system; Curriculum content reconstruction; Talent training; Learning initiative

## 1. INTRODUCTION

The output-oriented OBE concept is an international advanced educational philosophy that leads the current reform of talent training programs and curriculum teaching in higher education [1-2]. While the traditional educational philosophy focuses on how well teachers teach, the output-oriented OBE concept is more concerned with how well students learn [3]. It emphasizes that teaching should first clarify the competencies and qualities that students should eventually possess after learning, and then proceed to teaching design and implementation [4-5].

The learning center emphasizes following the law of teacher-training students' growth and success, allocating educational resources, organizing curriculum and implementing teaching with teacher-training students as the center [6-7]. Output orientation emphasizes taking teacher-training students' learning effects as the guide and evaluating the quality of talent

training against the core competencies and quality requirements for teacher-training students' graduation [8-9]. Continuous improvement emphasizes the all-round and whole process evaluation of teaching and the application of evaluation results to teaching improvement to promote the continuous improvement of talent cultivation quality [10]. Curriculum teaching reform in higher teacher training institutions should be output-oriented in practice, with the basic concept of continuous improvement, and a series of reflections and reforms on curriculum design and implementation, so as to improve the quality and efficiency of professional talent training.

## **2. MUSIC TEACHING IN PRESCHOOL EDUCATION BASED ON OBE CONCEPT**

### **2.1. ANALYSIS OF OBE CONCEPT PRESCHOOL EDUCATION PROFESSIONAL TEACHING**

#### **2.1.1. LOGICAL STARTING POINT OF OBE CONCEPT**

The logical starting point of the OBE philosophy is constructivism. Constructivism believes that learners construct knowledge modules through active learning in order to complete the analysis, synthesis and evaluation of knowledge. The learner is the subject of knowledge construction and the teacher is the guide of the learning process. The active learning model of learners, on the other hand, focuses on the learning process and learning outcomes, and learners must solve problems by engaging in reading, writing, and discussing, which becomes the basis of the core concept of OBE.

#### **2.1.2. CONNOTATION OF OBE CONCEPT**

The connotation of OBE concept is to improve learners' core competencies, achieve learning outcomes and learning goals through reverse design and positive implementation of the curriculum with the learner as the center and outcome output as the orientation. Simply put, it means setting educational standards based on the learning outcomes to be achieved in the end, setting learning goals after students understand the relevant educational standards, achieving learning goals in stages continuously during the teaching process, and using the achievement of learning goals and learning outcomes to form a way to evaluate learning outputs, and then based on learning outcomes, reversing the curriculum based on learning outcomes and organizing the implementation of outcome output-based Curriculum teaching.

### **2.2. EXISTING PROBLEMS OF MUSIC TEACHING IN PRESCHOOL EDUCATION BASED ON OBE CONCEPT**

#### **2.2.1. THE DILEMMA THAT TENDS TO CREATE UNSYSTEMATIC TEACHING**

In daily music teaching, if we want to grasp both practice and theory, we will inevitably face the problem of unsystematic teaching. The integrated teaching mode of theory and practice tends to fragment knowledge. Music is a relatively abstract subject, and the integration of theory and practice is more difficult than in other majors. After all, in the process of using the integrated teaching mode, some teachers may only focus on the teaching of music skills,

resulting in the lack of knowledge about music. Over time, students may also focus on musical skills and ignore the connotations of music itself. Music theory has a complete system chain, and if there is a slight lack of it, students will not be able to connect their knowledge smoothly, resulting in a more confusing knowledge system, which directly affects students' deeper mastery of music subjects later.

### **2.2.2. TEND TO CAUSE STUDENTS TO FAVOR PRACTICAL DILEMMAS**

Some students have a great interest in improving their musical skills in a short period of time, and in the skill improvement sessions they are interested in, these students are eager to get started as soon as the teacher finishes the demonstration without prompting or prodding, and thus are able to complete the skill training well. However, for theoretical lessons that are time-costly and ineffective, students are more impatient, which in turn leads to a lack of theoretical support behind the skills. For example, many students are very motivated in instrument playing classes, but are listless in basic music theory classes.

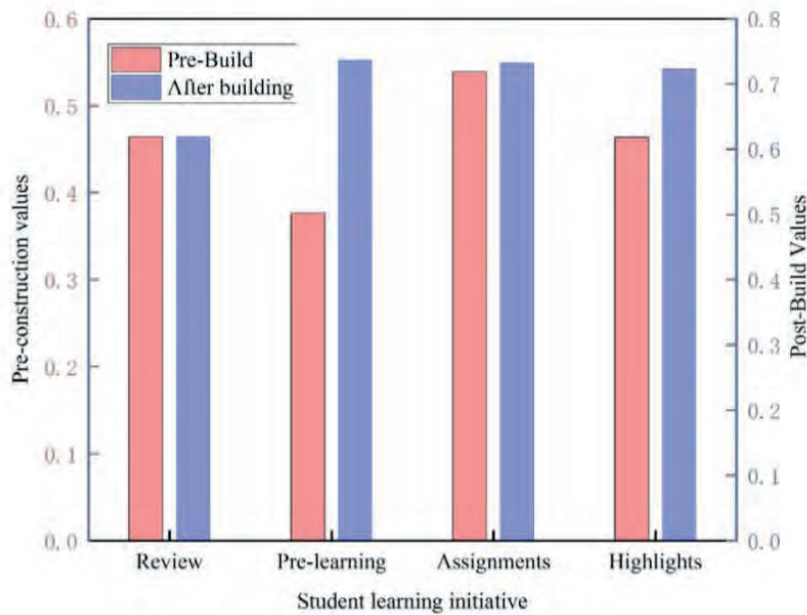
### **2.2.3. ONE-SIDED COURSE EVALUATION**

The traditional forms of evaluation are mainly divided into three kinds of examinations, examinations and certifications. In terms of the evaluation method of the course, it mainly follows the traditional way of forming a comprehensive grade in the form of attendance, classroom performance, post-class assignments and examinations to examine the students' learning outcomes of this course. This form of evaluation is mainly based on students' behavioral performance and on-site practical performance, but there is no assessment of the changes of students' ability and quality in the learning process. The final comprehensive grade is not able to objectively evaluate the learning results, and also cannot reflect the students' ability gaps in the practical teaching process, forming a one-sided evaluation result, which is not conducive to subsequent teaching improvement.

## **3. CONSTRUCTION OF MUSIC PEDAGOGY SYSTEM FOR PRESCHOOL EDUCATION MAJORS BASED ON OBE CONCEPT**

### **3.1. STUDENT LEARNING INITIATIVE**

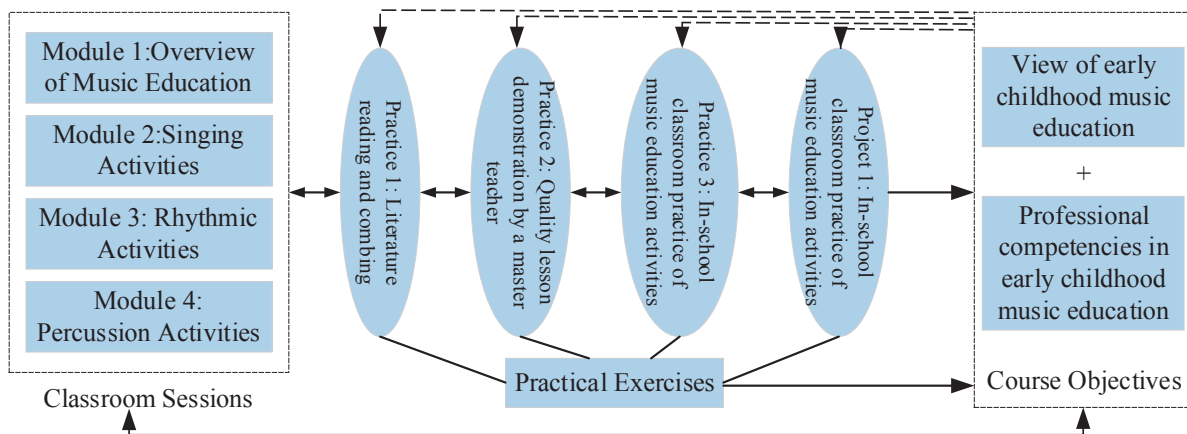
Based on the OBE concept of music pedagogy system construction for preschool education majors, the changes of students' learning initiative before and after the system construction are shown in Figure 1. Among them, 61.87% of students reviewed music theory knowledge, 46.37% before the construction, 73.65% of students previewed the course in advance, 37.62% before the construction, 73.24% of students completed the after-class homework in time, 53.87% before the construction, and 72.24% of students mastered the key points of the course, 46.36% before the construction. It can be seen that in the construction of music pedagogy system based on OBE concept helps to enhance students' learning initiative, thus guaranteeing the teaching quality of music courses in preschool education and realizing the consistency of learning outcome output and learning goal achievement.



**Figure 1.** Changes in students' learning initiative before and after the construction

### 3.2. COURSE CONTENT RECONSTRUCTION BASED ON OBE EDUCATION CONCEPT

The OBE education concept course content construction is shown in Figure 2, which completely breaks the traditional sense of subject content as the logical main line of course content construction method, and takes the final learning outcomes of students as the core structure of course content. The course content design with a high degree of integration between theory and practice focuses the course objectives on the acquisition of students' correct concepts and professional abilities in music education, which fully reflects the output-oriented OBE education concept.



**Figure 2.** OBE education concept course content construction

## 4. CONCLUSION

The long-standing problems of traditional preschool vocal music courses are mainly manifested in the lack of accurate positioning of course objectives, the disconnection between course content selection and kindergarten teaching practice, the emphasis of vocal music

teaching on skill training but not on ability cultivation, and the single way of vocal music course evaluation. With the guidance of OBE output orientation, we should accurately position the course objectives, reorganize the course contents, reform the teaching methods and adjust the course evaluation. At the same time, the study and practice of vocal music enriches students' knowledge of art appreciation and expression, enhances their musical literacy and aesthetic ability, meets vocational needs, and reserves solid musical literacy for students to engage in kindergarten music education activities in the future. In the current context of professional accreditation, it is of great significance and value to reflect on and reform the teaching design and implementation of the vocal music course for preschool education majors by applying the educational concept of OBE.

The objectives of the course can be made clearer and more humane by setting the whole objectives based on the students' core. It is easier for students to understand their learning goals intuitively and clearly, and to implement the teaching process step by step under the guidance of the whole system, because the introduction of teaching evaluation makes the teaching results can be gradually improved in the process of implementation, forming a continuous upgrading process. The establishment of such a system will eventually play a certain improvement role for the progress of music education in preschool education, and for There is a certain significance on the way of transporting talents to higher education.

## **FUNDING**

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# RESEARCH ON THE PSYCHOLOGICAL STATE OF HIGHER EDUCATION STUDENTS IN THE ERA OF BIG DATA

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## ABSTRACT

Mental health monitoring system is the basic link in the whole psychological crisis intervention system, which can play an early warning role. In this paper, in order to study whether the psychological crisis intervention platform based on big data technology for higher education students helps to understand the psychological state of students, therefore, the classification accuracy of the psychological crisis intervention platform is analyzed. The highest accuracy rates of five algorithms were 78.40%, 88.30%, 80.40%, 90.80%, and 89.30%, respectively, with logistic regression algorithm and support vector machine performing the best. Combining big data technology with the monitoring system of higher vocational students' mental health status is of great practical value and relevance to promote the stable development of mental health education in higher vocational institutions.

## KEYWORDS

Mental health education; Mental health status; Monitoring system; Psychological crisis intervention platform; Psychological development in higher education institutions

## 1. INTRODUCTION

Mental health education is pivotal, and higher vocational colleges and universities cultivate a large number of high quality technical skill talents every year to support economic and social development [1-2]. Vocational education has entered a critical moment, and psychological crisis intervention in the post-epidemic era is the top priority of mental health education in higher education institutions [3-4]. Using big data thinking and Internet technology means, we can dynamically track and understand the psychological state and thought behavior of higher vocational students and improve psychological intervention measures [5-6]. Saving teachers' working time, enhancing the efficiency of handling students' psychological crisis events, innovating and improving the psychological crisis platform for higher vocational students, and achieving four levels of psychological crisis prevention and intervention with precise education, management and service are inevitable, far-reaching and significant for psychological work in higher vocational institutions [7-9].

In this paper, we mainly establish the classification models of psychologically abnormal students and normal students. Firstly, the imbalanced data are mixed equalization processed, and the classification results of different classifiers are compared again, and it is found that the

logistic regression algorithm has better performance in classification accuracy and recall rate. The combined equalization process.

## **2. ANALYSIS OF STUDENTS' MENTAL HEALTH IN HIGHER EDUCATION INSTITUTIONS**

### **2.1. THE CURRENT SITUATION OF MENTAL HEALTH EDUCATION FOR HIGHER VOCATIONAL STUDENTS IN THE ERA OF BIG DATA**

#### **2.1.1. LOW STUDENT SELF-EFFICACY**

Currently, higher education students may have a sense of loss and low self-efficacy in the learning process. Students with a sense of loss will look for balance and recognition on the Internet. It can be said that currently every college student belongs to an independent self-media, but compared with adults, higher vocational college students are more likely to be influenced by the external environment. At the same time, there are different opinions on the Internet about the same thing and social hotspots, which are very likely to cause students' cognitive bias. Among them, negative comments are not conducive to the formation of positive mental health of students. In addition, students in higher education have just become adults, and their perceptions are easily influenced by public opinion, and their self-control still needs to be improved compared with adults in other age groups.

#### **2.1.2. SINGLE CHANNEL OF ACCESS TO MENTAL HEALTH**

At present, the mental health condition of college students in higher education is in dynamic change, and it will show different mental states with different grades. However, at present, the channels to obtain students' mental health in higher education are mainly paper-based psychological questionnaires. The survey method is mainly for the first year of university students. There are differences in the entrance time of higher vocational students, and they are under different academic and life pressures, but it is difficult to effectively collect the mental health status of all students by paper questionnaires. There are differences in the mental health status between freshman and senior students who face different pressures. If a single channel is used to obtain mental health status, it is difficult to effectively discover the heterogeneity of mental health status of the two students.

At the same time, in the Internet era, higher education also does not use big data technology to regularly and dynamically summarize and rank college students' health problems, and only uses paper questionnaires to obtain students' mental health status, which is an obstacle to the effective development of mental health education in higher education.

#### **2.1.3. LACK OF PROFESSIONAL FACULTY**

For a long time, it has been difficult to solve the shortage of mental health education professionals in higher education due to the low number of psychological professionals and the fact that most teachers are mainly engaged in research work. A large number of higher education institutions lower the recruitment threshold of mental health teachers. Many colleges and universities even directly take mental health courses as elective courses. It makes it possible to only teach mental health courses instead of school psychological work, and it is impossible to discover the mental health problems of students in a timely and effective way.

### **2.2. INNOVATIVE PATHS OF MENTAL HEALTH EDUCATION FOR HIGHER VOCATIONAL STUDENTS WITH BIG DATA**

#### **2.2.1. ESTABLISHING AWARENESS OF BIG DATA IN MENTAL HEALTH EDUCATION**

Under the background of big data, higher education should actively apply big data technology in mental health education courses according to the development needs of the

times, and actively use big data thinking mode to think about and understand students' mental health problems, with the intention of improving and enhancing the quality of students' mental health education service work. Higher education should establish the awareness of big data for mental health and improve the concept of data. Pay attention to the application of big data in mental health education in the field of ideology and use big data as an indispensable resource in order to promote the innovation and development of mental health education mode in higher education. At the same time, higher education should apply cloud computing and big data thinking in student mental health management work.

Secondly, higher education needs to develop diversified guarantee measures according to students' mental health, so as to create a working environment and atmosphere for mental health education using big data technology. Finally, in the process of daily teaching, higher vocational mental health teachers should form the habit of thinking about big data, organize and analyze relevant questions, and grasp the mental health condition of students in time.

### **2.2.2. PSYCHOLOGICAL CRISIS INTERVENTION PLATFORM FOR HIGHER VOCATIONAL STUDENTS**

The psychological behavioral characteristics of higher vocational students are positive and negative, which need timely adjustment and improvement, and intervention and promotion by educators. Integrating big data technology into the construction of a psychological crisis intervention platform for higher vocational students can comprehensively collect and process data information on students' academic performance, interpersonal relationships, living status, and network activity, deeply excavate and analyze students' psychological status, optimize the formation of unified information, enhance the accuracy of psychological intervention, and strengthen foresight. The flexible use of big data technology can not only make accurate prediction of individual behavioral tendencies, but also anticipate the development pattern of psychological behavior and major events of higher vocational students, thus laying a good foundation for educators to implement scientific treatment programs.

### **2.3. ANALYSIS OF MENTAL HEALTH DATA SOURCES FOR HIGHER EDUCATION STUDENTS**

There are various factors that contribute to psychological problems, and mental health data need to be analyzed from multiple perspectives. Mental health data obtained from different perspectives reflect different psychological states respectively. The main sources of data for mental health factor indicators are mental health centers, schools, dormitories, families, and friends with whom we have a lot of contact. From the perspective of the surveyed personnel, the main sources are mental health counselors, school teachers, classmates and friends they usually communicate with, and the way to obtain these data is through conversation, survey and counseling. The main source of mental health data for students in higher education is the school, because the school is the place where students live the longest, so the school mental health data is more important.

## **3. CONSTRUCTION OF A PSYCHOLOGICAL CRISIS INTERVENTION PLATFORM FOR HIGHER VOCATIONAL STUDENTS BASED ON BIG DATA TECHNOLOGY**

### **3.1. QUANTIFICATION AND ANALYSIS OF STUDENTS' BEHAVIORAL CHARACTERISTICS**

In the mining of higher vocational education data, based on the original large amount of data, the features are extracted and quantified, aiming at the feature indicators after extraction can more intuitively reflect the students' school behavior performance. In addition, by referring to the basic psychology and pedagogy, we establish indicators to extract students'

characteristic traits and build more complete and complete behavioral characteristics to measure students' school performance, compare and analyze the difference in performance between psychological abnormalities and normal students, paint an accurate portrait of students based on the above data, assess the estimated level of mental health, and establish corresponding coping mechanisms. It realizes the early warning of students' mental health status, psychological problems and other accurate predictions, and continuously improves the system of prevention and intervention of mental health crisis in higher education.

### 3.2. PSYCHOLOGICAL CRISIS INTERVENTION PLATFORM MODEL TRAINING AND OPTIMIZATION

In order to study whether the psychological crisis intervention platform based on big data technology for higher education students helps to understand the psychological state of students, the classification accuracy of the psychological crisis intervention platform is shown in Table 1. In this paper, we use the above filtered four features to train the model and select five algorithms: logistic regression algorithm, Bayesian algorithm, support vector machine algorithm, K-nearest neighbor algorithm and decision tree to classify them.

The highest accuracy rates of the five algorithms were 78.40%, 88.30%, 80.40%, 90.80%, and 89.30% when using data from three years of university to classify psychologically normal and abnormal students, respectively, with logistic regression algorithm and support vector machine performing the best, and the classification results of plain Bayes being relatively poor. This shows that the model of higher vocational psychological crisis intervention platform based on big data technology has a high accuracy rate in analyzing students' psychological status.

**Table 1.** Comparison of classification accuracy of different classifiers

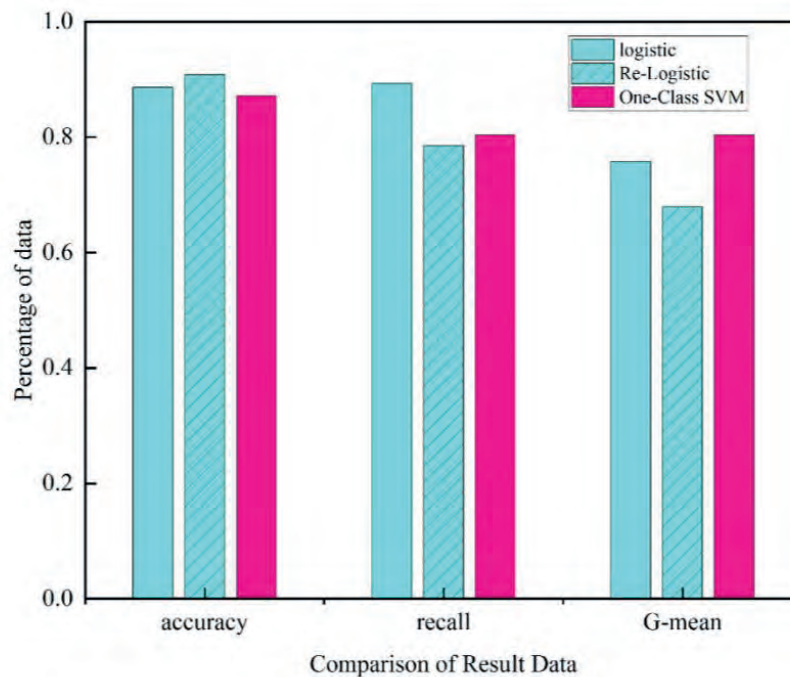
	Bayesian algorithm	Decision Trees	K Nearby	Logistic regression algorithm	Support vector machines
Freshman year	74.80%	82.60%	75.70%	88.60%	84.70%
Sophomore	78.40%	88.30%	80.40%	87.20%	89.30%
Junior	69.60%	76.80%	67.90%	90.80%	87.60%

### 3.3. COMPARISON OF CLASSIFICATION MODELS

The data are first oversampled by SMOTE and undersampled by K-means, after which the data are fed into a binary classification model for training to obtain classification results. However, due to the unbalanced nature of the data, excessive data sampling may lead to distortion of the data or produce overfitting of the classification model, so the classification algorithm One-Class SVM algorithm for outlier detection is used here to compare with it.

The One-Class SVM algorithm is suitable for situations where the sample data is extremely imbalanced and only the data patterns of the majority class samples are concerned. By learning the data from the majority class samples, a hyperplane is found to circle the majority class samples, and this hyperplane is used to make decisions thereafter. The test samples are input and the positive and negative samples are distinguished by the trained hyperplane. Since the One-Class SVM training model has only one class, the output can only discriminate whether it belongs to this class, and returns a "yes" result if it belongs to this class, or a "no" result if it does not. In this experiment, psychologically abnormal students are defined as positive cases and normal students are defined as negative cases. The positive and negative samples are divided into test sets according to 1:1, i.e., 50 normal students are randomly divided into 50 abnormal students as the test set, and the rest of the normal students are used as the training set to train the One-Class SVM model to find the classification boundary and classify.

The One-Class SVM classification results are shown in Figure 1. Its accuracy was 90.80%, and the recall and G-mean were 80.40% and 80.40%, respectively. Both are lower than the classification results of the optimized logistic regression model, but can also identify psychologically abnormal students by differential features.



**Figure 1.** Optimized logistic regression with one classification results

#### 4. CONCLUSION

With the popularization of information technology, the emotional communication barrier between people will become more and more obvious, and higher vocational students are a group with great mental health problems, so the active introduction of big data technology to analyze data in various aspects can help students grow up healthily by constructing a feedback system based on the results obtained from big data analysis.

This paper identifies psychologically abnormal students through big data analysis of different behavioral characteristics of higher education students. Based on multiple channels to optimize the integration of data, big data analysis allows to grasp students' behavioral performance and to study their thought dynamics. Student behavior patterns and psychological states are predicted through life, learning, and activities.

It helps mental health educators in higher education institutions to timely identify psychological crisis subjects, reduce the occurrence of psychological crisis events among college students, and promote the stable development of mental health education in higher education institutions, thus promoting the harmonious development of society.

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# CHALLENGES AND RESPONSES OF ENVIRONMENTAL ART DESIGN INNOVATION IN THE PERSPECTIVE OF RURAL REVITALIZATION

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## ABSTRACT

This paper introduces the role of environmental art design in rural revitalization, including enhancing the cultural connotation of the countryside and improving the aesthetic value of the rural environment. At the same time, the challenges faced by rural environmental art design innovation are analyzed, including the lack of professional talents, insufficient financial investment and the traditional concept of bondage. Then strategies and methods to cope with rural environmental art design innovation are proposed, including several specific practical measures to strengthen rural environmental art design talent training and promote rural environmental art design concept innovation. The results show that by guiding designers to focus on rural cultural characteristics and establishing the industrialization of rural environmental art design, the visibility of rural cultural tourism is effectively increased by 10-50%. This paper conducts an in-depth study on the challenges faced by rural environmental art design innovation and response strategies, which have important practical significance for promoting rural revitalization.

## KEYWORDS

environmental art; rural revitalization; cultural connotation; aesthetic value; design innovation; talent training

## 1. INTRODUCTION

Rural revitalization is one of the important development strategies of China at present, and environmental art design, as an innovative design form, also plays an important role in this process [1-2]. With the implementation of rural revitalization strategy, environmental art design has received more and more attention as an important means to promote sustainable rural development and create a beautiful countryside [3-4]. Some scholars have researched and elaborated on the role of



environmental art design in rural revitalization, such as enhancing the cultural connotation of the countryside and improving the aesthetic value of the rural environment [5]. At the same time, some researchers have also discussed the challenges faced by environmental art design innovation, such as the lack of professional talents and insufficient financial investment [6]. Some scholars believe that environmental art design can enhance the cultural connotation of the countryside, improve the quality of the rural environment, and explore the "ecology + culture" rural revitalization model, etc. [7]. This paper firstly introduces the role of environmental art design in rural revitalization, including enhancing the cultural connotation of the countryside and improving the aesthetic value of the rural environment. Secondly, it analyzes the challenges faced by rural environmental art design innovation, including the lack of professional talents, insufficient financial investment and the traditional concept of bondage. Finally, corresponding response strategies are proposed, including strengthening rural environmental art design talent training and promoting rural environmental art design concept innovation.

## **2. THE ROLE AND CHALLENGES OF ENVIRONMENTAL ART DESIGN IN RURAL REVITALIZATION**

### **2.1 THE ROLE OF ENVIRONMENTAL ART DESIGN IN RURAL REVITALIZATION**

#### **2.1.1 ENHANCE THE CULTURAL CONNOTATION OF THE COUNTRYSIDE**

In rural revitalization, environmental art design can enhance the cultural connotation of the countryside and improve the cultural taste of the countryside through the excavation and inheritance of the countryside culture. For example, in a certain countryside, designers can integrate these cultural elements into environmental art design by understanding and studying local traditional culture, such as setting up sculptures and murals with traditional cultural elements in public spaces, so that tourists and residents can feel the local traditional culture while enjoying the beautiful scenery.

Another role of environmental art design in rural revitalization is to enhance the cultural connotation of the countryside. The countryside is an important bearer of traditional culture, and environmental art design can promote rural traditional culture and enhance the cultural connotation of the countryside by creating cultural atmosphere and symbols with local characteristics. For example, setting cultural elements with local characteristics in rural public spaces, such as traditional architecture and folk art, can allow visitors and residents to better understand and feel the local cultural landscape, thus promoting cultural exchange and inheritance. At the same time, these cultural elements can also become brand symbols of the countryside, attracting more tourists and investors to develop and promote rural revitalization.

## **2.1.2 ENHANCE THE AESTHETIC VALUE OF THE RURAL ENVIRONMENT**

An important role of environmental art design in rural revitalization is to enhance the aesthetic value of rural environment. Through art design means, the rural environment can be aesthetically modified and shaped to make it more in line with people's aesthetic needs and cultural heritage.

For example, setting up landscape sculptures with local characteristics and painted walls on both sides of rural roads can make the rural environment more vivid and beautiful, attracting more tourists and investors to develop. At the same time, the enhancement of the aesthetic value of the rural environment can also stimulate the pride and sense of belonging of local residents and promote their love and identification with their hometowns, thus enhancing the endogenous power of rural revitalization.

## **2.2 THE CHALLENGES OF RURAL ENVIRONMENTAL ART DESIGN INNOVATION**

### **2.2.1 LACK OF PROFESSIONAL TALENTS**

In rural areas, there is a relative lack of professional talents in the field of environmental art design, which leads to the limitation of the ability to innovate rural environmental art design. As the rural environment is relatively homogeneous, the lack of professional talents makes it difficult to carry out diversified design innovation, which also limits the development of rural environmental art design. Therefore, it is necessary to strengthen the cultivation and introduction of professional talents for rural environmental art design in order to improve the ability of rural environmental art design innovation.

### **2.2.2 INSUFFICIENT FINANCIAL INVESTMENT**

The economy of rural areas is relatively weak, and insufficient capital investment is also one of the challenges facing rural environmental art design innovation. Rural environmental art design requires a large amount of capital investment, including design costs, material costs, construction costs, etc., and the relative lack of funds in rural areas cannot meet the needs of rural environmental art design innovation. Therefore, it is necessary to strengthen the financial support for rural environmental art design, including government funds and social funds, in order to promote the development of rural environmental art design innovation.

### **2.2.3 THE BONDAGE OF TRADITIONAL CONCEPTS**

The traditional concept in rural areas is more conservative, which also brings certain challenges to rural environmental art design innovation. In some areas, people's knowledge and understanding of environmental art design is still stuck in traditional concepts, and it is difficult to accept new design concepts and methods. This has also

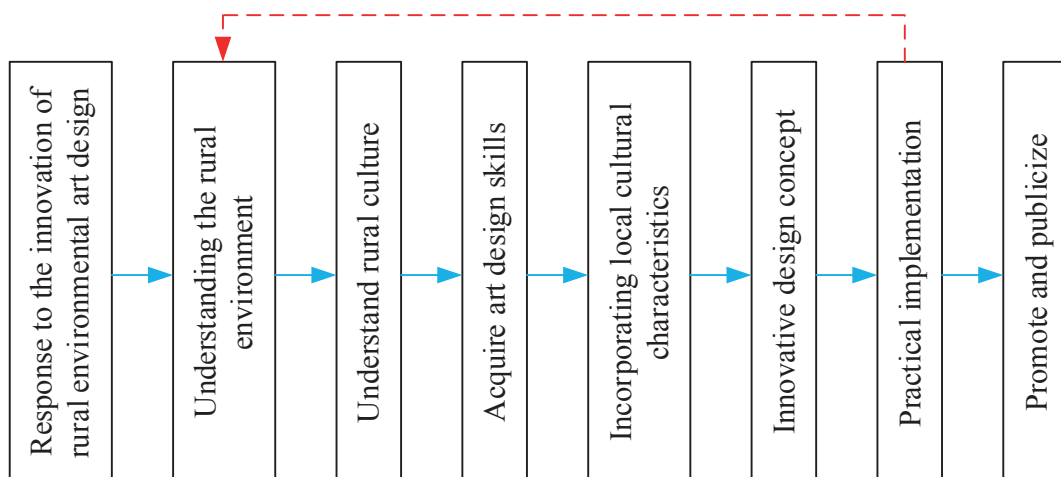
led to the hindrance of rural environmental art design innovation. Therefore, it is necessary to strengthen the propaganda and education in rural areas, improve people's knowledge and understanding of environmental art design, break the shackles of traditional concepts, and promote the development of rural environmental art design innovation.

### 3. RESPONSE TO THE INNOVATION OF RURAL ENVIRONMENTAL ART DESIGN

#### 3.1 STRENGTHEN THE TRAINING OF RURAL ENVIRONMENTAL ART DESIGN TALENTS

##### 3.1.1 STRENGTHEN THE CONSTRUCTION OF RURAL ENVIRONMENTAL ART AND DESIGN EDUCATION SYSTEM

The construction of rural environmental art design education system is an important initiative to strengthen the training of rural environmental art design talents. This education system should include basic courses, professional courses, and practical courses, etc., with the main goal of cultivating students' basic literacy and practical ability. In terms of basic courses, it should focus on the cultivation of students' art literacy, design thinking and cultural quality. In terms of professional courses, attention should be paid to the establishment of a diversified talent training system. The innovation path of rural environmental art design is shown in Figure 1.



**Figure 1** Rural environmental art design innovation path

In order to strengthen the training of rural environmental art design talents, a diversified talent training system needs to be established. The system should include multiple aspects such as school education, social practice and industry training. In terms of school education, the professional curriculum of rural environmental art design should be strengthened and students should be encouraged to participate in the practice of rural environmental art design. In terms of social practice, students can be

organized to participate in volunteer activities of rural environmental art design to improve their practical ability and sense of social responsibility. In terms of industry training, experts in the field of rural environmental art design can be invited to give lectures and training to help students better understand the latest developments and techniques in rural environmental art design.

### **3.1.2 ESTABLISHMENT OF INDUSTRY-ACADEMIA-RESEARCH COOPERATION MECHANISM**

Rural environmental art design is an interdisciplinary and comprehensive subject involving many fields, which requires the cooperation of industry, university and research. Therefore, an industry-university-research cooperation mechanism needs to be established to closely link schools, enterprises and research institutions to promote the innovation and development of rural environmental art design. This can be done by establishing internship bases and joint research projects, so that students can learn more knowledge and skills in practice, and also provide more talents and technical support for the development of the rural environmental art and design field.

### **3.2 PROMOTE THE INNOVATION OF RURAL ENVIRONMENTAL ART DESIGN CONCEPT**

#### **3.2.1 GUIDING DESIGNERS TO FOCUS ON RURAL CULTURAL FEATURES**

In rural environmental art design innovation, designers need to pay attention to the cultural characteristics of the countryside and integrate them into the design, so as to create works with regional characteristics and cultural connotations. The design elements of rural cultural characteristics are shown in Table 1.

For example, when designing a rural park, local traditional cultural elements can be incorporated into the landscape design, such as adopting the style of local traditional architecture and using local characteristic plants, so that the park has both a modern sense and a strong local flavor to attract more tourists to visit.

**Table 1** Design elements of rural cultural features

Design elements Elements	Design Practice
Geographical features Color	Integrate local traditional cultural elements into the landscape design, such as adopting the style of local traditional architecture, using local characteristic plants, etc.
Culture Connotation	Pay attention to the expression of cultural connotation in the design, such as setting up places to display local traditional culture and sculptures in the park

### **3.2.2 ESTABLISHING A SYSTEM FOR THE INDUSTRIAL DEVELOPMENT OF RURAL ENVIRONMENTAL ART DESIGN**

In order to strengthen the industrial development of rural environmental art design, a perfect system needs to be established. First of all, it is necessary to establish a market system for rural environmental art design, and attract more investment and capital into the field through market-oriented means. Secondly, it is necessary to establish a talent cultivation system for rural environmental art and design to cultivate more professional talents for this field. At the same time, it is also necessary to establish a technical innovation system for rural environmental art design to promote technical innovation and development in this field. Finally, a policy system for rural environmental art design needs to be established to provide policy support and guarantee for this field.

### **4. CONCLUSION**

This paper analyzes the role of environmental art design in rural revitalization, which includes enhancing the cultural connotation of the countryside and improving the aesthetic value of the rural environment. However, it also points out the challenges faced by rural environmental art design innovation, which mainly include the lack of professional talents, insufficient financial investment and the traditional concept of bondage. In order to cope with these challenges, the article puts forward a series of specific response strategies, including strengthening rural environmental art design talent training and promoting rural environmental art design concept innovation. Through the research work of this paper, we can conclude that only by innovating rural environmental art design, strengthening talent cultivation and promoting concept innovation can we better promote the process of rural revitalization, enhance the cultural connotation of the countryside and the aesthetic value of the rural environment, and realize the sustainable development of rural revitalization.

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# EXPLORING THE EFFECTIVE PATH OF CULTIVATING ENGLISH INTERCULTURAL COMMUNICATION SKILLS OF COLLEGE STUDENTS IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper discusses the application of big data technology to English teaching by analyzing the current problems in the cultivation of intercultural communication skills based on the main points of English intercultural communication skills of college students. The mean value of difference identity in each dimension of intercultural sensitivity is 4.27, communicative skill mean value is 3.27, communicative involvement mean value is 3.97, interactive confidence mean value is 3.51, communicative concentration mean value is 3.82, communicative interaction mean value is 4.18, and interactive respect mean value is 3.41. It shows that the development of English intercultural communication skills of college students based on the background of big data promotes the improvement of students' English literacy to provide a strong guarantee.

## KEYWORDS

English for college students; Intercultural communication; English teaching; Communicative competence development; English literacy

## 1. INTRODUCTION

With the continuous development of big data technologies, it makes people in the world communicate with each other more and more frequently [1-2]. As a result, students are facing increasing challenges in terms of skill acquisition in English, the world's lingua franca [3]. Cultivating college students' core literacy and cross-cultural communication skills has become an inevitable trend in the reform of college English teaching [4]. Language is an important vehicle for transmitting culture, and learning a new language is inseparably linked to its culture [5-6]. However, in terms of the current situation of university English teaching courses, most of them pay more attention to the teaching of students' English language knowledge and skills in the implementation process, while ignoring the education of cultivating students' language application literacy and culture, which makes the quality of course teaching generally low and makes it difficult to give full play to the effect of language and culture education [7-8]. Therefore, in response to this phenomenon, university English teachers need to change their teaching methods in time, optimize the university classroom curriculum system in a scientific and reasonable way based on intercultural communication skills, and provide a strong guarantee to improve the efficiency of university classroom teaching and promote the improvement of students' English literacy [9].

## **2. CULTIVATION OF ENGLISH INTERCULTURAL COMMUNICATION SKILLS AMONG COLLEGE STUDENTS**

### **2.1. INTERCULTURAL COMMUNICATION SKILLS DEVELOPMENT**

#### **2.1.1. STIMULATING INTEREST IN LEARNING**

The cultivation of English intercultural communication ability of college students based on the background of big data can not only innovate and optimize teaching methods, teaching activities and teaching modes, but also create a new educational environment for students and promote the improvement of their English literacy. On the one hand, to cultivate students' intercultural communication skills in university English teaching, teachers need to take into account the current needs of talent cultivation in society, constantly optimize teaching forms, take the principle of improving students' professional ability and literacy, and fully mobilize students' enthusiasm to participate in English teaching activities. On the other hand, college English has a certain degree of humanistic literacy, so in the process of cultural education in the discipline, English teachers can target English skills and knowledge transfer, dig deeper into English cultural content when preparing lessons, transfer cultural knowledge and English grammar, sentence patterns and words to students, so that they can have a deeper understanding of knowledge and cultural content, stimulate students' enthusiasm for learning English, and promote the quality of college English classroom. The quality of teaching is improved.

#### **2.1.2. DEVELOPING INTERCULTURAL COMMUNICATION SKILLS**

In the college English classroom teaching process, English subject as a language course, only through a specific scene to guide college students into the English scene, drive students' English emotion, so that they can be in a good environment, through the English language knowledge and skills to express their own thoughts and feelings, to achieve the purpose of perfecting students' English literacy.

Similarly, by integrating English culture and creating a good learning atmosphere for students in English classroom teaching based on intercultural communication ability, it can help students feel the charm and interest of English subject in English culture, effectively expand the level of students' English knowledge, and promote the improvement of students' intercultural communication ability. In addition, by cultivating the intercultural communication ability of college students, it can not only make the college English classroom give full play to the form of subject education and improve the quality of teaching, but also use English culture as a teaching carrier to achieve the goal of improving the cultural confidence and cultural literacy of college students.

### **2.2. COLLEGE ENGLISH TEACHING FOR INTERCULTURAL COMMUNICATION SKILLS DEVELOPMENT**

#### **2.2.1. BACKWARD TEACHING METHODS**

The teaching methods in the university English classroom based on the cultivation of intercultural communication skills are generally outdated. The goal of university English classroom teaching is to strengthen the students' language application level, and not only the students' theoretical learning achievement, but also the students' practical application level is highly valued. However, in the current English classroom teaching situation, teachers adopt a single form of teaching, which makes students gradually lack interest in learning under the influence of a single teaching method and eventually causes a decline in the quality of classroom teaching. When teaching, some teachers only focus on how to explain English sentence structure, English word pronunciation and other content, ignoring students' English



application ability, so that students' learning needs cannot be met, which has a negative impact on improving their English literacy.

### 2.2.2. SINGLE TEACHING CONTENT

In college English classroom teaching based on the cultivation of intercultural communication skills, there is a common phenomenon of single teaching content and lack of intercultural communication content in teaching materials. In the current situation of college English teaching materials, although some cultural knowledge is integrated, the content lacks comprehensiveness, and the culture of English teaching materials is mostly integrated with British and American culture, and the content of local culture is less, which is not conducive to students' in-depth understanding of local culture. In response to this phenomenon, only timely reform of teaching content can effectively improve students' English comprehension ability and promote the smooth development of college English teaching.

## 3. EXPLORING THE CULTIVATION OF ENGLISH INTERCULTURAL COMMUNICATION SKILLS AMONG COLLEGE STUDENTS BASED ON BIG DATA

### 3.1. SENSITIVITY AND EFFICACY DIMENSIONS

The overall situation of the dimensions of intercultural communication sensitivity and efficacy of college students is shown in Table 1. Among the dimensions of intercultural sensitivity, difference identity has the highest score with a mean value of 4.27, the lowest score is communicative skill with a mean value of 3.27, communicative involvement with a mean value of 3.97, interactive confidence with a mean value of 3.51, communicative concentration with a mean value of 3.82, communicative interaction with a mean value of 4.18, and interactive respect with a mean value of 3.41. Thus, it can be seen that although college students have a strong willingness to participate in However, due to their limited foreign language proficiency, insufficient knowledge of Chinese and foreign cultures and insufficient intercultural experience, they cannot have enough confidence to face intercultural communication activities.

**Table 1.** Sensitivity and efficacy dimensions as a whole

Dimension Type	Minimum value	Maximum value	Average value	Standard deviation
Communicative engagement	2.85	4.37	3.97	0.41
Differential identity	3.17	4.87	4.27	0.36
Interaction Confidence	2.30	5.00	3.51	0.61
Interaction Focus	1.92	4.97	3.82	0.53
Interaction skill	2.39	4.69	3.27	0.42
Interaction Interaction	2.81	5.00	4.18	0.45
Interaction Respect	2.37	5.00	3.41	0.67

### 3.2. ENGLISH PROFICIENCY FACTOR VARIABILITY

To study the influence of English proficiency factors on college students' English intercultural communicative competence, data analysis was conducted by one-way ANOVA test with big data, and the influence of English proficiency factors on intercultural sensitivity and efficacy is shown in Table 2. The significance of each dimension is greater than 0.5, and there is a significant difference of English proficiency factor in each dimension of intercultural communication ability, which shows that the difference of English proficiency is the reason of affecting students' intercultural communication ability.

**Table 2.** Effect of English proficiency factors on cross-cultural sensitivity and efficacy

Dimensionality	Average value	Average value	<i>F</i>	Significance
Communicative engagement	3.973	0.437	1.518	0.573
Differential identity	4.286	0.518	0.596	0.511
Interaction Confidence	3.626	0.461	1.151	0.569
Interaction Focus	3.704	0.437	0.979	0.718
Interaction skill	3.172	0.531	1.083	0.729
Interaction Interaction	3.619	0.528	1.429	0.617
Interaction Respect	4.085	0.362	0.828	0.527

#### 4. CONCLUSION

The cultivation of intercultural communication skills can be developed from language learning, listening and speaking skills and intercultural communication. Teachers can use both in-class and out-of-class to cultivate students' intercultural communication, improve their interest in learning and encourage them to improve their intercultural communication skills spontaneously, which is also conducive to optimizing teachers' college English teaching process and students' English learning process. Cultivating students' intercultural communication skills in college English classroom teaching can not only improve students' English literacy, but also help to promote classroom teaching reform. Therefore, university English teachers should clarify the importance of intercultural communication in the teaching process, improve their own intercultural teaching level and intercultural communication literacy in a timely manner, innovate teaching methods in a reasonable way, optimize the content of English teaching materials, and promote students' overall development in the future.

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# PACKAGE DESIGN FORM OPTIMIZATION RESEARCH BASED ON SPATIAL ANALYSIS AND LOCAL FEATURE EXTRACTION

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## ABSTRACT

This paper firstly continues to analyze the development trend of packaging design sex, including the development of new materials, new morphological shape development and the development trend of new process technology. Secondly, the basic steps of packaging design form recognition are analyzed based on two-dimensional space, and the steps of the two-dimensional space analysis algorithm are optimized using local feature extraction. Finally, the comparative analysis of recognition rate using product packaging design shows that the average accuracy of the algorithm in this paper is 86.72%, which is 3.47%, 4.55% and 20.24% higher than 2DPCA, 2DLDA and 2DLPP respectively. This shows that the packaging design form with spatial analysis and local feature extraction has good recognition rate, which in turn promotes the innovation and optimization of packaging design form.

## KEYWORDS

spatial analysis; local feature extraction; packaging design; morphology optimization; recognition rate; 2DPCA

## 1. INTRODUCTION

New products are constantly appearing, and some of them involve new areas that have not been accessible to humans before. For example, microelectronics, superconductors, biogenic products, nano products, etc. These new products pose new challenges to packaging design itself, how to protect and preserve them, how to get them safely into circulation, and how they can be successful in commercial sales [1-2]. These new topics have contributed to the constant updating and progress in packaging structures, new materials, and visual communication to adapt to the needs of new product packaging [3-4].

Design expression is the deepening and development of the design concept, not the end. The success or failure of a design depends on both artistic conception and formal expression, and a unique and clever artistic conception needs a certain artistic form to be fully reflected. The design performance cannot be limited to the image of the product itself, nor can it only start from the function [5-6]. The packaging design is shaped by the image of goods with strong artistic influence, which must have aesthetic value, meet the psychological feelings of consumers about the goods, and adapt to the aesthetic needs of consumers [7].

This paper analyzes the development trend of packaging design forms, including the development trend of new materials, the development trend of new form and shape, and the development trend of new process technology. Two-dimensional spatial analysis is used to identify the packaging design forms, and the algorithm is optimized by local feature extraction. In order to verify the effectiveness of the algorithm of this paper, a comparative analysis of experiments is conducted, and the results show that the packaging design form recognition based on spatial analysis and local feature extraction has a high recognition rate and can help designers optimize the packaging design form.

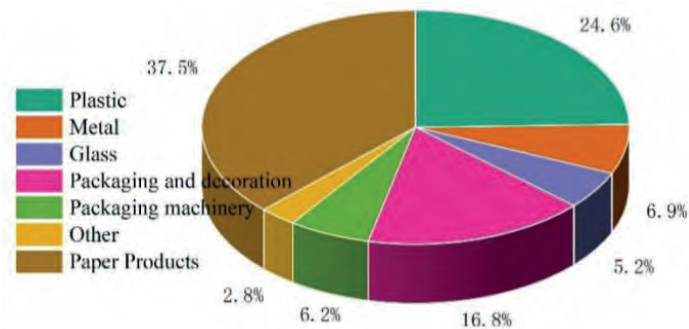
## **2. DEVELOPMENT TREND OF PACKAGING DESIGN FORM**

### **2.1 NEW MATERIAL DEVELOPMENT TREND**

With the deepening of economic globalization and the accelerated change of science and technology, many new materials are emerging in contemporary product packaging design. Product packaging materials and systems tend to reduce costs, invest in green technologies and materials, and commit to more applicable services and functional designs. The world of corrugated box manufacturing is now highly competitive, and the corrugated packaging industry in European countries is choosing the best cost solutions by analyzing orders and raw material inventories. As China's corrugated carton industry continues to advance in lightweighting and quantification technologies, it will be of value to the entire packaging industry and to the product industry as a whole.

Figure 1 shows the product packaging material output value possession analysis chart. According to the basic positioning and trends of the packaging industry in the last 5-10 years shown in the analysis of the basic status of the product packaging industry, the output value of the paper packaging category accounts for 37.13% of the entire packaging industry in the first place, plastic packaging second 25%, glass packaging 4.87%, packaging decoration accounted for 17%, packaging machinery 6%, 3% of other packaging industries. Paper packaging industry due to express logistics, physical marketing, brand promotion, increasingly become consumers and various industries

rely on the industry, and at a rapid pace, to absorb a variety of demand for technical components.



**Figure 1** Packaging Materials Production Value Share Analysis Chart

## 2.2 NEW FORM MODELING TRENDS

Zero packaging, simplified packaging, green packaging is becoming the new outer packaging development trend, green goods, green packaging combination has become more attractive to the public highlights. Modeling design changes from the traditional neat and tidy flat geometric outer packaging design, to shaped design, bionic shape design, curved shape design, breakthrough conventional visual aesthetics, in the realization of a unique new shape at the same time, the transformation of functional upgrades.

Shaped design is a design method to achieve special use, special product demand and special public taste with complex and unconventional shape; it has a new trendy sense of shape in display, show and sale. From the packaging design point of view, if there is a reasonable combination of design planning, shaped outer packaging design not only needs to be perfect in terms of storage and transportation, but also in terms of the fit of the product itself to be able to fit perfectly. Bionic design is a symbiotic design science that combines traditional and contemporary, natural and human, art and technology, micro and macro, unique and universal, and other popular multicultural fusion.

## 2.3 NEW PROCESS TECHNOLOGY TRENDS

In today's global economic boom and the rise of real and virtual industries, the packaging revolution is based on the concept of "zero-degree packaging", "green packaging" and "simplified packaging" and is being implemented. The implementation of environmentally friendly green goods and biodegradable green packaging has become a new social hotspot. Due to the growing demand for paper packaging market, the original plastic process is gradually used in paper packaging. Extrusion, stamping, integrated molding, these processes solve the traditional paper packaging form process problems, to assist the development of paper packaging form. Emerging wet processing

technology, ultraviolet drying technology, high-temperature bonding technology, vacuum technology, digital laser cutting technology are aiding the high-tech contemporary development of the paper packaging industry.

### 3. PACKAGING DESIGN MORPHOLOGY ANALYSIS BASED ON SPATIAL ANALYSIS AND LOCAL FEATURE EXTRACTION

Based on the previous analysis of the development trend of packaging design form, in order to be able to understand more intuitively and help designers to carry out innovative design of product packaging. This chapter introduces spatial analysis and local feature extraction to provide a new research method for packaging design morphology analysis.

#### 3.1 PACKAGING DESIGN FORM RECOGNITION BASED ON TWO-DIMENSIONAL SPACE ANALYSIS

One-dimensional principal component analysis first converts the packed two-dimensional image into a one-dimensional vector. The image is already high in dimensionality, and the transformed dimensionality is even higher, which greatly increases the complexity of calculating the sample covariance. Stretching the image data into a one-dimensional vector will destroy the original data structure of the image. Two-dimensional spatial principal component analysis can maintain the original structure of the packaging design data to a certain extent.

The 2DPCA algorithm process is as follows:

(1) Construct the matrix  $X = [x_1, x_2, \dots, x_N]$  and the covariance matrix.

(2) Construct the projection subspace, use the eigenvectors of the covariance matrix as the projection axes, and solve for the coordinates.

(3) Compress the data, and perform the corresponding transformations on the training and test samples to obtain the corresponding low-dimensional matrices, respectively.

(4) Classify and identify, and categorize the samples to be tested.

#### 3.2 OPTIMIZATION OF TWO-DIMENSIONAL SPATIAL ANALYSIS ALGORITHM INCORPORATING LOCAL FEATURE EXTRACTION

Suppose we obtain the data  $X = [x_1, x_2, \dots, x_n]$ ,  $X \in M$  and  $M$  is a manifold hidden in the space of  $R^D$ . The main purpose of 2DPCA is to find the projection matrix  $A$ ,  $R^D$  that maps the data  $X$  in space to the low-dimensional  $R^d (D \geq d)$  space,

and the projected sample is denoted as  $Y = [y_1, y_2, \dots, y_n]$ , where  $y_i = Ax_i$ . The idea of the algorithm can be briefly described as follows:

(1) Detect the acquired sample data  $X = [x_1, x_2, \dots, x_n]$ .

(2) Construct the adjacency matrix  $W$ , i.e., the weight matrix of the neighborhood connectivity graph, for the neighborhood of the sample  $x_i$ . The  $\varepsilon$ -neighborhood and  $k$ -nearest neighbor methods are usually used.

(3) Determine the weights, so that  $w_{ij} = 1$  or  $w_{ij} = \exp(-\|x_i - x_j\|^2 / t)$ ,  $t$  are parameters, which need to be set by us manually.

(4) Solve for the eigenroots, converting the optimization problem for the objective function  $\sum_{ij} (y_i - y_j)(y_i - y_j)^T w_{ij}$  and the orthogonal constraint  $y^T U y = 1$  into a problem of solving for the minimum eigenvalue and eigenvector of  $XLX^T a = \lambda XUX^T a$ , where  $L = U - W$  is called the Laplacian matrix.

(5) Let  $\{a_0, a_1, \dots, a_{k-1}\}$  be the solution of the above equation with corresponding eigenvalues  $\lambda_0 < \lambda_1 < \dots < \lambda_{k-1}$ , and be able to calculate the corresponding eigenvector  $A = [a_0, a_1, \dots, a_d] \in R^{d \times k}$ , i.e.,  $y_i = A^T x_i$ .

The 2DPCA algorithm incorporating local feature extraction, which can keep the local information of the data well and is linear mapping with good clustering and classification effect, well promotes the application of local feature extraction in packaging design form optimization.

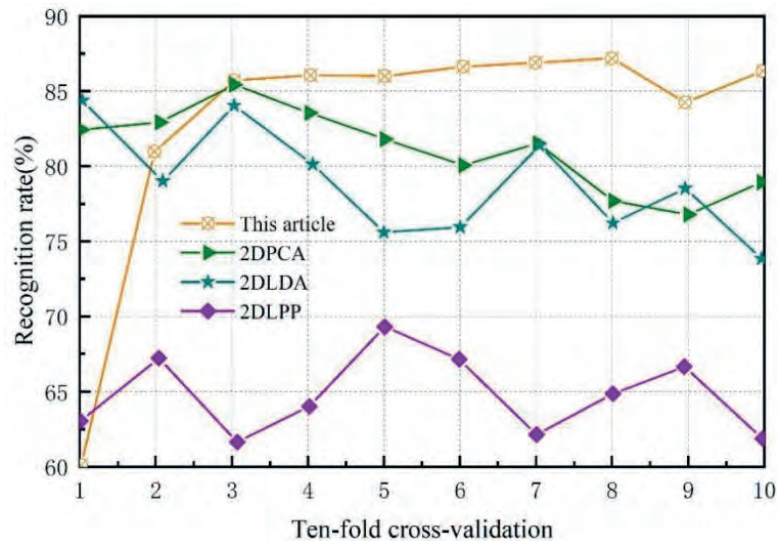
#### 4. EXPERIMENTAL RESULTS AND ANALYSIS

In order to verify the effectiveness of the method in this paper and its advantage in recognition rate, the experimental environment MATLAB is programmed to form a dataset by collecting the images of packaging products involved on the Internet. It is also compared with other existing algorithms to prove the effectiveness of the algorithm given in this paper on the recognition of packaging design forms.

This experiment pre-processes a total of 500 product packaging images in advance to facilitate subsequent operations without changing the gray scale. The first 80 images

are randomly selected as training samples to form a training set of 50\*80, and the rest are used as the test sample set, and the average value is taken as its final recognition rate using the ten-fold cross-validation method. The algorithms compared in this paper include 2DPCA, 2DLDA, and 2DLPP algorithms, and the classification method uses the nearest neighbor classifier with Euclidean distance. The comparison of recognition rates of each algorithm is shown in Figure 2.

From the algorithm comparison, the average accuracy of ten-fold cross-validation of the 2D spatial analysis algorithm incorporating local feature extraction in this paper is 86.72%, which is 3.47%, 4.55% and 20.24% higher than 2DPCA, 2DLDA and 2DLPP, respectively. This indicates that spatial analysis and local feature extraction can better identify packaging design forms, provide designers with more possible packaging design forms, and then promote the optimization and development of product packaging forms.



**Figure 2** Comparison of recognition rates by algorithm

## 5. CONCLUSION

Starting from the development trend of packaging design forms, this paper analyzes the trends of new materials, new form shapes and new process technology development. The two-dimensional spatial analysis algorithm is optimized by using local feature extraction to realize the effective recognition of packaging design forms. The results show that the average accuracy of this algorithm is 86.72%, which is 3.47%, 4.55% and 20.24% higher than that of 2DPCA, 2DLDA and 2DLPP respectively. This shows that the spatial analysis and local feature extraction can effectively carry out the recognition of packaging design forms, and then provide new possibilities for designers to innovate product packaging design forms.



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# AN INNOVATIVE PARADIGM STUDY OF LANGUAGE INTERACTION IN THE PROCESS OF ENGLISH SECOND LANGUAGE ACQUISITION IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

In this paper, we applied language interaction under the second language acquisition model to English learning, constructed a comparative study of language interaction groupings under the second language acquisition model, and analyzed the learning efficiency of multi-interactive classrooms. The average scores of the homogeneous, heterogeneous and self-selected groups were higher than those of the control group, with 57.5% for the control group, 71.5% for the homogeneous group, 68% for the heterogeneous group and 84% for the self-selected group. The active interaction between teachers and students, moderate decentralization of teachers, and motivation of students in the multi-interactive classroom are conducive to improving students' learning efficiency and promoting the development of interactive English teaching and the improvement of English teaching quality.

## KEYWORDS

English second language acquisition; Language interaction; Multiple interactions; Classroom learning efficiency; Interactive teaching of English

## 1. INTRODUCTION

Second language acquisition, as an important learning method in linguistics, plays an important role in improving the efficiency and learning skills of foreign languages [1]. The language teaching model of second language acquisition is based on the background of language knowledge, interactive learning based on the semantic correlation between the native language and the second language, improved means of language learning, improved effectiveness of language learning, and full dispatch of language learning [2-3]. The study of

the model of language interaction and innovation in the second language acquisition model is of great importance in language learning and foreign language teaching [4].

The process of linguistic interaction in second language acquisition is the process of characterization and information integration of language knowledge elements [5]. In the concretized application, the model of second language acquisition is constructed through the elements of language knowledge, and the concretized model of language application is used for holistic language teaching and full dispatch of the center of gravity of language learning [6-7]. The subject and object of second language acquisition are interchanged using the method of center of gravity shift to construct a pluralistic model of language interaction in the second language acquisition model [8-9]. Classroom interaction is a very important form of classroom teaching [10]. Teachers and students interact in the classroom to improve their understanding of each other, while increasing their knowledge and practicing their language expression and organizational skills. Through interaction, teachers can demonstrate expectations for their students, which can help them improve their academic performance. Teachers can also use interaction to regulate the classroom atmosphere and to better accomplish their teaching and tasks.

## **2. ANALYSIS OF LANGUAGE INTERACTION IN ENGLISH SECOND LANGUAGE ACQUISITION**

### **2.1. INTERACTIVE TEACHING OF ENGLISH AS A SECOND LANGUAGE ACQUISITION LANGUAGE**

#### **2.1.1. IMPROVING THE CLASSROOM LANGUAGE ENVIRONMENT AND SOCIAL ENVIRONMENT**

Interactive language education in the second language acquisition model is a multifaceted interactive teaching using the classroom environment and language environment, combined with multimedia technology to improve the direct perception of language knowledge and the ability to express information. We will build a good social and classroom environment for language learning, adopt a time-space integration approach to interactive language learning, and use advanced teaching and interactive tools to create a suitable teaching environment for language learning in second language acquisition. Teachers need to acquire rich knowledge of multimedia teaching, understand the local culture and geography of second-language countries, improve their information literacy, and play their technology-led and language-led roles. Deploy various resources to improve the classroom linguistic and social environment for second language acquisition, provide learners with a good learning environment, and realize the innovative teaching of language interaction in the second language acquisition mode.

#### **2.1.2. STIMULATING LEARNERS' COGNITION**

Through language interaction and knowledge transfer, learners' sensory perceptions are stimulated in many ways to improve the efficiency of learning. In the second language acquisition model, interactive language teaching is carried out through diverse learning and

teaching methods. A variety of activities such as lectures and conferences can be conducted to carry out interactive teaching of language learning, engage learners in the language environment, stimulate the senses of language learners, combine the second language acquisition mode of thinking, and carry out environmental language teaching to improve the efficiency of language learning. Campus radio is used to broadcast English programs at different levels to enhance the enjoyment of learning the language in a language environment that engages learners in language learning.

### **2.1.3. CONDUCT KNOWLEDGE EXPLORATION AND EXCHANGE**

The difference between teachers and students is mainly in the amount of knowledge acquisition and experience, and both parties are on an equal footing. Language interaction reflects the respect of both teachers and students for each other and is a progressive way of teaching. Students find the knowledge acquired through language interaction more interesting and memorable than traditional indoctrination. Through interaction, teachers can understand students' current learning situation and overall mental state, so that they can care for them in a targeted manner, help them reduce their learning stress, and allow them to acquire knowledge in a relaxed state.

## **2.2. INTERACTIVE IMPLEMENTATION OF ENGLISH SECOND LANGUAGE ACQUISITION LANGUAGE**

### **2.2.1. PARTICIPATION IN ENGLISH CLASSROOM INTERACTION**

English is a subject that must be voiced in order to be learned well, and speaking proficiency will get better as you speak more and more. The phenomenon of not participating in English classroom interaction only causes the gap between students' English proficiency to be widened further, thus creating a "monopoly on interaction". This is contrary to the goal of promoting the overall improvement of students' English proficiency through classroom interaction. At the same time, it also discourages students who are less proficient in English from interacting with each other, leading to their rejection of classroom language interaction, which is detrimental to their long-term development.

### **2.2.2. LOW LEVEL OF LANGUAGE INTERACTION**

In the process of English second language acquisition in colleges and universities, the way and level of language interaction is still at a preliminary stage, mainly consisting of teachers asking questions to students, which is not very different from the question-based interaction in traditional teaching. This superficial form of interaction lacks depth, and students do not have a strong sense of experience and therefore have little interest in language interaction. Interaction in the English classroom should be an exchange of English language knowledge between teachers and students, yet English teachers make a uniform choice of interactive content and do not design topics carefully, leading to students' fatigue and boredom. Teachers are less prepared for English classroom language interaction and have difficulty in accurately grasping the timing and amount of interaction, resulting in poor quality of interaction, failure to

stimulate students' interest in learning, difficulty in empathy between teachers and students, and loss of the meaning of interaction.

### 3. A STUDY OF MULTIPLE INTERACTIONS IN ENGLISH SECOND LANGUAGE ACQUISITION BASED ON DEEP LEARNING

#### 3.1. TEACHER-STUDENT INTERACTION

Teacher-student interaction is a basic form of organization for general teaching activities and also for multi-interactive classrooms. In order to investigate the changes in learning efficiency of teacher-student interaction in English second language acquisition, students were randomly selected and grouped according to the ranking of their English scores in the final exam, and the groups were tested at the end of the course as a way to analyze students' learning efficiency. The groups were divided into control group, homogeneous group, heterogeneous group, and self-selected group, and the self-selected group was formed by the students themselves. The learning efficiency of the multivariate interactive classroom is shown in Figure 1. The average scores of the homogeneous, heterogeneous, and self-selected groups were higher than those of the control group, with 57.5% for the control group, 71.5% for the homogeneous group, 68% for the heterogeneous group, and 84% for the self-selected group. This indicates that active teacher-student interaction, moderate teacher decentralization, and student motivation in the multi-interactive classroom are conducive to improving students' learning efficiency.

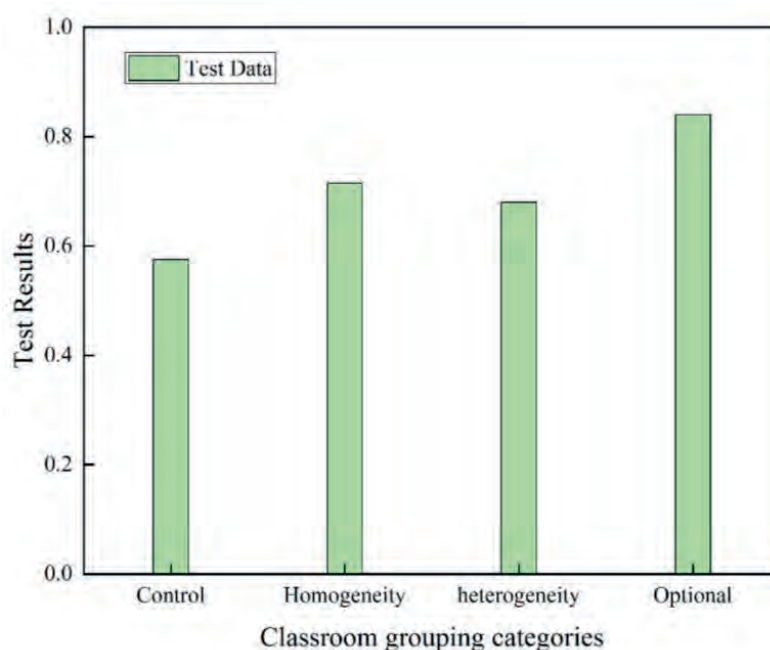


Figure 1. Learning efficiency of multi-interactive classroom

#### 3.2. MULTI-INTERACTIVE TEACHING MODE APPLICATION

In order to investigate the quality of English classroom questions in the multi-interactive teaching mode, classroom questions were divided into demonstrative and reference questions, and the quality of classroom questioning interaction is shown in Table 1. 108 reference

questions and 106 demonstrative questions were used by five teachers, and the use of demonstrative and reference questions in the English classroom was in a balanced state, with demonstrative questions occupying a dominant position in classroom questioning. It shows that English teachers are now fully integrating demonstrative and reference questions to examine students' knowledge learning and improve the quality of classroom questioning interaction.

**Table 1.** Quality of questioning interaction in the multi-interactive classroom

Teachers	Referential questions		Demonstrative questions		Total number of questions	Classroom interaction scores
	Quantity	Ratio (%)	Quantity	Ratio (%)		
<i>T1</i>	17	48%	19	52%	36	5.67
<i>T2</i>	21	50%	21	50%	42	5.65
<i>T3</i>	23	46%	27	54%	50	5.78
<i>T4</i>	27	58%	21	42%	48	5.93
<i>T5</i>	20	52%	18	48%	38	5.95
Total	108	52%	106	48%	214	

#### 4. CONCLUSION

With the development of the times, significant changes have taken place in all aspects of society. Education plays a huge role in the development of society. In the new era, the speed of updating and upgrading education is accelerating, and education can only avoid being eliminated by the times if it constantly updates its educational philosophy and methods. English education in colleges and universities has unique characteristics, and language interaction has a huge role in promoting English learning of college students. English teachers in secondary schools should introduce this new teaching method in their teaching activities in order to improve students' English and promote their overall development. The use of language interaction in the process of English second language acquisition has great advantages, but there are currently many problems with language interaction in English classes in Chinese universities. Among the more prominent problems, the number of participants in interaction is low, the level of teacher-student interaction is not high, and students are not motivated, etc.

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# RESEARCH ON THE IMPLANTATION AND APPLICATION OF TRADITIONAL CULTURAL ELEMENTS IN JEWELRY DESIGN IN THE AGE OF INTELLIGENCE

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## ABSTRACT

This paper symbolizes the traditional cultural elements under the guidance of intelligent era to make them modern, and studies the cultural attributes and characteristics of the era of jewelry design, combined with the analysis of jewelry consumer market and the design orientation to consumers. Among them, the acceptance rate of consumers aged 20-25 is 42.37%, that of consumers aged 25-30 is 53.64%, while that of consumers aged 30-35 is 67.93% and that of consumers aged 35-40 is 84.62%. As people's pursuit of spiritual life continues to develop, the acceptance of jewelry design implanted with traditional cultural elements has increased, increasing the historical and cultural heritage of jewelry design.

## KEYWORDS

Traditional cultural elements; Symbolization; Jewelry design; Cultural attributes; Cultural heritage

## 1. INTRODUCTION

With the rapid development of the economy and the improvement of people's material living standards, the pursuit of spiritual life of contemporary people also continues to develop, and jewelry can enhance the external temperament, which is one of the important ways to pursue elegant and noble temperament [1-2]. Due to the rotation of trends and the recognition of traditional Chinese culture, traditional Chinese ornamental elements have gradually become sought after in jewelry design, and jewelry that can embody traditional Chinese culture has gradually become an inevitable trend [3-4]. Adding elements of traditional Chinese ornaments in jewelry design can help the development of jewelry design industry and reflect the inheritance of culture, while designing jewelry that is more in line with modern aesthetics, which is also beneficial to the enhancement of commercial value [5-6]. Traditional culture is reflected everywhere in modern jewelry design, and the patterns of traditional Chinese ornaments are widely used in modern jewelry design [7]. Designers simplify and reorganize traditional ornaments, and subtly fuse them with modern aesthetics to introduce novel and unique jewelry with traditional cultural connotations [8]. In the development of national culture, the continuous evolution of history, Chinese traditional ornamentation and other art forms are the embodiment



of cultural heritage, modern jewelry design should be more in line with modern aesthetics, increase the historical and cultural heritage of the jewelry design market, and improve cultural literacy.

## **2. TRADITIONAL CULTURAL ELEMENTS AND JEWELRY DESIGN**

### **2.1. CURRENT STATUS OF JEWELRY DESIGN**

#### **2.1.1. CHINA JEWELRY DESIGN**

First of all, the materials in the jewelry market are relatively single. Jewelry materials should be colorful, and designers should use various jewelry materials with their own ideas combined with the market trends, instead of designing jewelry only with whatever material types are popular. Such a design will only always follow the fashion trend and will not become a trend-setting excellent work.

Molded jewelry dominates the market. The most important feature of molded jewelry is that it is all the same. The reason for this phenomenon is also that the market blindly follows the popular styles and only makes some changes in some small details, and then mass production. At present, jewelry enterprises are creating their own brands, but the jewelry styles on the market are more or less the same, which causes no own characteristics, it is difficult to distinguish from other brands, so we should strongly advocate designers to focus on originality.

#### **2.1.2. INTERNATIONAL JEWELRY DESIGN**

Western jewelry design has experienced a longer period of development, and now has a more complete set of design concepts and methods. First of all, the design strength is strong, active thinking, bold and advanced ideas. There are not only designers from international jewelry companies in the jewelry design field, but also designers who are active in other industries such as the construction industry. Most of these designers aim at innovation and establish their own brands, giving full play to their imagination and creative thinking, so their works have a unique style. Secondly, design exhibitions lead the fashion trend. In Europe and Japan, jewelry exhibitions are very frequent, and various jewelry associations have their own publications and magazines, hold knowledge lectures, and invite designers to communicate with the audience at the same time of the exhibition, all of which promote innovative design ideas, so new designs can become popular quickly.

## **2.2. HERITAGE CHINESE TRADITIONAL CULTURE IN JEWELRY DESIGN**

### **2.2.1. COMBINING CULTURE AND JEWELRY DESIGN**

The form of jewelry can be imitated, but the connotation of temperament cannot be copied. Therefore, we should advocate “cultural jewelry”, draw creative inspiration from the historical and cultural precipitation of jewelry, design jewelry with Chinese traditional cultural connotation, and strive to guide the culture of jewelry to become a consumer demand.

Jewelry market has developed to a certain stage, culture has become a demand. If Chinese jewelry brands want to go to the world, “cultural jewelry” is the way to go. If design is the soul, then the designer is the shaper of the soul. The president of the American Society of Designers once said, “If you don’t understand Western civilization, you don’t understand modern design; if you don’t understand Eastern civilization, you don’t understand design; Eastern civilization is the only path to save modern design.” China’s thousands of years of history and culture is our pride and the essence that distinguishes us from the Western culture. If jewelry is the inheritance of culture, then Chinese jewelry should inherit traditional Chinese culture.

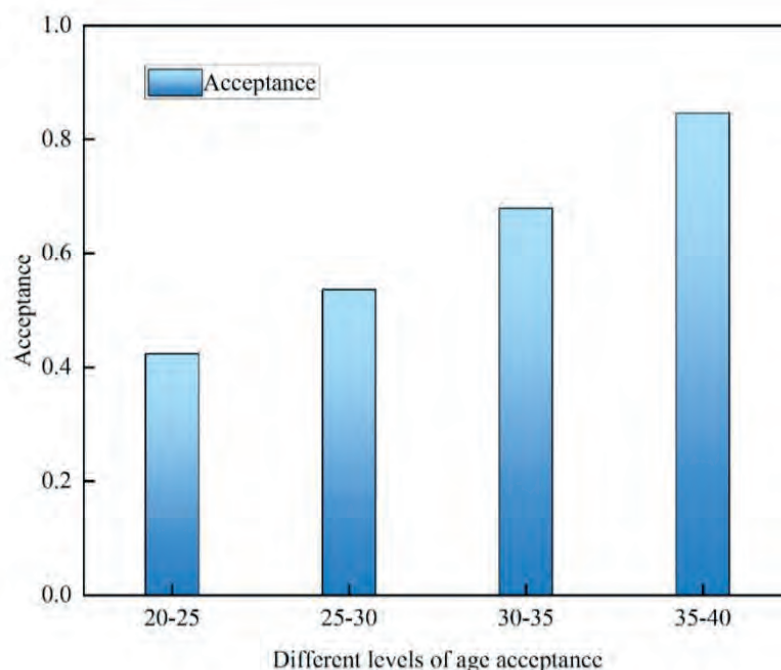
## 2.2.2. IMPORTANT EMBODIMENT OF TRADITIONAL CULTURE INHERITANCE

Traditional Chinese ornaments, with their diverse forms and beautiful meanings, are the embodiment of ancient Chinese civilization, containing the desire for a better life, and their profound cultural heritage also has an important influence on jewelry design. Whether it is the patterns simply recorded on rocks and walls in primitive society, or the exquisite patterns stamped on pottery, porcelain and clothing, they are all products of the specific social culture at that time, and are an important reflection of traditional Chinese culture. In ancient times, traditional ornaments were symbols of people's aspirations and hopes, and ancestors put their good hopes in patterns of animals, plants, and words, such as carp leaping over the dragon gate. The combination of good wishes and traditional culture in jewelry design is an important embodiment of the Chinese idea of symbolizing things. Chinese traditional ornamentation is the traditional art of combining figures, animals and other patterns with legends and stories to send people's good needs, and is a comprehensive reflection of the social conditions of the time, political, economic, moral and so on. No matter how the pattern form changes in different periods, the national spirit contained in its essence remains the same, and the inheritance of traditional culture remains the same.

## 3. TRADITIONAL CULTURAL ELEMENTS IN JEWELRY DESIGN APPLICATIONS

### 3.1. ANALYSIS OF THE ACCEPTANCE OF TRADITIONAL CULTURAL JEWELRY DESIGN

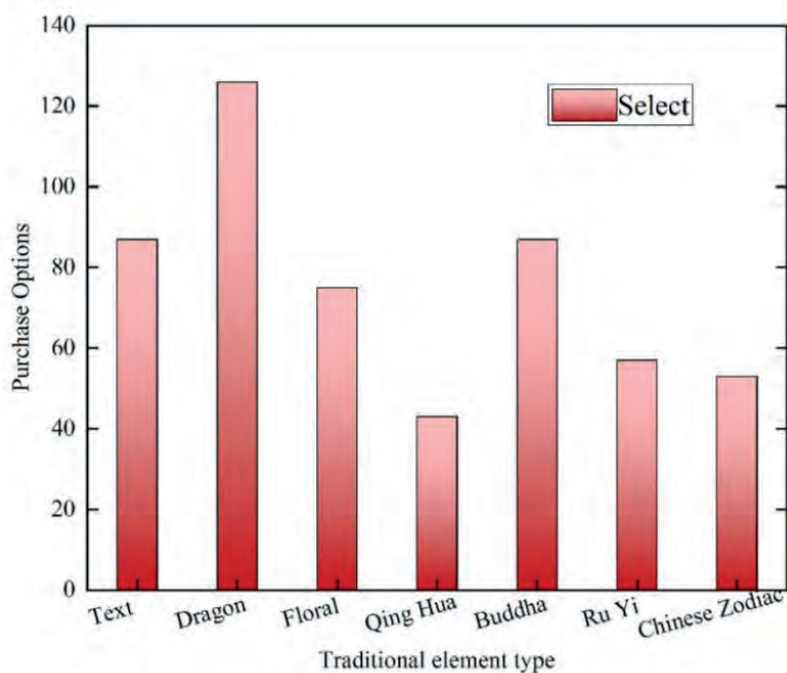
Consumer acceptance of traditional cultural elements jewelry is shown in Figure 1. The acceptance rate of consumers aged 20-25 is 42.37%, that of consumers aged 25-30 is 53.64%, while that of consumers aged 30-35 is 67.93% and that of consumers aged 35-40 is 84.62%. The older the consumers, the more they prefer Chinese design. And among the younger consumers, those who like Chinese design, though less, also have a certain percentage. The older consumers are more profound in their knowledge of national culture, and they also identify more with traditional culture.



**Figure 1.** Acceptance of traditional cultural elements jewelry at different ages

### 3.2. TRADITIONAL DESIGN ELEMENTS JEWELRY CONSUMPTION MOTIVATION

To explore the implantation and application of traditional cultural elements in jewelry design, the analysis of consumers' choice of traditional design elements is shown in Figure 2. The high number of choices are the more symbolic ones, such as dragon, Buddha and Chinese zodiac. These are some elements representing China that we often see in various occasions, while relatively weaker design elements are blue flowers, long-life locks and auspicious clouds. When people buy jewelry, there is a considerable part of them, who pay great attention to the design style, and they have a stronger sense of national identity. When we design popular jewelry, we should first consider the more symbolic elements, so that our works are more easily accepted by the market.



**Figure 2.** Analysis of consumers' choice of traditional design elements

## 4. CONCLUSION

Different people have different definitions of beauty, and traditional Chinese ornamentation meets the aesthetics of contemporary people, which is an important embodiment of emotional attachment on the one hand, and the inheritance of the aesthetics of the ancients on the other. In modern times, the development of traditional ornamentation is organically combined with the development of jewelry design, which is the embodiment of modern people's aesthetics and permeates every aspect of daily life.

Traditional Chinese ornamentation is an extension of natural phenomena and is often used in modern jewelry design. Because the fashionable aesthetics meet the modern aesthetics and the modern people's identification with traditional culture and strong national pride, jewelry designs containing traditional ornamentation patterns are widely welcomed. Taking typical silver jewelry as an example, the combination of color contrast and traditional ornamentation in jewelry design is an effective fusion of modern aesthetics and classical culture, and produces a unique artistic effect.

Chinese traditional ornaments have a deep cultural heritage and are a source of inspiration for jewelry designers. Designers will use modern technology and techniques to apply traditional Chinese ornaments to jewelry design, which not only reflects the artistic connotation of jewelry design, but also is the process of fully displaying traditional Chinese cultural elements. And in

the long run, Chinese traditional ornaments are rich in subject matter, diversified patterns and large market potential, if we can design jewelry that contains 5,000 years of Chinese culture, it is also an effective way to show the world the charm of Oriental culture. At the same time, designers should improve the ability of independent innovation to promote the development of the domestic jewelry industry and enhance the international status.

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# A STUDY ON INNOVATION AND ENTREPRENEURSHIP CHARACTERISTICS OF COLLEGE STUDENTS BASED ON LOGISTIC REGRESSION MODEL

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## ABSTRACT

Innovation and entrepreneurship is an important force in the current economic development of China. In this paper, in order to study the characteristics of innovation and entrepreneurship of college students based on logistic regression model, the main problems of innovation and entrepreneurship of college students at present are analyzed, and the logistic regression of factors influencing students' innovation and entrepreneurship ability is analyzed. The VIF of each variable is much less than 10, which indicates that there is no covariance problem between each independent variable. The  $F$ -test observation of the model equation is 106.581, and the Sig value is 0.000, which is less than 0.05. Based on the logistic regression model, we analyze the degree of influence of entrepreneurial factors on the innovation and entrepreneurship efficacy of college students, which provides an empirical basis and practical insight to promote the cultivation of college students' innovation and entrepreneurship ability.

## KEYWORDS

Innovation and entrepreneurship; Test observations; Entrepreneurial factors; Innovation and entrepreneurial effectiveness; Competence development

## 1. INTRODUCTION

Innovation and entrepreneurship education is the third passport of education, which is called by the United Nations as having the same importance as academic education and vocational education [1-2]. Cultivating the new generation with innovative and entrepreneurial qualities is the concrete practice of the fundamental task of colleges and universities in the new era to adhere to the fundamental task of establishing moral education and the concept of student-centered schooling, and it is the urgent need to create the new generation who can be responsible for national rejuvenation [3-4]. To understand the real situation of innovation and entrepreneurship of higher vocational students in the new era, to study students' understanding and awareness of innovation and entrepreneurship, to analyze students' willingness to start a business, to show the new views and needs of higher vocational students on innovation and entrepreneurship, and to better open up new employment channels for higher vocational students [5-6].

Through optimizing the top-level design to improve the incentive guarantee mechanism, scientifically constructing the curriculum to reform the talent cultivation mode and building an

effective platform to provide personalized customization, the system of cultivating outstanding talents in colleges and universities is constructed [7-8]. To do this basic project well, universities must innovate talent cultivation mechanism, build an education system in line with their own characteristics, and devote themselves to the connotative development of higher education [9-10].

## **2. THE IMPACT AND ROLE MECHANISM OF INNOVATION AND ENTREPRENEURSHIP OF STUDENTS IN HIGHER EDUCATION**

### **2.1. THE MAIN PROBLEMS OF INNOVATION AND ENTREPRENEURSHIP FOR STUDENTS IN HIGHER EDUCATION**

#### **2.1.1. UNSTABLE INNOVATION AND ENTREPRENEURSHIP TEAM**

Whether it is an innovation project or an entrepreneurial practice, it is characterized by a strong collective nature and requires the full cooperation of team members to achieve. However, even with a common goal, innovation and entrepreneurship teams are still unstable, mainly in the following ways:

(1) Is weak in collaboration among members, poor sense of cooperation, team leaders often take on too much work and other members are in an optional position.

(2) The ability of self-control is slightly weak, and some students are extremely utilitarian, which makes it easier for friction and misunderstanding among members to occur when disagreements or problems arise.

(3) It is easy for college students' innovation and entrepreneurship team to be reorganized or disbanded because of different academic progress such as graduation of main members and inability to take care of professional study.

#### **2.1.2. TRANSFORMATION OF INNOVATION RESULTS**

Various competitions provide the best platform to show the value of college students' innovative achievements, whose innovative achievements and technologies can be applied for patent and technology protection, and transferred to enterprises through patent transfer and technology shareholding, thus transforming into actual productivity for economic development. Some college students' weak awareness of independent intellectual property protection has led to the phenomenon of scientific and technological works being stolen and produced by unscrupulous companies and others very commonly. The innovation activities stay at the competition level, lacking the overall concept, focusing only on the competition ranking and ignoring the subsequent transformation of innovation results, technology application and intellectual property protection. Lacking the scientific development concept, it has not established a technological innovation system with enterprise as the main body, market as the guide and the combination of industry, academia and research, not to mention the inability to combine the innovation activities of college students with the regional development under the new economic normal and promote the innovation of higher education as an important force to improve social productivity.

## **2.2. MECHANISM OF THE ROLE OF STUDENTS' INNOVATION ABILITY IN HIGHER EDUCATION**

### **2.2.1. IMPROVE THE CONSTRUCTION OF INNOVATION AND ENTREPRENEURSHIP TEAM**

When creating the innovation and entrepreneurship team, we should examine the ability and personality characteristics of the members to achieve complementary strengths and match the personality, ability and position. In the internal management of the team to clear the

positioning of the members. The team performance assessment should be adhered to the principle of fairness and openness to establish performance assessment indexes that take into account the team and individuals, and adopt differentiated rewards to ensure that team members are rewarded for their efforts. Reasonable use of the school's preferential policies such as flexible academic system, credit replacement and other balanced professional learning and innovation and entrepreneurial activities to ensure the stability of the team.

### **2.2.2. STRENGTHEN THE GUIDANCE AND MONITORING OF THE INNOVATION AND ENTREPRENEURSHIP PROCESS**

(1) Improve the incentive system for mentors of innovation and entrepreneurship projects, mainly including matching mentoring fees for mentors, including mentoring work into the calculation of teaching workload, linking it to teachers' personal development such as title promotion and personal assessment, providing opportunities for mentors to go out for exchanges and training, establishing a dual mentor system, with mentoring by teachers on campus and mentors from enterprises, and warning or disqualifying mentors who fail to fulfill their mentoring duties. The mentors who fail to fulfill their mentoring duties should be warned or disqualified.

(2) To establish a system for the phased disbursement of funding, to regularly check the progress of the project, and to order timely rectification or termination of the project if problems are found.

(3) Combine process assessment and result assessment in the project evaluation. The process assessment focuses on the implementation of the project, the records of the teacher's guidance process, and the details of the use of funds. The result assessment focuses on the form of project results, and strengthens the supervision of the originality and innovation of project results, such as the repetition rate detection, etc., while establishing a resource base of excellent projects.

### **2.2.3. ESTABLISHING A WIN-WIN MODEL OF "MUTUALLY BENEFICIAL COOPERATION BETWEEN SCHOOLS AND ENTERPRISES"**

Facing the changes of the new economic normal, universities should establish the awareness of market competition, actively dovetail with the needs of enterprises and industries, optimize the talent training structure, actively serve and lead the regional economic development, enhance the contribution of talents, and realize the deep integration with the economy and society. Close contact with enterprises, implement targeted research and development, and build a cooperation platform for the transformation of enterprises' scientific and technological innovation results. Through the enterprise's scientific and technological innovation proceeds to fund the innovation and entrepreneurial activities of universities, and jointly develop products that meet the market needs with universities.

## **3. LOGISTIC REGRESSION ANALYSIS OF FACTORS INFLUENCING COLLEGE STUDENTS' INNOVATION AND ENTREPRENEURIAL ABILITY**

### **3.1. DATA REGRESSION ANALYSIS**

To investigate the degree of influence of each entrepreneurial factor on college students' innovation efficacy, multiple regression analysis was conducted on each variable. Before conducting the regression analysis, considering the possible co-linearity among the six variables of college student group's knowledge of innovation and entrepreneurship competition, social capital, competition team, instructor's attitude, personal ability and personal innovation motivation, firstly, we should exclude the multiple co-linearity and prevent the existence of linear correlation among independent variables. The tolerance and variance inflation factor

(VIF) tests are used to determine whether there is multicollinearity among the above variables, with tolerance ranging from 0 to 1. The smaller the tolerance, the more serious the problem of multicollinearity exists. The variance inflation factor is the inverse of the tolerance, the larger the VIF, the more obvious the multicollinearity, and it is usually considered that when the VIF is less than 10, there is no multicollinearity. The results of the regression model are shown in Table 1, and the VIF of each variable is much less than 10, indicating that there is no co-linearity problem among the independent variables. The  $F$ -test observation of the model equation is 106.581, and the Sig value is 0.000, which is less than 0.05, so it can be judged that the model reaches the significant level and the equation to establish the model is feasible.

**Table 1.** Results of the innovation effectiveness regression model

Models	Non-standardized coefficient		Standard coefficient	$t$	Sig	Covariance statistics	
	$B$	Standard Error	Trial Version			tolerances	VIF
Level of understanding	0.268	0.031	0.371	12.390	0.000	0.678	1.596
Social Capital	0.077	0.020	0.072	3.763	0.000	0.898	1.182
Competition Team	0.060	0.019	0.057	3.061	0.003	0.858	1.094
Positive Attitude	0.057	0.028	0.064	2.057	0.030	0.610	1.350
Personal Capabilities	0.034	0.014	0.038	2.282	0.035	0.674	1.662
Personal motivation for innovation	0.155	0.032	0.170	7.347	0.000	0.459	1.352

### 3.2. ANALYSIS OF LOGISTIC REGRESSION RESULTS

In terms of the significance probability of the influence coefficients, the significance levels of the influence coefficients of college students' knowledge about innovation and entrepreneurship competition ( $X_1$ ), social capital ( $X_2$ ), competition team ( $X_3$ ), instructor's attitude ( $X_4$ ), personal ability ( $X_5$ ) and personal innovation motivation ( $X_6$ ) on college students' innovation efficacy ( $Y$ ) are all less than 0.05, indicating that all of them are significant.

The respective influence coefficients (i.e., non-standardized coefficient  $B$ ) of the six variables, i.e., knowledge of the university student group about the Internet+ competition, social capital, competition team, instructor's attitude, personal ability, and personal innovation motivation, on the dependent variable innovation effectiveness are 0.268, 0.077, 0.060, 0.057, 0.034, and 0.155, respectively, 0.034, and 0.155, i.e., when the higher the respondents rated the degree of knowledge about the innovation and entrepreneurship competition, social capital, competition team, mentor's attitude, personal ability, and personal motivation to innovate among the college student population, the higher they perceived the innovation efficacy. Among them, understanding the innovation and entrepreneurship competition has the greatest influence on innovation efficacy, and the rest are personal innovation motivation, social capital, competition team, instructors' attitude, and personal ability in order. From the above analysis, the six adjusted research hypotheses  $H1$ ,  $H2$ ,  $H3$ ,  $H4$ ,  $H5$ , and  $H6$  proposed in this study were all verified to be valid, and the results are shown in Table 2.



**Table 2.** Hypothesis testing results

Serial number	Research Hypothesis	Hypothesis validation results
<i>H1</i>	The degree of knowledge about the competition has a positive effect on the innovation and entrepreneurship efficacy of college students	Established
<i>H2</i>	Social capital has a positive impact on college students' innovation and entrepreneurship efficacy	Established
<i>H3</i>	Team member collaboration has a positive impact on college students' innovation and entrepreneurial effectiveness	Established
<i>H4</i>	Instructors' attitudes have a positive impact on the effectiveness of college students' innovation and entrepreneurship	Established
<i>H5</i>	Personal ability has a positive impact on college students' innovation and entrepreneurial effectiveness	Established
<i>H6</i>	Personal motivation to innovate has a positive effect on college students' innovation and entrepreneurship efficacy	Established

#### 4. CONCLUSION

Based on the understanding of the problems of innovation and entrepreneurship of higher vocational students and the main factors affecting students' entrepreneurship, the government, society and schools should continuously improve their work and take effective measures to stimulate college students' innovation and entrepreneurship. In talent training, colleges and universities should adhere to the guidance of social needs, adjust professional courses according to the market, and strengthen the cultivation of students' comprehensive ability, practical skills, pioneering and innovative ability, team cooperation and entrepreneurial consciousness, so as to improve the entrepreneurial self-confidence of higher vocational students.

After years of rapid development, China's economic growth has slowed down, the economy is operating with a better structure and higher efficiency, and the development model has shifted to innovation-driven development. The shift from factor-driven and investment-driven to innovation-driven is an important feature of the new economic normal. Higher education can guide scientific and technological innovation, export knowledgeable talents to the society, and provide great energy for economic growth. As the first productive force of science and technology and the first resource of talents, higher education is an important part of the national innovation system. Talent is the root of innovation, and it is necessary to make strong practices and reforms for innovation and entrepreneurship education under the new economic normal.

#### FUNDING

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# THE INFLUENCE OF COLLEGE PHYSICAL EDUCATION BREATHING RESILIENCE OF DIFFICULT GROUPS IN THE CONTEXT OF THE INTERNET

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## ABSTRACT

In order to be able to help the group of students with respiratory difficulties to build a spirit of tenacity and perseverance, physical education in colleges and universities, which is developed by Internet technology, has an unshirkable obligation. This paper gives the epidemiological principles, pathogenesis and definition criteria of the existence of diaphragmatic dysfunction in the respiratory difficulty group, starting from the basic definition analysis of the respiratory difficulty group. The role of physical education in improving physical fitness and toughness is explained, and strategies for developing toughness in the group of students with respiratory difficulties in physical education are given. The development of physical education in colleges and universities should provide students with effective quality cultivation assistance, which in turn will enable more disadvantaged student groups to face the future with a sunnier mentality and a more resilient spirit.

## KEYWORDS

College education; Internet; Respiratory distress group; Resilience; Diaphragm dysfunction; Teaching

## 1. INTRODUCTION

In the background of the Internet, with the popularization of higher education and the awareness of educational equity, more and more physically ill and weak students are entering universities. Physical education course is a compulsory course in universities, which carries the double responsibility of enhancing physical fitness and improving mental health, and special physical education courses for physically ill and weak students in colleges and universities are also an integral part of college physical education courses [1-2]. The physical fitness and health level of physically handicapped and weak students in colleges and universities are in the lower to middle level due to their long-term chronic diseases, and the long-term medication and treatment make them in a low and depressed psychological mood for a long time [3-4].

According to the World Health Organization, health is not only the absence of disease, but also the maintenance of good physical, psychological and social adaptability. This definition has changed the long-standing traditional view that “no disease is healthy” and started to pay attention to mental health and social adaptability [5-6]. Compared with other exercises that can achieve both physical and mental health, physical health exercises are slow and gentle with deep and long breathing, which can stretch the limbs and achieve balance, and normalize the secretion of various organs and glands in the body [7-8]. The breathing and meditation regulate

the nervous system, thus promoting the physical and mental health of people with respiratory difficulties.

This paper analyzes the criteria for defining the respiratory distress group in the context of the Internet and gives the epidemiology and pathogenesis of diaphragmatic dysfunction present in the respiratory distress group. The role of physical education in improving physical fitness and toughness qualities is discussed, and the rational use of game teaching can promote the positive impact of sports on mental health. Based on this, strategies are given for the development of toughness in the respiratory distressed group in physical education, focusing on the creation of mental health education activities as well as physical education activities. Thus, physical education is used to improve the mental health quality and resilience of the respiratory distressed group.

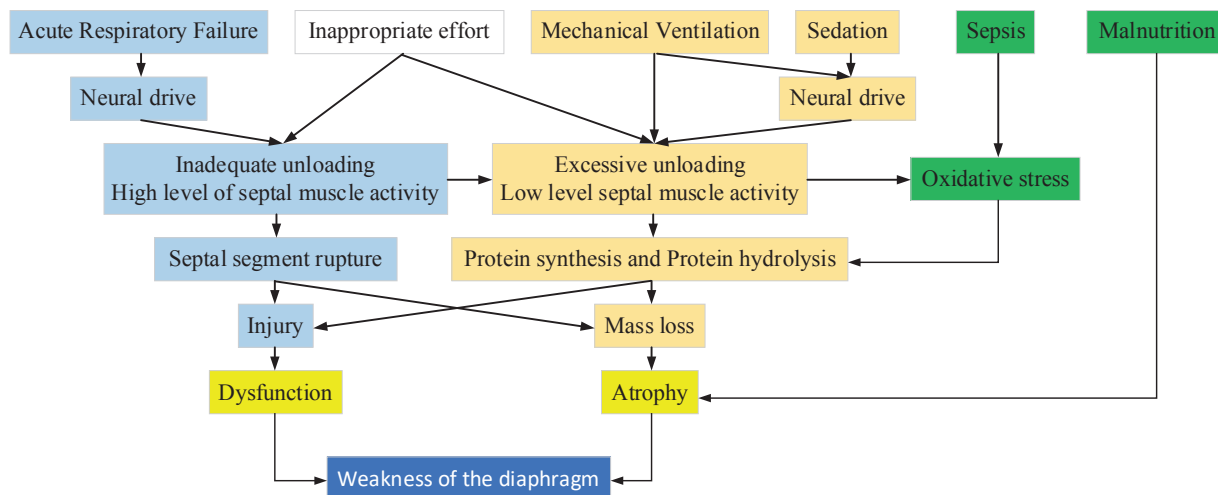
## **2. BASIC DEFINITION OF RESPIRATORY DISTRESS GROUP**

### **2.1. EPIDEMIOLOGY OF DIAPHRAGM DYSFUNCTION**

The probable factor that produces dyspnea in the dyspnea group is diaphragmatic dysfunction. Diaphragmatic dysfunction, however, refers to changes in lung capacity, active inspiratory capacity, and decreased contractile movements of the diaphragm triggered by a series of factors that diminish or lose the ability of the diaphragm to produce force. It can lead to respiratory distress, exercise intolerance, and sleep disturbances. Diaphragmatic dysfunction in mechanically ventilated patients is characterized by high incidence, rapid changes, and greater severity, and its functional status is often monitored clinically by inspiratory manometry, diaphragmatic ultrasonography, pulmonary function tests, and others. The definition of diaphragmatic dysfunction varies in different studies and includes bilateral phrenic nerve magnetic stimulation airway twitch pressure  $<7$  or  $11$  cmH<sub>2</sub>O, diaphragm mobility  $<10$  mm, diaphragm thickening fraction  $<20\%$ , etc.

### **2.2. PATHOGENESIS OF DIAPHRAGM DYSFUNCTION**

From a respiratory physiology perspective, damage to any link in the respiratory center to diaphragm contractile protein pathway can lead to diaphragm dysfunction. It is known that patients with acquired weakness in the ICU can develop neurological and or muscular impairment, which in turn affects the patient's functional status. However, the correlation with diaphragmatic dysfunction is low or absent, possibly due to different risk factors for its onset. Drugs often used in critically ill patients include propofol, glucocorticoids, and neuromuscular blocking agents that inhibit respiration and enhance protein hydrolysis with inhibition of protein synthesis. It can also be associated with sepsis and malnutrition triggering impaired mitochondrial oxidative stress or inflammatory responses that impair mitochondrial function and aerobic metabolism, leading to apoptosis. In the context of a multifactorial combination, a full understanding and exploration of the pathogenesis of diaphragmatic dysfunction is conducive to better diaphragm protection and strengthening, and the pathogenesis of diaphragmatic weakness in critically ill patients is shown in Figure 1.



**Figure 1.** Pathogenesis of diaphragmatic dysfunction

### 2.3. CRITERIA FOR DEFINING PATIENTS WITH RESPIRATORY DISTRESS

(1) Patients come to the hospital with dyspnea as the primary clinical manifestation, which meets the definition of dyspnea, referring to the expert consensus on the diagnosis, assessment and management of dyspnea, which can be a subjective feeling of respiratory discomfort or an objective sign of labored breathing.

(2) The criteria for determining severe dyspnea are the British Medical Research Society's modified dyspnea index, which classifies the severity of dyspnea as severe dyspnea at level 2 or higher, including level 3, when dyspnea occurs after walking about 100 meters or a few minutes on level ground and one must stop and breathe heavily. The level 4 is when the dyspnea makes it impossible to leave the house or when the dyspnea is evident when dressing or undressing. The specific grading is shown in Table 1.

**Table 1.** mMRC Assessment

mMRC grading	Respiratory distress symptoms
Level 0	Dyspnea during strenuous activity.
Level 1	Difficulty breathing when walking fast on level ground or climbing hills.
Level 2	Walking at a fast pace on level ground slower than peers or needing to stop and rest due to breathing difficulties.
Level 3	Needs to stop after walking about 100m or a few minutes on level ground to catch his or her breath.
Level 4	Difficulty in leaving the house due to breathlessness, or difficulty in breathing when dressing or undressing.

## 3. THE ROLE OF PHYSICAL EDUCATION IN IMPROVING PHYSICAL FITNESS AND TOUGHNESS

### 3.1. THE NEED FOR RATIONAL USE OF GAME TEACHING TOOLS

In traditional physical education, teachers are mainly responsible for imparting knowledge and skills with less interaction, which leads to students mastering some motor skills but not having better understanding of mastery and lower interest in sports. Analysis of the reasons for this is mainly due to the teachers' failure to start from the students' subjectivity, allowing them to feel the action and understand the role and effectiveness of the action. Therefore, in physical education to let students master skills is only part of the teaching goal, more need to let students know how to use skills, more help breathing difficulties students from the psychological acceptance of the game teaching, and then develop their good habits of life and exercise.

The reform of physical education curriculum also mentions that while students learn new knowledge and skills, they focus on the cultivation of students' active learning attitude and prompt them to develop good physical exercise habits. This requires a change in the teaching concept of physical education teachers, who need to abandon the traditional teaching concept and give full play to the subjectivity of students. At the same time, teachers should also give full play to their leading role, actively guide students to participate in sports, so that students are brave enough to explore the practice of movement, so as to effectively cultivate students' practical skills and lay a solid foundation for lifelong physical education.

### **3.2. POSITIVE EFFECTS OF TEACHING PHYSICAL GAMES ON PHYSICAL AND MENTAL DEVELOPMENT**

Physical education originates from games, a social and recreational activity that promotes the harmonious development of human beings through physical exercises. It can fully blend the physical and mental development of students and has both recreational and educational effects. Sports games can make students feel the fun of sports and competition in a happy atmosphere. Sports games have a wide range of subjects, and almost all sports can develop sports games. Therefore, sports games can provide rich teaching contents and means for physical education classroom.

The use of physical education games in physical education can bring out the intelligence of each student to a great extent and develop their collective consciousness and strong mentality. The use of physical education games before the teaching of physical education skills can generate a strong interest in students, and when used during the teaching of skills, students can transfer their interest in physical education games to the learning of motor skills, thus improving the teaching effect. When used after the skills are taught, they can consolidate the skills learned and have a relaxing effect on the body and mind. Sports games have a positive effect on developing students' good character, developing their intelligence, and developing their basic motor and tactical skills and social skills.

Based on the above, exploring the degree of influence of game teaching in physical education on the physical health and physical interest of the respiratory difficulty group will help physical education teachers to better develop teaching plans to promote the physical health level as well as the mental health level of students.

## **4. STRATEGIES FOR CULTIVATING THE QUALITY OF RESILIENCE IN GROUPS WITH BREATHING DIFFICULTIES IN PHYSICAL EDUCATION**

### **4.1. CREATE MENTAL HEALTH EDUCATION ACTIVITIES**

(1) During free time, the school organizes a "Mental Health Movie Salon" for groups of students with respiratory problems to help them develop a positive mindset by watching movies about mental health and to guide them to face their physical difficulties and problems properly.

(2) Create a mental health curriculum. Schools can create a mental health curriculum related to the actual situation of the group of students with respiratory difficulties, and achieve the cultivation of students' resilience qualities through targeted training.

(3) Provide mental health lectures. Schools can conduct a series of mental health lectures on a regular basis so that groups of students with breathing difficulties can understand the importance of the quality of resilience for life development and then take the initiative to develop a spirit of not giving up easily in the face of difficulties in their daily lives.

### **4.2. CREATE RELEVANT PHYSICAL EDUCATION ACTIVITIES**

Sports have a tough, competitive nature, and students need to have a strong will and perseverance when they participate in various sports and exercises. Therefore, a moderate amount of sports can develop the quality of resilience in the group of students with breathing difficulties while ensuring their safety. The series of physical education activities contribute to the overall development of students, and have certain boosting advantages for improving students' interest in sports, removing psychological barriers, strengthening students' behavioral qualities and enhancing their mental health. It enables students to have a strong heart, resourceful thinking and a calm and courageous will in the face of difficult and dangerous situations, which are all necessary qualities of toughness.

## 5. CONCLUSION

This paper gives a basic definition of the respiratory difficulty group, including epidemiological principles, pathogenesis, and definition criteria, and gives the role of physical education in improving physical fitness and toughness qualities. Based on physical education, the basic strategies for cultivating the toughness quality of the respiratory difficulty group are given, which can be promoted through mental health education activities and physical activities. For this reason, in the context of the Internet, the education of cultivating resilience quality through physical education in colleges and universities for the group of students with respiratory difficulties will not only help students to establish a resilient and healthy psychology. It can also cultivate the spirit of self-improvement, so that students can be resilient in the face of setbacks in life and eventually achieve victory.

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# EXPLORING THE APPLICATION OF COGNITIVE METAPHOR THEORY IN ENGLISH VOCABULARY TEACHING IN THE CONTEXT OF INTERNET

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## ABSTRACT

This paper explores the application of cognitive metaphor theory in English vocabulary teaching in the context of the Internet, constructs a controlled experiment, analyzes students' cognitive metaphor vocabulary levels, and tests the teaching effects. The mean value of the vocabulary post-test scores of the experimental group was 76.583 and the mean value of the post-test scores of the control group was 71.161, with a two-tailed significant level of  $0.020 < 0.05$ , and significant differences occurred between the experimental data of the two groups on the post-test. The students in the experimental class improved their metaphorical vocabulary level, which indicates that this way of teaching vocabulary is helpful for students to learn English vocabulary and verifies that the cognitive metaphor theory is feasible for teaching English vocabulary in English vocabulary teaching.

## KEYWORDS

Cognitive metaphor theory; Vocabulary level; English vocabulary teaching; Metaphorical vocabulary; Teaching style

## 1. INTRODUCTION

In studying English at university, especially in the process of preparing for English level 4 and English level 6, students need to spend a lot of energy and time learning and memorizing English words [1]. However, such a simple learning method does not achieve the best learning effect, resulting in a serious blow to students' learning motivation and a certain degree of influence on their English performance and English application ability [2-3]. The key to this situation is that students only memorize English words by rote and lack understanding of the regularity of words, which in turn has an impact on the solidity and profundity of vocabulary memory [4]. Therefore, constantly stimulating students' interest in learning English words and expanding their vocabulary have an important role in teaching English at university [5-6].

In college English teaching, a sound vocabulary teaching strategy can lead to better mastery and application of all basic skills [7]. The central task of second language acquisition is vocabulary acquisition, and the ideas and basic skills of foreign language teaching are very dependent on vocabulary [8]. Some foreign scholars are conducting research on metaphorical engineering, which is the construction of metaphors as well as analogical sets and the application of metaphors to explain abstract thinking, and their research topics are metaphors and literacy, metaphors and vocabulary teaching, and the relationship between metaphors and language learning in adolescents [9-10]. Therefore, it is feasible and necessary to apply metaphorical cognitive theory for teaching English vocabulary, which motivates students to be

more aware of the origin and development of word meanings and improves the interest of vocabulary teaching.

## **2. COGNITIVE METAPHOR THEORY APPLIED TO ENGLISH VOCABULARY TEACHING**

### **2.1. COGNITIVE METAPHOR THEORY**

#### **2.1.1. COGNITIVE METAPHOR THEORY PERSPECTIVE**

Metaphor is not only a purely linguistic phenomenon or literary rhetoric, but also a way of thinking and a tool for human beings to perceive the world and things, i.e., a cognitive activity in which people use experience in one domain to understand or explain experience in other domains. Currently, the main ideas about cognitive metaphors include:

(1) When people use language, they often encounter metaphors, such as those in poetry, which are not different in nature from the metaphors they use in everyday life.

(2) The main components of a metaphor are the target domain and the origin domain, which are used to construct and understand the target domain by mapping various structures of the origin domain schema onto the target domain.

(3) Metaphors have a certain degree of systematicity, i.e. a certain conceptual metaphor can produce a large number of linguistic expressions in harmony with each other, and the different metaphorical meanings can be used together to build a coherent and coordinated system that affects human logical thinking and verbal thinking.

#### **2.1.2. COGNITIVE METAPHOR THEORY APPLICATION**

From a cognitive point of view, all types of human language can be considered as systems with metaphorical properties. The process of cognitive vocabulary is a systematic and complex process. Many students in the process of cognitive vocabulary only deep processing leads to a deeper understanding of words. Metaphor is not only the main way to produce word meanings, but also a key mechanism to express the meaning of words and to compensate for the lack of vocabulary. Therefore, the use of cognitive metaphor theory in English vocabulary teaching is very meaningful. The scientific use of cognitive metaphor theory not only helps students to raise their daily language learning to the level of cognitive thinking, but also enables them to understand the deep metaphorical mapping between the brain and English vocabulary, and thus to understand, remember and use vocabulary more accurately.

## **2.2. APPLICATION OF COGNITIVE METAPHOR THEORY IN VOCABULARY TEACHING**

### **2.2.1. FOCUS ON THE UNDERSTANDING OF THE ESSENCE OF CHINESE-ENGLISH CULTURE**

Any language arises from the life of people. English and Chinese belong to different language families with different language and culture. Although the languages are different, people in each culture can have similar perceptions and understandings of the world through metaphors.

Teachers need to guide students to a systematic understanding of Chinese and Western culture in order to familiarize them with the essential similarities and differences between Chinese and English cultures. In the process of teaching vocabulary, teachers need to explain Western ways of cognition and culture, thus ensuring that students have a deeper knowledge of the culture contained in English vocabulary.

### **2.2.2. MASTERING BASIC CATEGORY VOCABULARY TEACHING**

Many contemporary teachers use the grammar teaching model to teach English-Chinese translation by combining the words provided in the textbook with the basic word meanings, phonology, word structures and collocations. In this model, many students are mechanical learners and do not actively participate in the learning process. This makes them not remember the words deeply and their learning effect is very poor. Therefore, teachers should help and guide students to analyze vocabulary metaphors, so that they can master the method, start from the basic category vocabulary, develop their metaphorical logic thinking, and consolidate the foundation of vocabulary.

### 2.2.3. IN-DEPTH UNDERSTANDING OF ENGLISH VOCABULARY

Cognitive metaphor theory is based on “similarity”, i.e., an all-embracing mapping within one’s own system through similar features. One of the main manifestations of metaphor is the multiple meanings of words and synonyms. In the new era, it is not enough for students to remember only the prototypical meaning of words. Students need to have a deeper understanding of the prototypical and basic meanings of words.

## 3. A STUDY ON THE APPLICATION OF COGNITIVE METAPHOR THEORY IN ENGLISH VOCABULARY TEACHING

### 3.1. COMPARATIVE ANALYSIS OF VOCABULARY LEVELS

In order to examine the differences in the pre-experimental English general and vocabulary levels between the two groups of students in the Internet context, a control experiment was constructed, and the data from the pre-test of cognitive metaphor vocabulary levels are shown in Table 1. The mean value of the pre-test scores of the experimental group was 72.670, and the mean value of the pre-test scores of the control group was 73.573. The two-tailed significance level in the pre-test was 0.085, and this value was greater than 0.05, indicating that there was no significant difference in the pre-experimental vocabulary levels between the experimental and control groups, so the students in both groups fully met the conditions for participating in this experiment. After the experiment, the mean value of the vocabulary post-test scores of the experimental group was 76.583 and the mean value of the post-test scores of the control group was 71.161, with a two-tailed significant level of  $0.020 < 0.05$ , which indicates that significant differences occurred in the experimental data from the two groups of the post-test. The metaphorical vocabulary level of the students in the experimental class has improved, and it also shows that this way of teaching vocabulary is helpful for students to learn English vocabulary.

**Table 1.** Vocabulary pre-test and post-test performance tests

	Mean	<i>N</i>	Standard deviation	<i>T</i>	Sig
Experimental Classes	72.670	50	11.6772	1.750	0.085
	73.573	50	9.5627	5.276	0.020
Control class	76.583	50	11.5849	1.750	0.085
	71.161	50	10.3411	5.276	0.020

### 3.2. ANALYSIS OF TEACHING EFFECT TEST

The data of the teaching effect significance test are shown in Table 2, and the results of the paired test were experimental class  $T = 5.427$  and control class  $T = 3.724$  (*T* indicates the test statistic). The two-tailed significance level of the control class is  $0.245 > 0.05$ , which means that the difference between the two test levels is not significant, while the two-tailed significance level of the pre- and post-test of the experimental class is 0.085, and this value is much less than 0.05, so it can be considered that the difference between the two vocabulary tests of the

experimental group is significantly different, that is, the effect of vocabulary teaching under the guidance of conceptual metaphor theory is considered significant.

**Table 2.** Sample *T* test results of vocabulary test scores

	Paired Differences					<i>T</i>	<i>df</i>	Sig
	Mean	Standard deviation	Standard Error Mean	Intervals for 95% confidence level differences				
				Lower	Upper			
Experimental Classes	5.5000	6.739	1.0503	3.2715	7.8028	5.427	50	0.085
Control class	0.6840	1.7749	0.3531	0.5898	1.0962	3.724	50	0.253

#### 4. CONCLUSION

By applying cognitive metaphor theory to English vocabulary teaching, teachers can guide students to understand the surface and deeper meanings of English vocabulary in the process of explaining the basic meanings of words, and make them think and analyze the inner connections of words through reasoning, induction and association. By mastering core English vocabulary and practicing metaphorical logic, students can increase their confidence in learning English and ultimately improve their overall learning efficiency.

Cognitive metaphors can not only be the best tool for students to learn English, but they can also be a good way to enhance students' creative thinking skills as well as their language learning abilities. The role of the teacher is crucial to the effective introduction of metaphors in teaching. Therefore, teachers should have a strong sense of metaphor and metaphorical ability themselves, constantly improve and refine their existing teaching methods, try to use cognitive metaphors in teaching English, and make students realize together that metaphors are commonly found in people's daily lives and that metaphors are essential.

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# INNOVATION OF HIGHER EDUCATION MANAGEMENT MODEL IN THE ERA OF “INTERNET+”

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## ABSTRACT

This paper proposes a management model for university students' education under the full credit system in the era of “Internet+” and under the strategic planning of higher education reform from two aspects of university research management and service to society. The reliability of the management model is evaluated by using Cronbach's alpha coefficient. Based on the evaluation results, the bias of learning motivation is -0.5061, the bias of learning behavior is 0.15108, the bias of teacher quality is 0.06118, and the bias of teaching attitude is 0.07462. Only by adapting to the characteristics and requirements of “Internet+” era, we can follow the trend and innovate “Internet+ education”. Only by adapting to the characteristics and requirements of the “Internet+” era, innovating the new business mode of “Internet+ education” and promoting the deep integration between higher education and the Internet can we make the sustainable and healthy development of higher education.

## KEYWORDS

Reform strategy; Research management; Full credit system; Management model; New business

## 1. INTRODUCTION

With the acceleration of globalization, today any country, organization and individual is facing unprecedented challenges [1-2]. As the main sector of human resources training, excellence in teaching quality in higher education is the fundamental guarantee for its own development, social progress and improvement of the overall competitiveness of the country [3-4]. The quality of higher education has become the focus of attention of all countries and sectors [5]. In order to cope with the accountability of higher education from all walks of life, many higher education researchers and educators have focused their attention on the solution of teachers' teaching ability and teaching assurance problems [6-8]. With the development of learning theories, the subjective role of learners in the learning process that cannot be ignored has been gradually recognized [9-10]. Therefore, taking higher education teaching as a complete system, studying the mechanism of the role of key teaching factors on the quality of higher education teaching and their influence on teaching outcomes and carrying out teaching reform practice are not only the hot issues explored in the theoretical circles of higher education education reform, but also the basic problems urgently needed to be solved in higher education teaching practice.

## **2. EXPLORING THE NEW MODE OF “INTERNET+” HIGHER EDUCATION MANAGEMENT**

### **2.1. HIGHER EDUCATION MANAGEMENT INSIGHTS**

#### **2.1.1. STRATEGIC PLANNING OF HIGHER EDUCATION REFORM**

The loss of the competition of knowledge platforms among countries will lead to the loss of intellectual capital, the weakening of national famous universities, and the control of educational research big data by foreign countries, which will endanger national security. In a sense, university online education will become an important carrier of national culture and soft power export. From the strategic height of enhancing national cultural soft power and defending national security in the field of education, we should focus on creating high-quality online education courses in national universities and improving the competitive advantage of inter-national knowledge platforms. In international higher education cooperation, it is necessary to enhance negotiation ability and prevent big data of education research from being controlled by foreign countries.

#### **2.1.2. REFORM OF UNIVERSITY RESEARCH MANAGEMENT**

In the field of scientific research, the open and distributed collaborative innovation in scientific research in the era of “Internet+” brings new challenges to the scientific research management of universities. Universities should encourage collaborative innovation among researchers from different units, and reform the organizational management, personnel system, personnel evaluation and international cooperation system of collaborative innovation departments. Adopt different interest incentive mechanisms for scientific researchers and marketers in collaborative innovation centers, such as betting agreements and equity option incentives. People from different units should break the attributes of the units to carry out collaborative innovation, and let the scientific researchers “move but not transfer”.

#### **2.1.3. REFORM OF SOCIAL MANAGEMENT OF HIGHER EDUCATION SERVICES**

In the field of serving the society, the transformation of scientific and technological achievements of colleges and universities should use the Internet thinking, combine the Internet with the transformation of scientific and technological achievements of colleges and universities, aim at the user demand for research and development, actively develop the marketing mode by using the existing network platform for transformation of scientific and technological achievements, precisely match the market demand with the research and development of colleges and universities, and form the “Internet + service mode of transformation of scientific and technological achievements”.

### **2.2. EDUCATIONAL MANAGEMENT OF COLLEGE STUDENTS UNDER THE CONDITION OF FULL CREDIT SYSTEM**

#### **2.2.1. INNOVATIVE IMPLEMENTATION OF CREDIT-BASED EDUCATION MANAGEMENT MODEL**

The long-implemented student education management service system is not compatible with the full credit system reform, and a series of problems have emerged. For example, students’ one-sided pursuit of credits can lead to increased utilitarianism. Respecting students’ individual development can lead to individualism, etc. In order to adapt to the new situation of the credit system reform, in response to these series of problems, we must actively take countermeasures to reform and adjust the existing student education management service system to ensure the smooth implementation of the full credit system. The establishment of a student education management service model that is compatible with the full credit system is the original purpose of the full credit system reform and an important condition for realizing the

training goals of the school. Students are the main body of the school, and only good education and management of college students can ensure the smooth implementation of the credit system reform.

### 2.2.2. IMPROVE THE QUALITY OF TALENT CULTIVATION

The full credit system embodies the concept of people-oriented education. The core and soul of the full credit system is the course selection system, the essence of which is to take students' needs as the core, in fact, it respects students' individual development and reflects the human-centered education idea. Correspondingly, our education and teaching should also be based on students' needs, with the fundamental task of "establishing moral education", taking students as the foundation, love as the source, establishing a new type of teacher-student relationship, mutual respect, understanding and care, correctly guiding students to develop their individuality, encouraging them to be self-sufficient and develop comprehensively. The essence of the full credit system is to establish a rich "curriculum supermarket", to accept students' choices in a service posture, to achieve superiority in students' choices, to achieve teaching and learning, and to allow students to learn self-development and self-improvement in their choices.

## 3. RESEARCH ON HIGHER EDUCATION MANAGEMENT OF FULL CREDIT SYSTEM

### 3.1. RELIABILITY ANALYSIS

Theoretically, the observed variables corresponding to the same latent variable should be consistent, and the exploratory study latent variables are shown in Table 1. The Cronbach alpha coefficient is precisely a measure of the consistency between the observed variables corresponding to the same latent variable, i.e., the higher the correlation coefficient between the observed variables, the closer the Cronbach alpha coefficient is to 1, and the higher the confidence of the observed data. According to the criteria used in existing exploratory studies, the Cronbach alpha internal consistency coefficient data for that variable are retained if they are all greater than 0.7. Also, if it was found that removing a question would instead enhance the internal consistency value, the question was removed. Internal consistency analysis of the seven latent variable measurement scales for the study hypotheses was conducted using VisualPLS 1.04bl software, and it was found that no variable had a significant increase in its reliability after the deletion of a question item, and the internal consistency coefficients of all seven variables were greater than 0.7, which indicates that the measurement scales have good internal consistency.

**Table 1.** Cronbach $\alpha$  coefficients of latent variables in exploratory studies

Variable Name	Number of measurement items	Cronbach $\alpha$ Coefficient
Learning Motivation	5	0.776845
Learning Behavior	9	0.850951
Teacher Quality	4	0.859573
Teaching Attitude	4	0.837827
Teaching Behavior	10	0.915310
Teaching Environment	7	0.870851
Learning Results	4	0.745059

### 3.2. DESCRIPTIVE STATISTICAL ANALYSIS

The indicators of quality of higher education management are shown in Table 2. If  $\alpha=5\%$  and  $x=100$ , checking the table of bias kurtosis thresholds, we get  $C_1=0.39$  and  $C_2=0.77$ . The learning motivation bias is  $-0.5061$ , the learning behavior bias is  $0.15108$ , the teacher quality



bias is 0.06118, and the teaching attitude bias is 0.07462, all of which are less than 0.1. Therefore, the innovation of higher education management mode in the era of “Internet+” should focus on these educational management factors to improve the quality of higher education management.

**Table 2.** Descriptive statistics of measurement indicators

latent variable	Minimum value	Maximum value	Average value	Standard deviation	Skewness	Kurtosis
Learning Motivation	1	5	3.387724	0.879391	-0.35238	-0.5061
Learning Behavior	1	5	3.701478	0.914851	-0.30628	-0.1510
Teacher Quality	1	5	2.823428	0.737292	0.157643	0.06118
Teaching attitude	1	5	3.78307	0.857438	-0.23510	0.07462
Teaching behavior	1	5	2.751838	0.796224	-0.17372	0.07389
Teaching Environment	1	5	3.789826	0.902956	-0.49474	0.06483

#### 4. CONCLUSION

The “Internet+” era is changing the way of life, work and education, bringing disruptive impact and even revolution to higher education, but it is also important to be aware of the limitations of the “Internet+” itself and the risks it brings to higher education. Internet+ education should use Internet thinking to transform and upgrade or even subversively change the traditional education industry. The use of big data to reengineer the organizational process of traditional education, promote the deep integration of the Internet and traditional industries, and bring about disruptive changes in teaching methods and teaching organization and management. The implementation of the full credit system has broken the traditional restrictions of years of study and classes by department, class, and uniform class schedule, and is the embodiment of a student-centered educational philosophy and education model, an education and teaching management system that greatly respects individual differences and has no uniform program, triggering profound and fundamental changes in teaching and education. Comprehensive assessment has brought a great impact and strong influence on the evaluation standard of student work, which has an important influence on the education and management of college students.

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# STUDY ON THE INTERACTIVE INTEGRATION OF RURAL REVITALIZATION STRATEGY AND RURAL ECOTOURISM IN THE CONTEXT OF DIGITAL MEDIA

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## ABSTRACT

Rural tourism and rural revitalization are closely related, and they are interrelated and work together. Based on the new development idea of rural regeneration, this study investigates the link between the spatial structure of ecotourism and rural development. According to the coupling degree assessment approach, it also performs coupling degree analysis on the interactive and integrated growth of rural revitalization strategy and rural ecotourism. The combined development level of rural tourism was valued at 0.00435 in 2014, and it increased to 0.33762 in 2019. The combined development level of rural revitalization was valued at 0.08895 in 2014, and it increased to 0.48405 in 2019. To encourage the orderly and harmonious growth of tourism high-quality growth and rural regeneration, it is crucial to investigate the coupling and coordination connection between the two.

## KEYWORDS

Coupling degree evaluation model; Integrated development; Coupling degree; Tourism; Comprehensive development

## 1. INTRODUCTION

Rural rejuvenation has a leading and normative role in the development of rural tourism, and rural tourism is an essential approach to accomplish rural rehabilitation and plays a role in supporting rural development [1-2]. Rural tourism development has a new historical purpose in the context of rural regeneration strategy, and understanding how the two are related from a theoretical and practical standpoint is extremely important [3-4]. It advances the growth of rural tourism, strengthens the rural industrial structure, raises the standard of life for people, and boosts the effectiveness of the tourism reception system [5-6].

The coupling and coordination theory is used in this essay to examine the degree of coupling and cooperation between high-quality tourism development and rural rejuvenation [7]. This is important because it can be used to assess how well high-quality tourism development and rural revitalization have adapted to different regions and time periods as well as identify the distinctive laws governing the spatial and temporal evolution of these two phenomena [8-9]. It can find theoretical breakthroughs for the problems that arise in the interactive development of regional tourism and rural construction, and it may serve as a guiding principle for government agencies to create pertinent policies and strategies to encourage the high-quality and coordinated growth of tourism and rural rejuvenation in various eras and places [10].

## **2. BASIS OF INTERACTION BETWEEN RURAL REVITALIZATION AND RURAL ECOTOURISM**

### **2.1. CONCEPTUAL BASIS FOR THE STUDY OF INTEGRATION DEVELOPMENT**

#### **2.1.1. NEW DEVELOPMENT CONCEPT**

Development is the basis for solving all problems, and the concept of development is the precursor of development practice. The new development concept is a systematic theoretical framework, and its fundamental connotation has five dimensions: innovation is its primary driving force, coordination is its inescapable prerequisite, green is its universal manifestation, openness is its essential route, and sharing is its ultimate goal.

#### **2.1.2. THEORY OF TOURISM SPATIAL STRUCTURE**

An important scientific question in tourist geography study is the spatial organization of tourism. Tourism spatial structure theory regards the elements of tourism system within a certain spatial territory as an interconnected organic organization, and not only focuses on tourism spatial structure association, but also actively explores the temporal evolution law of tourism system. Based on tourism spatial structure theory, explaining the spatial patterns of China's regional tourism quality development and comprehensively examining the characteristics of spatial and temporal evolution, as well as the processes and mechanisms underlying the degree of coupling and coordination between tourism quality development and rural revitalization, are both useful from a theoretical and scientific standpoint. Strong practical advice is provided for the modernization of the spatial organization of regional tourist quality development and its integrated pattern of growth with rural rehabilitation.

#### **2.1.3. COUPLED COORDINATION THEORY**

Under the direction of the new development concept and the notion of high-quality development, linked coordination theory is a major theory and technique to explain the complex ecosystem and the coordinated growth of regional economies, which is a vital component of sustainable development. Tourism and rural revitalization are two important subsystems of the coupled coordination system of rural people and land. The coupling and coordination of the two is a complex interactive process of mutual support, integration and reconstruction and optimization of all elements within the system.

## **2.2. COUPLING AND COORDINATION BETWEEN RURAL TOURISM AND RURAL REVITALIZATION**

### **2.2.1. CONNOTATION OF HIGH QUALITY DEVELOPMENT OF TOURISM INDUSTRY**

(1) Make the best stock. The notion of tourist development should be modernized, the resource-dependent model of tourism development abandoned, the integration of innovative tourism resources accelerated, and the sustainability and resilience of regional tourism development improved.

(2) Improve quality. Adopt the new development idea and prioritize innovation as the primary engine behind tourist growth, enhance the capacity of independent innovation in tourism, and cultivate new tourism industry and new dynamic energy. Meet the cultural tourism consumption needs of urban and rural residents and their aspirations for a better life.

(3) Expand the incremental volume. Grasp the opportunity of technological revolution and industrial change, through technological progress and industrial restructuring of elements, accelerate the transformation of old and new dynamics, optimize the allocation of tourism elements and supply system to lead and create new demand for tourism with high-quality supply, cultivate new growth points for tourism development, and increase the tourist

industry's overall effectiveness.

### **2.2.2. RESOURCE SHARING LAYS THE FOUNDATION FOR COUPLING AND COORDINATION**

Resources are both an important factor in tourism development and a core element of rural development, and achieving resource sharing is the main way to maximize the benefits of resource utilization. The distinctive industrial, ecological, historical, and cultural resources of the countryside may be used to generate high-quality tourism while also being shared with one another.

### **2.2.3. VALUE CONVERGENCE FORETELLS THE PROSPECT OF COUPLED AND COORDINATED DEVELOPMENT OF THE TWO**

For a long time, China's tourism economic development has been more at the expense of resources and the environment, still belonging to a rough and unsustainable development model, which has seriously hindered the development prospects of tourism. The ecological transformation of tourism is a crucial component and a prerequisite for the high-quality growth of tourism in the context of the new era. An essential component and unavoidable trend for the future high-quality growth of tourism is the transformation to a green and ecological mindset. The interaction coupling of tourism development and rural rejuvenation will undoubtedly result from the convergence of both development values. Their coupled development can promote regional economic transformation and upgrading, social progress, and has a bright prospect of sustainable development.

## **3. COUPLING EVALUATION ANALYSIS OF RURAL TOURISM AND RURAL REVITALIZATION**

### **3.1. ANALYSIS OF THE COUPLING DEGREE BETWEEN RURAL TOURISM AND RURAL REVITALIZATION**

The coupling degree of rural tourism and the rural revitalization system is displayed in Table 1 in accordance with the coupling degree assessment model for coupling degree analysis. The integrated development level of rural tourism is valued at 0.00435 in 2014 and grows to 0.33762 in 2019, while the integrated development level of rural revitalization is valued at 0.08895 in 2014 and grows to 0.48405 in 2019, showing that both are expanding and developing quickly. From 2014 to 2016, the growth rates of the complete development levels of rural tourism and rural revitalization have a tendency to be similar., and the two increased gradually almost simultaneously. From 2016 to 2017, however, the value of the comprehensive development level of rural revitalization increased significantly, while the growth rate of the comprehensive development level of rural tourism did not change significantly compared to the two years prior. The entire development level of rural revitalization's growth rate fell from 2017 to 2018, year over year, while rural tourism's overall level of development climbed significantly and its growth rate increased year over year. Additionally, there was little change year-over-year in the growth rate of rural revitalization in 2018–2019. However, both the overall degree of development and the growth rate of rural tourism continued to rise year over year.

From 2017-2019, the coupling degree values show a smooth development, the coupling relationship tends to be stable, and the coupling degree values have been maintained in the range of (0.4, 0.5) from 2015 onwards, which is in the antagonistic level stage. The connection between rural tourism and the rural revitalization system is thought to be low level coupled in 2014 and earlier and hostile in 2014 to 2019. Additionally, it is expected that between 2014 and 2019, the rural tourist system and rural revitalization system's coordination

degree coefficients will be high, suggesting a high level of interaction and coupling between the two systems.

**Table 1** The coupling degree of rural tourism and rural revitalization system

Year	Revitalising the system $F(x)$	Tourism System $G(y)$	Integrated development $T$	Coherence $K$	Coupling $L$	Degree of development $P$	Coupling coordination Degree of coupling coordination
2014	0.08895	0.00435	0.4797	0.03933	0.22635	0.03736	Low level
2015	0.10428	0.03556	0.06983	0.46552	0.32590	0.23175	Low level
2016	0.16837	0.08285	0.13138	0.72870	0.45560	0.21558	Moderate
2017	0.30585	0.13827	0.23257	0.75018	0.46375	0.41309	Moderate
2018	0.39427	0.24097	0.40264	0.84552	0.48134	0.45068	Height
2019	0.48405	0.33762	0.36527	0.86510	0.48414	0.58090	Height

### 3.2. COUPLED DEVELOPMENT EVALUATION INDEX WEIGHTS

In order to prove whether the above coupling degree evaluation indexes are scientific and reasonable, Table 2 displays the coupling evaluation weights of rural rejuvenation and rural tourism after an analysis of the coupling evaluation indices of these two sectors. And the index weights of each layer are measured by Yaahp software and all the index weights of each layer pass the consistency test. The weight of rural revitalization is 0.6558, while the weight of rural tourism subsystem is 0.3442. As can be observed, in the assessment system of rural regeneration and rural tourist coupling development, rural revitalization is significantly more significant than rural tourism.

**Table 2.** Evaluation weights for coupling rural revitalization and rural tourism

System System Layer	Tier 1 indicators	Indicator weights	Total weighting of indicators
Rural revitalization	Rural Industries	0.3748	0.2582
	Rural Ecology	0.2174	0.1759
	Rural Culture	0.3572	0.1253
	Rural Governance	0.1783	0.0964
Rural tourism	Country Life	0.1367	0.0827
	Rural tourism demand	0.2510	0.0680
	Rural Tourism Resources	0.2152	0.0631
	Rural tourism economy	0.1539	0.0580
	Rural Tourism Services	0.0187	0.0676

## 4. CONCLUSION

The high-quality development of tourism and rural revitalization has recently attracted a lot of attention from academics, and the literature on the subject is expanding quickly. The tourism academic community is also attempting to understand the inner logical relationship and the path to synergistic development between tourism development and rural revitalization. The index system for evaluation of coupled growth in rural revitalization and rural tourism is formed by this paper, which, in contrast to prior studies, is primarily based on the system coupling perspective and the new development concept. The method of hierarchical analysis is used to determine the index weights.

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# RESEARCH ON REFORMING THE CULTIVATION MODE OF INNOVATIVE ENTREPRENEURIAL TALENTS IN UNIVERSITIES UNDER THE BACKGROUND OF BIG DATA ANALYSIS

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## ABSTRACT

The paper investigates a fresh approach to talent development that emphasizes teacher preparation while merging professional education and moral education. It achieves this by examining the amount of innovation and entrepreneurial awareness among current college students, pursuing that route, and developing an analytical model of talent development influencing variables utilizing big data analysis. There are 57.45% of college students who do not know enough about innovation and entrepreneurship, 26.23% of college students who have narrow understanding, 23.87% of students who have wrong understanding and positioning, and 16.52% of students who have wrong understanding of the content. According to an examination of the existing scenario, it is critical that colleges and universities improve their methods for cultivating innovative and entrepreneurial potential.

## KEYWORDS

Innovation and entrepreneurship; Professional education; Faculty training; Moral education; Talent training

## 1. INTRODUCTION

Furthermore, the majority of earlier studies on education in entrepreneurship and innovation were based on developing students' ability to entrepreneurs from the perspective of the economy or management [1-3]. Innovation and entrepreneurship education only recently emerged in China and has not yet developed into a full education system. However, there are few investigations into the amount of political and ideological instruction motivation, and there are even fewer research on how to inspire students to engage in innovation and entrepreneurship [4-6]. In the modern period, college students' education in innovation and entrepreneurship must not only foster strong innovation and entrepreneurship skills but also be informed by socialist ideas with Chinese features [7-8]. Along with the interpretation and propagandizing of pertinent Party Central Committee policy documents to encourage the innovative spirit and business consciousness of college students, ideological and political education is used to encourage a variety of aspects and angles to inspire college students to innovate and launch their own businesses [9].



## 2. THE PRACTICE OF CULTIVATING TALENTS FOR INNOVATION AND ENTREPRENEURSHIP EDUCATION IN HIGHER EDUCATION

### 2.1. THE SITUATION OF INNOVATION AND ENTREPRENEURSHIP EDUCATION IN HIGHER EDUCATION

#### 2.1.1. DEGREE OF AWARENESS OF INNOVATION AND ENTREPRENEURSHIP

Innovation education is a brand-new approach to education that aims to develop students' innovation literacy and innovation potential in the context of the present reform of innovation and entrepreneurship talent nurturing in colleges and universities. Table 1 displays the present condition of the level of innovation and entrepreneurship awareness among college students using big data analysis. 57.45% of college students lack sufficient knowledge about innovation and entrepreneurship, 26.23% narrowly equate innovation and entrepreneurship with creating a technological or scientific project, 23.87% of students have incorrect understanding and positioning, and college students believe that innovation and entrepreneurship are only creative endeavors. Even 16.52% of students misinterpreted the material, believing that entrepreneurship and innovation are limited to founding a firm or organization. This demonstrates that the current status of education in entrepreneurship and innovation in colleges and universities is still a long way from the desired outcome, and that acceptance of college students' understanding of innovation and entrepreneurship is only at a passive level. The cause of this is that ideological and political education motivation's intended effect has not been realized, leaving only a very superficial knowledge of innovation and entrepreneurship in the heart and mind. This ultimately results in the innovation and entrepreneurship education's failure to produce the desired result.

**Table 1.** Awareness of innovation and entrepreneurship among college students

	Number of people	Number of people
Insufficient awareness	184	57.45%
Wrong awareness	98	26.23%
Wrong positioning	113	23.87%
Wrong content	78	16.52%

#### 2.1.2. LACK OF SOCIAL CONCEPT

College students who have spent a lot of time in the "adaptive education" atmosphere are heavily impacted by conventional and outdated thinking, showing insufficient self-confidence, poor independence, lack of strong innovation consciousness and entrepreneurial desire, afraid to accept challenges and express themselves, resulting in both the inability to build a true idea of innovation and entrepreneurship as well as the absence of a strong climate of innovation and entrepreneurship throughout the whole society. A strong culture of innovation and entrepreneurship is lacking across society, and the proper ideas about how to educate people about these topics and develop their inventive and entrepreneurial skills are not being established. The notion of innovation and entrepreneurship is not clearly understood by people from all walks of life, and their knowledge of its implications cannot keep up with the pace of the times. Therefore, the value of entrepreneurship and innovation education for developing talent, advancing society, and advancing the nation is not fully appreciated.

#### 2.1.3. DISCONNECT BETWEEN INNOVATION THEORY AND PRACTICE

There is a dearth of hands-on training for innovation and entrepreneurship at colleges and universities, and the understanding of these topics is exclusively taught in the classroom. College students who get this ineffective innovation and entrepreneurship education eventually

develop poor eyesight, shaky hand-eye coordination, a lack of imagination for innovation and entrepreneurship, and weak inventive thinking. The teaching of innovation and entrepreneurial abilities in Chinese colleges and universities is now inadequate in practice and unable to keep up with the demand of college students for these skills through time and distance. The fundamental challenge of developing innovation and entrepreneurship talent in colleges and universities will continue to be how to construct a suitable and efficient innovation and entrepreneurship training platform and combine various innovation and entrepreneurship resources.

## **2.2. NEW PATH OF INNOVATIVE ENTREPRENEURIAL TALENT CULTIVATION**

### **2.2.1. ESTABLISHMENT OF MORAL GUIDANCE**

Enterprise and innovation at the new age, education at colleges and universities must be founded on China's fundamental national conditions, strive to meet national strategic goals and promote economic and social growth, be driven by moral education, and support students' ideological and moral development. It is a current idea and trend to lead education in entrepreneurship and innovation via moral education, to lead innovation and entrepreneurial education through ideological and political theory, and to encourage college students to engage in innovation and entrepreneurship. The key to addressing the transformation of social contradictions and resolving a number of development challenges in the new era is to incorporate "moral education" into innovation and entrepreneurship education. In doing so, it will become clear that the individuals who receive such training go on to become the individuals required for contemporary social development and progress.

### **2.2.2. INTEGRATION OF PROFESSIONAL EDUCATION**

Curriculum plays a key role in the current implementation of innovation and entrepreneurship training in China, because it is directly related to the question of what kind of people to train and how to train them. To create a three-dimensional, integrated entrepreneurial and innovation curriculum system and a scientific teaching plan, colleges and institutions should actively reform the innovation and entrepreneurial curriculum system from many linkages and based on design thinking. Promote creativity in the development of professional entrepreneurial curriculum by integrating the subject matter of entrepreneurship and innovation instruction into the system of professional curriculum. By enhancing the study of career development in professional domains, you may direct the establishment of a professional education system that promotes innovation and entrepreneurship education and implement curriculum construction for training creative and entrepreneurial talents, increasing the weight of scientific research and technology development in professional fields, and improving the teaching of innovative and entrepreneurial cases in professional fields, so as to increase students' knowledge of job entrepreneurship and cultivate professionals who can start a business and entrepreneurial talents who understand their profession.

### **2.2.3. EMPHASIS ON TEACHER TRAINING**

Teachers are the architects of human souls, and the teaching staff is crucial to the success of innovation and entrepreneurship education. However, at the moment, a lack of qualified teachers and complicated qualifications have emerged as major obstacles to the development of innovation and entrepreneurship talent, making the urgent task of creating an interdisciplinary and multi-source teaching staff necessary. Universities need to set up a mentor system for innovation and entrepreneurship of college students, equip at least one "dual teacher" mentor with both theoretical and practical teaching quality for each student's innovation and entrepreneurship project, provide one-on-one guidance to the project, enhance the talent evaluation process and system to teach innovators and entrepreneurs to the highest

standards. In order to make the outcomes of the evaluation and assessment more scientific and impartial, we will enhance the process evaluation system for the quality of innovation and entrepreneurship training, optimize the content and standards of talent evaluation, and dynamically grasp the information of innovation and entrepreneurship.

### 3. ANALYSIS AND SUGGESTIONS OF FACTORS INFLUENCING THE CULTIVATION OF INNOVATIVE AND ENTREPRENEURIAL TALENTS

#### 3.1. ANALYSIS OF FACTORS AND INDICATORS

Table 2 provides an overview of the critical elements in the development of entrepreneurial and innovative potential at universities. Considering the main elements that shape the development of innovative and entrepreneurial potential in universities, the decision result is given a certain weight, and the calculation steps of DEMATEL method are used to derive a comprehensive influence matrix and analyze each factor, and the cause degree and centrality of each influencing factor are calculated in turn.

**Table 2.** Factors and indicators influencing innovation and entrepreneurship

Influencing factors	Influence degree	Centrality	Cause degree
University Policies	-0.64	-0.11	-0.52
Related Systems	3.05	-2.04	5.14
Cooperation Model	-3.82	-1.35	-2.41
Mentoring Institutions	-7.63	-0.17	-7.27
Teacher Qualifications	4.34	-0.93	4.81
Education and Training	2.07	-1.69	3.16
Innovation achievements	-3.90	-0.95	-3.34

#### 3.2. STRENGTHEN THE SENSE OF COOPERATION TO ESTABLISH

The dialectical relationship between the whole and the parts tells us that only the coordinated development of each part can realize the overall optimum. In order to develop innovative and entrepreneurial skills, conflicts and contradictions will inevitably arise in the process of collaborative cultivation of talents because there are different goals and interest demands among various subjects, with universities pursuing specific employment and entrepreneurship rates and enterprises focusing more on the economic benefits created by talents. So, in order to cultivate innovative and entrepreneurial talents, top-level design should be strengthened under the direction of the party committee, the enthusiasm of universities and businesses should be fully mobilized, guarantee mechanisms in policies and regulations should be provided, the conflict of interests between the subjects should be coordinated, and a favorable policy environment should be created for the cultivation of innovative and entrepreneurial talents.

### 4. CONCLUSION

The future of the nation and its fate are intimately correlated with talent, which is the key to the effective implementation of the Party and national plans. A crucial element in the achievement of the lofty aim of "two hundred years" is the development of talents who will work for the cause of constructing socialism with Chinese characteristics throughout their whole lives. In the modern period, China's efforts to develop inventive and entrepreneurial talent must contend with issues including cognitive bias, route inertia, and a lack of main body execution. Having a feeling of innovation, a strong desire for innovation and the readiness to take the initiative to study for it, as well as an interest and drive for innovation and entrepreneurship are the key ways that innovation and entrepreneurial awareness are displayed. The capacity to

innovate and be entrepreneurial is the foundation for achieving innovation and entrepreneurship. This ability includes invention, resource integration, organization and management, opportunity identification, and strategy layout.

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# THE ROLE OF COGNITIVE PSYCHOLOGICAL ADJUSTMENT OF TEACHER-STUDENT RELATIONSHIP IN PROMOTING STUDENTS' LEARNING MOTIVATION

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## ABSTRACT

This paper firstly analyzes the causes of students' low motivation to learn, showing that the internal factors such as unclear goals and lack of self-confidence make students less motivated to learn. Secondly, regression analysis was used to analyze the factors influencing students' learning motivation, and the factors influencing students' low motivation were shown through both endogenous and exogenous factors. The analysis showed that the significance levels of learning behavior, learning emotion, and social climate were 0.000, 0.0274, and 0.0482, respectively, all of which were less than 0.05. Finally, strategies to promote students' learning motivation were given based on metacognitive psychological adjustment, namely, regaining confidence, improving cognitive ability, and strengthening monitoring and adjustment of independent learning. This also indicates that metacognitive psychological adjustment can effectively promote students' learning motivation under good interaction between teachers and students.

## KEYWORDS

Teacher-student relationship; Metacognition; Psychological adjustment; Learning motivation; Regression analysis; Influencing factors

## 1. INTRODUCTION

A relaxed and pleasant classroom environment is easy for teachers and students to form a good teacher-student relationship, and students can unite and help each other. Compared with the strict didactic management model, a good relationship between teachers and students can make students more obedient to the teacher's management, which is beneficial to the management of the whole class. To establish a good teacher-student relationship, teachers should treat each student fairly and not discriminate against any of them [1-2]. This will lead to smoother teacher-student interaction in the classroom, students will be more cooperative with the teacher's teaching activities, the teaching progress can proceed smoothly or even speed up, and students' various abilities will be improved [3-4].

Lively and diverse teaching situations can stimulate students' interest in learning, and teachers can increase the interest of the classroom by role-playing and letting students do hands-on work, so that students can explore themselves in the activities, think about the problems by themselves, and gain knowledge through their own figuring out [5-6]. Nowadays, there are more and more new things, and if the previous teaching methods are continued, students will be more and more bored with learning. The use of teacher-student interaction can reduce students' boredom and even make them enjoy learning. Teachers can also optimize the traditional teaching structure and clarify the purpose of teaching through teacher-

student interaction [7-8].

Starting from the causes of students' low motivation to learn, this paper discusses that low motivation to learn is due to unclear goals, poor self-control, a strong sense of inferiority, and poor learning foundation. Regression analysis was used to analyze the factors influencing students' learning motivation, including both endogenous and exogenous factors. Based on the results of the regression analysis, a strategy based on metacognitive psychological adjustment is proposed to promote students' learning motivation, which also indicates that students' learning motivation can be effectively enhanced through metacognitive psychological adjustment in a good teacher-student relationship.

## **2. ANALYSIS OF THE REASONS WHY STUDENTS ARE NOT MOTIVATED TO LEARN**

### **2.1. UNCLEAR GOALS AND LACK OF SELF-CONFIDENCE AND LOW SELF-ESTEEM**

Many students enter school with a lack of professional knowledge and are not sure how the position they will take after graduation relates to the major they will now study. Even some parents treat the school as a custodian. Parents have no goals, students have no motivation, they just get by, and they lack initiative and motivation to learn. Because there are no clear learning goals and no pressure to advance to higher education, they are even more reluctant to study, and sleeping in class, playing with cell phones, reading novels and chatting are common. Most of the students have very poor academic performance in junior high school, so they still think they are not good at learning when they go to vocational school, and they always feel that they are inferior to others. Some students can't choose vocational school because they didn't get into high school due to their poor performance in the secondary school entrance examination.

### **2.2. STUDENTS HAVE POOR SELF-CONTROL AND NO GOOD LIVING HABITS**

Students are relatively young and generally have poor self-control. Some students disregard the school rules and regulations, they are late to class, leave early, and are absent from class, and they have loose discipline in class, they can sleep, talk, and play with their cell phones. Teachers often have to emphasize classroom discipline before they can continue their lectures, and the class learning atmosphere is poor. Some students know that this behavior is not good, but they just can't control themselves very well, and most of them don't have good living habits. It is known that many of them do not eat breakfast and often skip meals, replacing them with snacks of instant noodles. Since they go to bed late, wake up early, have irregular meals, and don't have enough sleep and adequate nutrition, they can't guarantee the quality of their classes well.

### **2.3. POOR LEARNING FOUNDATION AND LACK OF EFFECTIVE LEARNING METHODS**

Most students have poor learning foundation, so there will be some students although they want to learn the knowledge of professional courses, also spent a lot of time to read books and do problems, but often the learning efficiency is very low, can not really master the knowledge points. Some students don't have good learning methods, can't allocate their time and energy to study reasonably, and don't get the main points and lack of focus in learning. When they are promoted from junior high school to secondary school, they lack correct knowledge of professional courses, plus the teacher's teaching mode and progress are too different from junior high school, so they cannot keep up with the teacher's rhythm, which leads to lack of interest in professional courses and aversion to learning.

### 3. ANALYSIS OF FACTORS INFLUENCING STUDENTS' LEARNING MOTIVATION

#### 3.1. ANALYSIS OF THE INFLUENCE OF INTERNAL FACTORS ON STUDENTS' LEARNING MOTIVATION

Considering only the degree of influence of internal student factors on students' learning motivation, learning cognition, learning emotion, learning will, and learning behavior were taken as independent variables, and learning motivation was taken as the dependent variable. Using SPSS software, regression analysis can be conducted to find out whether there is a significant effect of the independent variables on the dependent variables and the magnitude of the effect, and the specific results obtained are shown in Table 1.

**Table 1.** Regression analysis of internal factors and motivation to learn

Model	Unstandardized		Standardisation	T	Saliency
	B	SD	Beta		
(Constant)	1.752	0.0312	-	5.612	0.0000
Learning Behaviors	0.415	0.102	0.563	4.113	0.0001
Learning emotions	0.138	0.060	0.251	2.264	0.0274
Learning cognition	-0.049	0.068	-0.098	-0.712	0.4783
Volition to learn	-0.026	0.067	-0.050	-0.0362	0.7195
R-squared	0.372				
Value of F-statistic	10.575				
Significance level	0.0001				

The results of the regression analysis showed that the R-squared reached 37.2%, indicating that all 37.2% of the change in learning motivation can be explained by the independent variables involved in this study. The significant level of the F-test was 0.0001, which is less than 0.05, indicating that at least one of the independent variables in this study may affect the dependent variable. Then, in order to further determine which specific factor influences learning motivation, it is necessary to continue to observe the t-value of each factor. The significance level of learning behavior is 0.000, which is less than 0.05, indicating that learning behavior can significantly affect learning motivation, and furthermore, the coefficient of influence of learning behavior on learning motivation is 0.415, which is greater than 0, indicating that the influence of learning behavior on learning motivation is significantly positive, implying that the more regular learning behavior is, the higher learning motivation follows.

In summary, among the internal influencing factors of students, learning cognition and learning will have no significant influence on students' learning motivation, learning emotion and learning behavior have a significant positive influence on secondary school students' learning motivation, and learning behavior has a greater influence on learning motivation.

#### 3.2. ANALYSIS OF THE INFLUENCE OF EXTERNAL FACTORS ON STUDENTS' LEARNING MOTIVATION

Considering only the degree of influence of social level factors on students' learning motivation, the social employment situation, social climate, and social acceptance were taken as independent variables, and learning motivation was taken as the dependent variable. Using SPSS software, regression analysis can be conducted to find out whether there is a significant effect of the independent variable on the dependent variable and the magnitude of the effect, and the obtained results are shown in Table 2.

**Table 2.** Analysis of exogenous factors on motivation to learn

Model	Unstandardized		Standardisation	T	Saliency
	B	SD	Beta		
(Constant)	3.215	0.237	-	13.504	0.0001
Social climate	0.133	0.062	0.292	1.932	0.0482
Social recognition of the school	0.015	0.061	0.035	0.256	0.6132
Forms of employment in society	-0.012	0.064	-0.023	-0.177	0.7011
R-squared	0.0752				
Value of F-statistic	7.4213				
Significance level	0.0082				

From the results of the regression analysis, it can be seen that the R-squared reached 7.52%, indicating that all 7.52% of the change in learning motivation can be explained by the independent variables involved in this study. The significance level of the F-test is 0.0082, which is less than 0.05, indicating that at least one of the social dimension factors of the independent variables in this study may affect the dependent variable learning motivation. From the results of the T-test, the significance level of social climate is 0.0482, which is less than 0.05, indicating that social climate can significantly influence learning motivation. Further, the coefficient of influence of social climate on learning motivation is 0.133, which is greater than 0. This indicates that the influence of social climate on learning motivation is significantly positive, which means that the better the social climate is, the higher the learning motivation will be. The rest of the indicators will not be repeated.

In summary, among the social level factors, there is no significant effect of social employment form and social recognition of school on students' motivation to study, and there is a significant positive effect of social climate on motivation to study.

#### **4. STRATEGIES TO PROMOTE STUDENTS' LEARNING MOTIVATION BASED ON METACOGNITIVE PSYCHOLOGICAL ADJUSTMENT**

##### **4.1. HELP STUDENTS BUILD CONFIDENCE AND GOALS**

Students often lack motivation and confidence in learning, are less clear about their own deficits, do not have a rational approach to learning, lack reflection on the learning process, and engage in useless learning week after week, resulting in unsatisfactory academic performance. Metacognitive psychological interventions can effectively allow students to recognize their own personal characteristics, learning styles, and strengths and weaknesses in different aspects of the learning process, such as listening, speaking, reading, and writing, through reflection and awareness of themselves. When students have a full knowledge and understanding of these, they can analyze and judge their own cognitive level and clarify their own learning goals. This in turn increases interest and motivation in learning, gradually builds confidence in learning, and drives students to find appropriate strategies to solve their learning difficulties.

##### **4.2. PROMOTE STUDENTS' COGNITIVE ABILITY TO IMPROVE**

When students understand the importance of "cognitive cognition", they will implicitly learn this metacognitive strategy and improve their cognitive ability. Usually, students who have difficulty in learning do not care much about the purpose of learning, the effect of learning, and the specific methods of learning, and they do not know and understand the nature of learning deeply enough, so they learn blindly without planning and effect. The reason for this is that their cognitive ability is poor, they do not have a clear way of thinking about learning, and their



cognitive understanding of learning is still relatively superficial. Through the teacher's interactive metacognitive psychological intervention, all students understand their current situation, understand the essential connotation of learning, and master specific independent learning tools to facilitate their learning through learning metacognitive strategies.

#### **4.3. STRENGTHEN THE MONITORING AND ADJUSTMENT OF STUDENTS' INDEPENDENT LEARNING**

Students usually adopt escape strategies when facing difficulties, without analyzing and adjusting the current situation, while metacognitive strategies require students to be able to address problems, propose solutions to problems, reflect on their learning strategies, adjust their learning styles, and achieve changes in the current situation through repeated practice. Therefore, with the regulation and intervention of metacognition, the monitoring and adjustment of students' independent learning can be effectively strengthened to get rid of the unfavorable situation in time, so that students can face the dilemma positively.

### **5. CONCLUSION**

In order to investigate the role of cognitive-psychological regulation of teacher-student relationship in promoting students' motivation, this paper analyzes the causes of students' low motivation as well as its influencing factors by using regression analysis. The regression analysis revealed that the significance level of learning behavior is 0.000, which is less than 0.05, the significance level of learning emotion is 0.0274, which is less than 0.05, and the significance level of social climate is 0.0482, which is less than 0.05. This indicates that learning behavior, learning emotion, and social climate all have significant effects on students' learning motivation. This gives strategies to promote students' learning motivation based on metacognitive psychological adjustment, and further enhance students' learning motivation through good teacher-student relationship and teacher-teaching interaction.

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# RESEARCH ON THE INNOVATIVE MODE OF TEACHING IN HIGHER MATHEMATICS EDUCATION IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

This paper analyzes the stage of implementing inquiry-based teaching in the context of deep learning, explores the inquiry-based teaching model system, and analyzes the significance of the difference in students' mathematical quality under the inquiry-based teaching model in a controlled manner. The average mathematical quality score of 30 students randomly selected from the experimental group was 40.4 with a standard deviation of 18.3, while the average mathematical quality score of 30 students selected from the control group was 37.5 with a standard deviation of 17.4. It is important to change the teaching method through the innovative teaching mode of higher mathematics so as to mobilize students' enthusiasm and creativity in improving the mathematical quality of students.

## KEYWORDS

Inquiry-based teaching; Teaching model; Mathematical quality; Significance of differences; Student creativity

## 1. INTRODUCTION

With the increasing development of social economy and science and technology, the demand for high quality talents has increased significantly [1-2]. As an effective way to cultivate talents, colleges and universities have received great attention and wide concern from all walks of life [3-4]. In this situation, colleges and universities have been expanding their enrollment, which makes the problems hidden in the classroom teaching of mathematics in colleges and universities become more and more prominent. The traditional mathematics classroom teaching mode in colleges and universities can hardly meet the diversified development needs and individual learning needs of modern college students [5-6]. The mathematics course in higher education is an important course in higher education, especially for science students, and it is a fundamental tool for subsequent course learning, and with the popularization and innovation of technology, the importance of mathematics course learning in higher education has become more and more prominent [7-9]. The reasonable use of deep learning methods to improve the efficiency of teaching mathematics courses in colleges and universities has also become a common focus topic for teachers in colleges and universities, so it is imperative for colleges and universities to carry out the innovation of mathematics classroom teaching mode.

## **2. EXPLORATION AND PRACTICE OF INNOVATION OF HIGHER MATHEMATICS EDUCATION MODEL**

### **2.1. EXPLORATION OF INQUIRY-BASED TEACHING MODE OF ADVANCED MATHEMATICS**

#### **2.1.1. ESTABLISHING AN INQUIRY-BASED TEACHING SYSTEM**

Higher mathematics is an important public basic course in engineering colleges and higher teacher training colleges, and its teaching quality directly affects students' learning of subsequent courses. The original "lecture-based" teaching mode does not fully mobilize students' initiative and creative spirit. The key to solve the above problems is to change the lecture style to inquiry style, to collect, select, classify and compile classical problems before inquiry and discussion, and to carefully design the difficulty of the problems, to adopt the mode of easy first and then difficult, and to adopt the mode of graded progression, and to use the problems of different levels to stimulate students' learning interest for different students.

#### **2.1.2. REASONABLE DESIGN OF TEACHING GRADIENTS**

Teaching according to students' abilities is a principle that must be followed in education, and any teaching that is detached from the students' foundation and acceptance ability is a failure. Students can only cooperate with the teacher to teach well if they can keep up with the teacher's ideas, which requires the teacher to understand the students' foundation, master the syllabus, and be familiar with the teaching materials, so as to grasp the center of teaching, highlight the key points, and design reasonable teaching gradient, disperse the difficult points, and design reasonable inquiry topics and contents, so that students can think positively under the teacher's guidance, and teachers and students can interact to achieve the teaching and learning Resonance.

#### **2.1.3. OPTIMIZE CLASSROOM TEACHING PROCESS**

Enriching classroom teaching activities and transforming the traditional teaching mode enable students to experience the process of abstract knowledge learning, conceptual knowledge learning, and to enhance the ability to discover problems, analyze problems, and solve problems through knowledge point induction knowledge point comparison, etc. On the basis of ensuring the understanding of mathematical knowledge, a solid foundation is laid for the subsequent learning of more difficult mathematical knowledge. At the same time, the introduction of inquiry-based teaching mode, experiential teaching mode and mathematical modeling activities ensure that students can understand the main knowledge content more comprehensively.

### **2.2. ANALYSIS OF THE STAGES OF IMPLEMENTING INQUIRY-BASED TEACHING**

#### **2.2.1. PROBLEM INTRODUCTION PHASE**

Teachers start from students' cognitive base, and design problems in accordance with the teaching content to make students clear the goal of inquiry, while stimulating students' enthusiasm and initiative in inquiry learning. Students use their own thinking to come up with some initial ideas for solving problems based on their original knowledge and experience, and learn and solve problem-related content independently. Fully demonstrate their own thinking process and methods to reveal the laws of knowledge and the methods and approaches to solve problems.

#### **2.2.2. PROBLEM SOLVING STAGE**

Teachers try to provoke students to think deeply and exchange and discuss again as much as possible, and guide them to summarize what they have learned and how to solve problems,

so that new knowledge can be consolidated and internalized on the original basis. So that students can flexibly use what they have learned, they can broaden their thinking, experience success and explore innovation, so as to refine and sublimate their thinking and construct their own knowledge system.

### 3. RESEARCH ON INNOVATIVE MODELS OF TEACHING HIGHER MATHEMATICS

#### 3.1. MATHEMATICS QUALITY INDICATORS

Mathematical quality is the characteristic and basis of a socialized person's mature personality in mathematics, and for students it is a facet of their professional quality. In the process of learning mathematics and applying mathematics, students internalize mathematical knowledge and abilities in their own development, and gradually develop a sense of mathematical thinking and the ability to use "mathematical" methods to observe the world and solve practical problems. The mathematical qualities of students are shown in Table 1. "Mathematical thinking and awareness", "ability to calculate mathematical problems", "ability to reason and argue", "ability to apply in practice" and "sustainable development of mathematical psychology". These five level 1 indicators are subdivided into several level 2 indicators.

**Table 1.** Indicator system for assessing students' quality in mathematics

Tier 1 Indicators	Secondary indicators
Mind and Awareness	Knowledge perception
	Quantitative awareness
Numeracy	Open-mindedness
	Accurate calculations
Ability to reason and argue	Analytical skills
	Logical reasoning
Practical application skills	Creative ability
	Thinking and thinking
Mathematical psychology	Quality of will
	Thinking and attitude

#### 3.2. SIGNIFICANCE ANALYSIS OF MATHEMATICAL QUALITY

In order to investigate the differences of students' mathematical quality under the innovative mode of teaching higher mathematics education, students were randomly selected to carry out a control experiment, and the significant data of mathematical quality between the control group and the experimental group are shown in Table 2.

The weight vector was taken as:

$$W = \omega_1, \omega_2, \omega_3, \omega_4, \omega_5 = (0.20, 0.20, 0.25, 0.25, 0.1) \quad (1)$$

Take confidence level  $\lambda = 0.66$ .

From the experimental group, 30 students were randomly selected with an average mathematical quality score of 40.4 and a standard deviation of 18.3, while the control group was selected with an average mathematical quality score of 37.5 and a standard deviation of 17.4. Through the above analysis, the overall quality of the students in the experimental group improved greatly after the implementation of inquiry-based teaching, especially the ability to reason and argue, and the practical application ability changed greatly, while the control group The overall quality of the students in the control group did not improve significantly. This fully

illustrates the importance of changing teaching methods and mobilizing students' enthusiasm and creativity to improve students' mathematical quality. This evaluation provides the necessary support for the scientific evaluation of the quality of education after the innovation of the teaching model.

**Table 2.** Data on the significance of students' quality in mathematics

Types	Thought and Awareness	Mathematical Calculation	Reasoning and argumentation	Practical Application	Mathematical Psychology	Overall score
Experimental group	9.5	8.5	8.0	8.0	8.5	0.49
	8.5	7.0	8.5	8.0	7.5	0.39
	9.0	8.0	6.5	8.5	9.5	0.47
Control group	8.5	7.5	7.0	9.5	6.5	0.41
	7.5	7.5	8.5	7.5	8.5	0.37
	9.0	8.0	7.5	7.0	9.0	0.41

#### 4. CONCLUSION

Deep learning methods are highly compatible with the reform of mathematics curriculum in colleges and universities, and there are many interactions between them. By scientifically summarizing, scientifically summarizing teaching contents, setting deep learning objectives, appropriately introducing deep learning contents, scientifically organizing teaching activities and optimizing classroom teaching process, we can significantly improve the teaching effect of mathematics in colleges and universities, and lay a solid and stable foundation for students' learning ability and mathematical thinking development while ensuring the level of mathematics teaching in colleges and universities. Help students to enter into a deep learning state. The second is to combine the students' interest characteristics and cognitive level to carry out targeted training, to ensure that the students' understanding of the depth of the content learned on the basis of the students' key abilities and higher-order thinking can also be solidly improved.

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# AN EMPIRICAL STUDY OF ENGLISH TEXT INFORMATION TRANSLATION BASED ON KNOWLEDGE GRAPHS

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## ABSTRACT

This paper explores the English text information translation framework, embeds the alignment model into the knowledge graph to construct the MTransD model, carries out a comparative analysis study of the MTransD model and the traditional method, and analyzes the factors affecting the model effect. The four metrics of MRR, Hits@1, Hits@3, and Hits@10 were improved by 1.7, 4.3, 3.8, and 1.7 percentage points. On the WN18RR dataset, the MTransD model achieves optimal results on all metrics, and improves at least 1.6, 3.9, 4.6 and 8.6 percentage points on the four metrics of MRR, Hits@1, Hits@3, and Hits@10 compared to the knowledge graph complementation model using graph neural networks. It proves that the MTransD knowledge graph model has better generalization ability in English text information translation.

## KEYWORDS

Knowledge graph; WN18RR dataset; MTransD model; translation framework; Alignment model

## 1. INTRODUCTION

The concept of Knowledge Graph was born in 2012. In order to systematize knowledge and information so that users can obtain a complete system of relevant knowledge by any keyword and improve the quality of search, Google proposed the concept of knowledge graph and constructed the initial knowledge graph [1-3]. Since knowledge graphs can accurately reflect real-world facts and can express abstract knowledge such as concepts and hierarchies well [4-5]. In recent years, knowledge graphs have been applied to several fields and a lot of research has been conducted around them [6-7]. In this paper, we analyze and solve a series of problems and propose solutions for the alignment and fusion of knowledge graphs for English textual information translation to improve the internationalization of linked data between different languages and the globalization of knowledge sharing, and to facilitate applications such as natural language processing for English textual information translation, English information retrieval, simultaneous translation, and cross-lingual knowledge Q&A [8-10].

## 2. KNOWLEDGE BASE MODEL AND ENGLISH TEXT INFORMATION TRANSLATION

### 2.1. ENGLISH TEXT INFORMATION

#### 2.1.1. ENGLISH TEXT INFORMATION TRANSLATION FRAMEWORK

The focus of information translation in English texts is on “external situations, facts about a



subject”, “ontology beyond language”. Therefore, conveying true and accurate information is the core of such texts, and the language is plain and objective, and the author of the text is only in an “anonymous” position in the text, only conveying information objectively, with little personal emotion. For the translation of English text information, the translator should put the reader's understanding and reaction in the first place, that is to say, pay attention to the effect of information transmission, and it is important to transmit information accurately and truthfully. In informational texts, the text structure is focused on the semantic syntactic level, and literary techniques take a back seat to the communication of content as the primary task.

### **2.1.2. TRANSLATION PRINCIPLES**

Translation of English text information should follow the following three principles:

(1) The principle of fidelity, the translation is concerned with the professionalism of expression and must be 100% faithful, aiming to deliver true and accurate information to the readers.

(2) The principle of accuracy, which means that the translator cannot arbitrarily miss the information of the original text. The core function of English text information translation is “authenticity”, mainly to express information, which requires that the translation must be accurate and clear in order to achieve the purpose of transmitting true and effective information.

(3) The principle of readability refers to the fact that the translator can not stick to the original text, make corrections to the original text and restructure the sentences to enhance the readability of the translation. The advantages of the translated language should be brought into play to enhance the readability of the text.

## **2.2. KNOWLEDGE GRAPH FOR ENGLISH TEXT INFORMATION TRANSLATION**

### **2.2.1. KNOWLEDGE GRAPH EMBEDDING ALIGNMENT MODEL**

The knowledge graph embedding model is a model that uses vectors to express knowledge by embedding the knowledge graph into a low-dimensional real vector space. Compared with the knowledge expressed in discrete form in the knowledge graph, vectors have continuity and thus can model the association between entities and relations in the knowledge graph with the help of spatial relations of vectors. Based on previous work in the field of knowledge graph embedding models, this paper proposes a multilingual knowledge graph embedding alignment model MtransD that dynamically constructs spatial connections.

### **2.2.2. THE IDEA OF MTRANSD MODEL**

The MTransD model takes advantage of the TransD model's separation of semantic and spatial information, opens up new meanings and functions for the projection vectors in the TransD model, and improves on previous work in the area of multilingual knowledge graph embedding. The MTransD model uses the knowledge model and the alignment model together to learn a multilingual knowledge graph embedding model. The knowledge model embeds the entities and relations of each language into the corresponding vector space separately, and the alignment model performs cross-linguistic transformation of the learned entities and relations for each language. In the following, the knowledge model and alignment model of MTransD model are introduced with two languages as examples. Since the MTransD model has the advantage of multi-lingual knowledge graph embedding innately, it is possible to either learn a series of alignment models or train the models separately to form an overall alignment model for a knowledge graph set of more than two languages.

### **2.2.3. MTRANSD MODEL APPLIED TO ALIGNMENT AND FUSION PROBLEMS**

Ideally, the semantic vectors corresponding to entities or relations with the same semantics in the knowledge graph of different languages should be identical in the embedding vector space. Although the semantic vectors corresponding to entities or relations with the same semantics in the knowledge graphs of different languages are not exactly the same in the trained models due to the limitations of the training set and training process, however, the corresponding semantic vectors have a tendency to converge to the same during the training process, so they can be applied to the alignment and fusion of cross-language entities and relations.

### 3. STUDY ON THE KNOWLEDGE BASE OF ENGLISH TEXT INFORMATION TRANSLATION

#### 3.1. COMPARATIVE ANALYSIS OF MTRANSD MODEL AND TRADITIONAL METHODS

In this paper, we compare popular knowledge graph complementation models in recent years to evaluate the performance of the MTransD model, and compare the difference in effectiveness between the MTransD model and the above models on four datasets, FB15K237, WN18RR, Kinship, and UMLS. a comparison of the effectiveness of the MTransD model and the baseline model on the four datasets is shown in Table 1. Compared with the four baseline models using graph neural networks, the model in this paper improved at least 1.7, 4.3, 3.8 and 1.7 percentage points on the four metrics of MRR, Hits@1, Hits@3 and Hits@10. On the WN18RR dataset, the model in this paper achieves optimal results on all metrics. Compared with the knowledge graph complementation model using graph neural networks, the model in this paper improves at least 1.6, 3.9, 4.6, and 8.6 percentage points on four metrics, MRR, Hits@1, Hits@3, and Hits@10. On Kinship dataset and UMLS dataset, the model also achieves the best results on all metrics, Hits@1 metrics improved by at least 17.8 and 5.3 percentage points compared to the five baseline models, indicating that the model can be effectively applied to domain-specific datasets, proving that the model has good generalization ability and proving the effectiveness of the model in this paper.

**Table 1.** Results of MTransD Model and Baseline Models on the WN18RR Datasets

Models	WN18RR			
	MRR/%	Hits@1/%	Hits@3/%	Hits@10/%
TransE	22.2	4.9	35.2	32.4
TransH	22.5	5.3	32.8	40.3
TransR	23.0	8.2	32.5	40.9
TransD	21.8	4.8	32.4	43.8
DistMult	43.2	35.4	41.1	44.2
CompLEx	41.5	37.2	36.4	41.9
TuckER	42.6	34.3	31.2	42.6
ConvE	41.2	41.1	43.2	46.0
ConvR	43.5	41.0	42.9	53.1
HypER	42.3	41.3	42.6	50.1
AcrE	41.4	32.3	44.2	52.2
R-GCN	12.7	9.3	13.9	20.7
SACN	38.0	42.1	42.8	52.7
CompGCN	46.2	42.6	46.4	51.3
ComplexGCN	44.3	41.5	42.7	51.4
MTransD	45.6	48.9	52.2	61.9

#### 3.2. ANALYSIS OF FACTORS INFLUENCING MODEL EFFECTS

In order to investigate the effect of each module on the effect of MTransD model, this paper conducts ablation experiments on the general domain dataset WN18RR. The results of the ablation experiments of MTransD model on the WN18RR dataset are shown in Table 2. The

two experiments include removing the contrast learning loss and removing the entity relationship fusion module. It can be seen that the model effect is reduced to different degrees after removing both the contrast learning loss and entity relationship fusion modules. After removing the contrast learning loss, the MTransD model is reduced by 1.6, 2.0, 2.2 and 0.9 percentage points on the WN18RR dataset, respectively. After removing the entity relationship fusion module, it is reduced by 1.9, 4.7, 2.0 and 2.7 percentage points on the WN18RR dataset, respectively. The results of the ablation experiments demonstrate the effectiveness of the above two modules in the MTransD model.

**Table 2.** Ablation Experimental Results of MTransD Model on the WN18RR Dataset

Models	MRR/%	Hits@1/%	Hits@3/%	Hits@10/%
MTransD	45.6	48.9	52.2	61.9
w/o Contrast learning loss	44.0(-1.6)	46.9(-2.0)	50.0(-2.2)	61.0(-0.9)
w/o Entity relationship integration	44.5(-1.9)	44.2(-4.7)	50.2(-2.0)	59.2(-2.7)

#### 4. CONCLUSION

The research direction of this paper is knowledge graph, and the main research content is alignment and fusion of knowledge graphs for English textual information translation. Based on the previous work in the field of knowledge graph embedding model, a knowledge graph embedding alignment model MTransD for English text information translation is proposed, and the idea of the model, knowledge model, alignment model, and training process are elaborated. The form of separating semantic vectors and spatial vectors is used in the model, and the alignment model is constructed between different languages with the help of semantic vectors and spatial vectors. Based on this, two kinds of loss functions for the alignment model and a model training process adapted to the characteristics of multilingual knowledge graphs are proposed in this paper. After experiments, the feasibility and effectiveness of the model are verified.

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# RESEARCH ON EMPLOYMENT AND ENTREPRENEURSHIP GUIDANCE STRATEGY AND ABILITY CULTIVATION OF COLLEGE STUDENTS IN THE INTERNET ERA

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## ABSTRACT

This paper analyzes the employment and entrepreneurship guidance strategies in colleges and universities, and analyzes the current teaching situation at this stage, and explores the level of students' entrepreneurial practice according to the level of their ability, and strengthens the guidance strategies and ability development based on the analysis of the problems. 38% of students do not understand the employment policy, 59% of students do not have timely access to employment information, 28% of students lack experience in online application, 65% of students lack of interview experience, and 23% and 48% of students, respectively, chose vague career planning and little work experience. Colleges and universities in the development of guidance strategies and ability development plan from the practical perspective of contemporary solutions to college students' job search dilemmas, so that students have the ability to employment and entrepreneurship.

## KEYWORDS

Employment and entrepreneurship; Student entrepreneurship; Guidance strategy; Ability development; Job search dilemma

## 1. INTRODUCTION

The Internet era has brought unprecedented opportunities for career guidance in colleges and universities, and new impetus for educational reform and innovation [1-2]. The employment guidance in colleges and universities is generally guided by the concept of career selection and self-employment of college students [3]. With the gradual increase of graduates, the market competition is also getting stronger, so the application of employment guidance should be carried out for the shortcomings of college students in entrepreneurship [4-5]. Through the development of employment projects for college students, students are encouraged to practice while ensuring that they can have the ability to start their own businesses as a way to cope with social employment pressure [6-7]. In this paper, we combine the background of the Internet era, deeply analyze the advantages of the Internet in unifying social resources and its influence on college students' employment and entrepreneurship guidance, and explore new strategies and capacity development of employment guidance in combination with the long-standing traditional strategies of college students' employment guidance [8-9]. In order to improve the awareness and ability of college students' employment and entrepreneurship in the context of Internet and further promote the prosperous development of Internet and the reform of college education.

## **2. ANALYSIS OF THE CURRENT SITUATION AND PROBLEMS OF EMPLOYMENT AND ENTREPRENEURSHIP IN COLLEGES AND UNIVERSITIES**

### **2.1. EMPLOYMENT AND ENTREPRENEURSHIP IN UNIVERSITIES IN THE INTERNET ERA**

#### **2.1.1. THE PHENOMENON OF SOCIAL DISCONNECTION IN HIGHER EDUCATION**

Due to the current overall environment in China, employment and entrepreneurship education starts late compared to developed countries. Students are still in the early stage of understanding about employment and entrepreneurship, and there is no good atmosphere and environment for entrepreneurship due to the overall general environment of the school. In general, college students lack attention to entrepreneurship under the long-term influence and limitation of the traditional closed teaching mode, while most of them do not have the spirit of employment entrepreneurship.

#### **2.1.2. THE LEVEL OF STUDENTS' ENTREPRENEURIAL PRACTICE ABILITY**

Teachers of employment and entrepreneurship in colleges and universities still have a narrow knowledge and understanding of entrepreneurship education and inaccurate positioning. The curriculum focuses on improving students' professional skills and does not pay attention to creating an entrepreneurial atmosphere to improve students' enthusiasm and enthusiasm for entrepreneurship. This leads to a weak level of students' entrepreneurial practical skills, insufficient knowledge reserves, lack of entrepreneurial motivation and self-confidence, and then insufficient overall self-confidence in entrepreneurship. They hold a skeptical attitude towards their technical level, capital source, communication ability, organization ability, management level, etc.

### **2.2. STRATEGIES FOR EMPLOYMENT AND ENTREPRENEURSHIP GUIDANCE IN HIGHER EDUCATION**

#### **2.2.1. EMPLOYMENT SITUATION GUIDANCE**

In order to better help students to make their life choices, we should combine the market development trend to ensure that college students understand the employment prospect, enhance the awareness of market concepts, and know their own advantages and shortcomings, so as to effectively ensure that college students can quickly integrate into the development of society. Colleges and universities should lead college students to establish a clear perception of the employment situation and look at it correctly, avoid having too high expectations of themselves, avoid the appearance of excessive "superiority", do not be blinded by the traditional employment concept, uphold the mentality of striving hard and be well prepared for employment competition.

#### **2.2.2. KNOWLEDGE AND COMPETENCY GUIDANCE**

Only with sufficient knowledge can one exert one's ability. However, knowledge does not mean having the ability, but in the process of improving the ability, it should be based on understanding and applying the knowledge. With the continuous development of the society, there are brand-new requirements for "talents": a perfect knowledge structure, the existence of innovative ideas and abilities, the ability to manage and express, etc. Therefore, in order to better choose a career and employment, contemporary university students should pay attention to the cultivation of abilities in addition to the guidance that they should improve their knowledge under the condition of systematic and comprehensive knowledge structure.

#### **2.2.3. COLLEGE STUDENTS' CAREER PLANNING DESIGN**

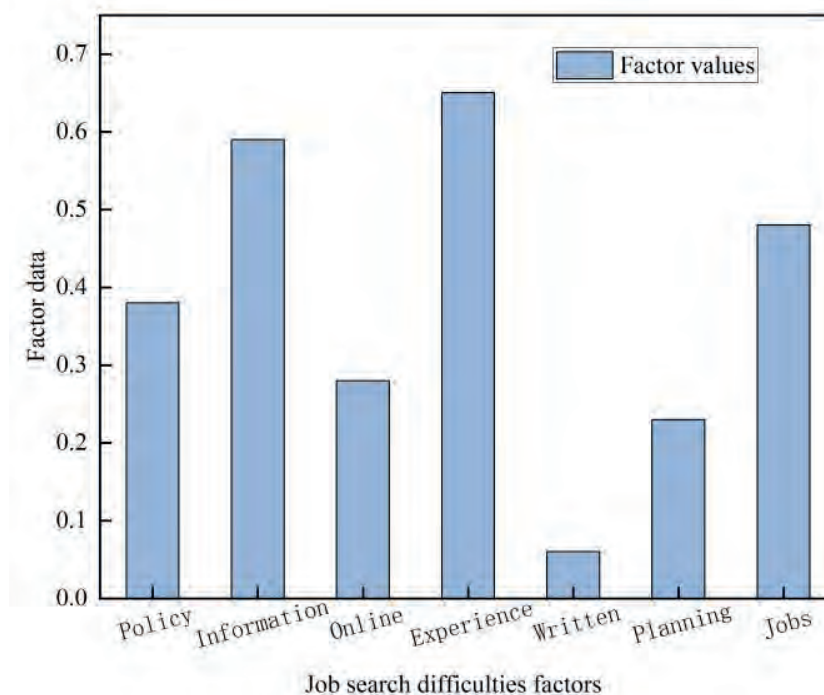
Career planning design is of great importance to individuals in choosing their careers. Only

through continuous understanding of one's own situation and comprehensive self-cognition can one purposefully determine career direction and thus complete career design. The cognition of self is to analyze the strengths and weaknesses of oneself more deeply, and to gain insight into the level of one's ability. Combined with my work experience, I study the direction of future employment, so as to know the question of "what can I do". In the process of career planning, college students should analyze their own highlights and continuously improve and enrich them, so as to realize their life value.

### 3. ANALYSIS OF COLLEGE STUDENTS' EMPLOYMENT AND ENTREPRENEURSHIP GUIDANCE STRATEGIES AND CAPACITY DEVELOPMENT

#### 3.1. CAREER GUIDANCE STRATEGIES FOR COLLEGE STUDENTS

In order to explore the countermeasures in college students' career guidance strategy to cope with students' difficulties in seeking help, the factors of college students' difficulties in seeking jobs were analyzed, and the factors of college students' difficulties in seeking jobs are shown in Figure 1. 38% of students did not understand the employment policy, 59% of students did not have timely access to employment information, 28% of students lacked experience in online application, 65% of students had insufficient interview experience, 6% of students had unsatisfactory written exams, 23% and 48% of students, respectively, chose vague career planning and little work experience. Therefore, among the problems that affect job seekers applying for jobs, they are more seriously affected by untimely employment information on the one hand and insufficient interview experience on the other. Therefore, college students' employment guidance strategy should focus on these factors of job search difficulties, realistically help to solve the problem of difficult job search and improve students' employment and entrepreneurial ability.

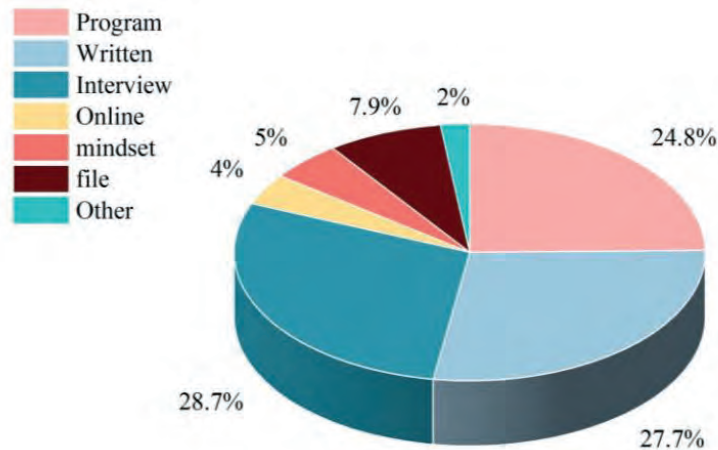


**Figure 1.** Factors that make it difficult for university students to find work

#### 3.2. CAREER AND ENTREPRENEURSHIP DEVELOPMENT COURSES

In order to study the cultivation of college students' employment and entrepreneurial skills by the college employment courses, the analysis was conducted on the students who participated in the employment guidance courses. 25% of the students chose the career plan,

28% chose the written test skills, 29% chose the interview skills, and the numbers of those who chose the online application skills, the skills of adjusting the mindset of the career, making personal files and others were 4%, 5%, 8% and 2% respectively. From this we can see that in the process of job hunting, employment refers to the teacher as the main body of teaching, whose theoretical knowledge determines the depth of teaching, and whose social level of knowledge determines the students' ability to cope in the specific practical process.



**Figure 2.** Analysis of students' choice of career guidance content

#### 4. CONCLUSION

At the present stage, the cultivation of employment and entrepreneurial ability for college students is an important demand for economic and social development, and the construction of employment guidance mode and the strengthening of employment ability cultivation on this basis is a basic goal to enhance the effect of higher education. In the current employment and entrepreneurship education for college students, there are various problems such as imperfect discipline system and poor entrepreneurial environment. Therefore, in order to guarantee the effect of employment guidance for school students, students should be cultivated with innovative thinking and entrepreneurial consciousness. The school should also optimize the employment and entrepreneurship ability by updating the concept of employment and entrepreneurship guidance and strengthening the faculty construction at the same time. In the strengthening of the strategy, the overall construction effect is ensured by strengthening the entrepreneurial concept and consciousness and introducing innovative employment models on the basis of improving the entrepreneurial employment team, so as to improve the entrepreneurial ability at the same time.

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# STRATEGIES OF TEACHING REFORM IN PRIMARY AND SECONDARY SCHOOLS IN THE CONTEXT OF EDUCATION INFORMATIZATION

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## ABSTRACT

This paper analyzes the effectiveness of teaching applications in primary and secondary schools in the context of education informatization by exploring the overall level of information technology teaching in primary and secondary schools and conducting research on teaching reform strategies in primary and secondary schools. 38.21% of teachers think that information technology is of great value, 57.24% of teachers think it is of great value, 52% of teachers strongly support the application of information technology to classroom teaching, 36% of teachers were more supportive, and another 12% of teachers had little or no recognition of the teaching application of information technology. Therefore, the teaching reform in primary and secondary schools should be student-oriented and adhere to the use of information technology teaching to guide students' independent learning, so as to achieve the fundamental purpose of teaching reform.

## KEYWORDS

Primary and secondary school teaching; Teaching reform; Education informatization; Independent learning; Application effectiveness

## 1. INTRODUCTION

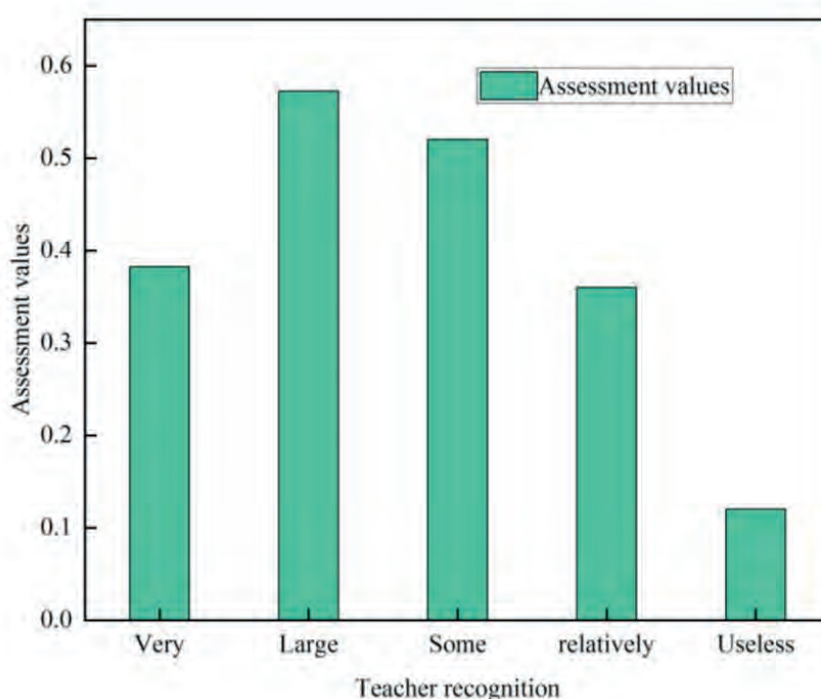
With the continuous development of information technology, education informatization and curriculum reform, various modern educational technology media and information resources have been introduced into schools, and information technology, represented by computers and the Internet, has been commonly used in schools and universities [1-3]. The pace of education modernization has greatly accelerated, and teachers' lesson preparation and teaching methods have undergone fundamental changes [4-5]. In this context, information-based instructional design has emerged and gradually replaced traditional instructional design methods, and teachers' ability of information-based instructional design has become an important criterion for teachers' professional quality [6-8]. However, as a new type of instructional design, some problems inevitably occur in the process of teaching application [9-10].

## 2. EFFECTIVENESS OF TEACHING APPLICATIONS IN PRIMARY AND SECONDARY SCHOOLS IN THE CONTEXT OF EDUCATION INFORMATIZATION

### 2.1. OVERALL LEVEL OF TEACHING IN PRIMARY AND SECONDARY SCHOOLS

#### 2.1.1. TEACHERS ARE ACTIVE IN INFORMATION-BASED TEACHING

To explore teachers' enthusiasm for information technology teaching, the application of information technology teaching by primary and secondary school teachers was analyzed, and the value of information technology teaching reform to improve teaching effectiveness is shown in Figure 1. 38.21% of teachers thought that information technology was of great value, 57.24% thought it was of great value, 52% strongly supported the application of information technology to classroom teaching, and 36% Another 12% of teachers did not recognize the application of IT in teaching very much or not very much. Primary and secondary school teachers' recognition of IT application in teaching and learning was high, between very supportive and relatively supportive.



**Figure 1.** Value identity of information technology to improve teaching effectiveness

#### 2.1.2. ABILITY TO APPLY INFORMATION-BASED TEACHING

In terms of teachers' ability to apply information technology, the subject teachers' ability to search for teaching resources, ability to create teaching resources, ability to present information using technology, ability to use technology as a cognitive tool, ability to use technology as an interactive tool, and ability to use technology as an evaluation tool were examined. The results of descriptive statistics of teachers' application of information technology in teaching are shown in Table 1. The observation statistics revealed that 51.5% of the teachers were relatively proficient in using information technology, 30.3% were less proficient, and 18.2% were not proficient.

**Table 1.** Teachers applied information teaching descriptive statistics results

<b>Dimensionality</b>	<b>Average value</b>	<b>Standard deviation</b>	<b>Variance</b>
Teaching Resource Search	3.58	0.738	0.573
Teaching Resource Production	2.71	0.748	0.551
Media presentation of information	3.20	0.782	0.536
As a cognitive tool	3.09	0.728	0.628
As an interactive tool	3.01	0.672	0.527
As an evaluation tool	2.51	0.662	0.529

## **2.2. NEED FOR TEACHING REFORM**

### **2.2.1. STIMULATE STUDENTS' INTEREST IN LEARNING**

Under the traditional “blackboard + chalk” teaching mode, students always receive knowledge passively and often learn only for the purpose of exams, without applying mathematical methods to solve practical problems. In the background of education information technology, the new classroom teaching can create effective teaching scenarios and animation effects to help students understand the classroom knowledge, thus enhancing students' interest in learning and helping to promote the teaching reform in primary and secondary schools.

### **2.2.2. 2.2.2 ENRICHING TEACHING RESOURCES**

Traditional teaching methods have a lack of teaching resources, and textbooks are almost the only source of information. This kind of learning cannot broaden students' horizons and acquire more, newer and broader knowledge. Teachers should encourage students to expand their thinking space and build a bridge for them to realize the leap from concrete perception to abstract thinking. Information technology in education not only provides rich resources for teaching, but also develops students' knowledge and cultivates their creative spirit and innovative consciousness. The rich teaching resources provided by information technology not only further expand students' knowledge horizons, enhance their motivation to learn, but also enable them to enjoy classroom learning.

### **2.2.3. REALIZE RESOURCE SHARING**

Teaching resources are an important part of the teaching and learning system, which is directly related to the quality of teaching and learning. There is a relatively serious problem of educational equity at present. The differentiation of educational resources is an important reason for the problem of educational equity, and excellent teachers and advanced equipment become the primary consideration. Reasonable use of information technology to realize the sharing of high-quality educational resources is an important way to solve the problem of educational resource equity.

## **3. STUDY ON THE STRATEGIES OF TEACHING REFORM IN PRIMARY AND SECONDARY SCHOOLS**

### **3.1. RATIONALIZATION OF CAPITAL INVESTMENT**

Increase the proportion of funds invested in less developed areas to narrow the distance between regions and between urban and rural areas. Make education get balanced development. Set up relevant special funds for informatization teaching design to effectively meet the different needs of informatization teaching design for computers, campus network, multimedia classrooms and other hardware environments. In addition, after all, the education department's allocation is limited, and schools or relevant education departments with conditions can also obtain more funds for information teaching equipment through the means

of funding from other enterprises or institutions in society.

### **3.2. IMPROVE INFORMATION-BASED TEACHING DESIGN ASSESSMENT**

Schools should system a scientific and reasonable assessment system of informatization teaching design according to the actual situation of their schools, clarify the assessment criteria for teachers at different levels, and include the assessment of informatization teaching design in the assessment of teachers' performance. In addition, different assessment methods should be chosen for teachers of different levels according to their characteristics.

### **3.3. CHANGING TRADITIONAL TEACHING PHILOSOPHY**

For a long time, teachers in primary and secondary schools have been under pressure from various aspects, such as completing teaching tasks, i.e. teaching objectives, and are accustomed to a teaching-oriented teaching style. Therefore, in order to change this way of teaching, teachers must first understand that the traditional teaching-oriented teaching mode is no longer able to meet the requirements of the development of the educational situation. Modern educational thinking requires teachers to reflect the main position of students in teaching activities in the teaching design. Therefore, teachers should pay attention to informatization teaching design from the concept, use modern education ideas and concepts to guide informatization teaching design, and continuously improve their own professional development level.

## **4. CONCLUSION**

In recent years, against the background of the rapid spread of information technology and the rapid development of the information society, information technology has begun to enter classroom teaching rapidly and comprehensively. "The integration of information technology and teaching has received unprecedented attention from the government, schools and teachers. The teaching reform effectively improves learning efficiency, reduces students' learning burden, and effectively strengthens the effective communication between students and teachers, which is very effective in cultivating students' interest in learning mathematics and logical thinking ability and improving students' learning efficiency. It enables education informatization to serve teaching well, and can integrate high-quality teaching and education resources from the society, provide a better learning platform for students and bring more effective teaching support to teachers.

## **FUNDING**

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# RESEARCH ON INNOVATIVE PRACTICAL TEACHING MODE OF COLLEGE CIVIC SCIENCE COURSE IN THE INTERNET ERA

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## ABSTRACT

This essay examines the problems with the way civics is currently taught in colleges, examines how students can take civics courses in an online classroom setting, looks at how online teaching is evolving, and offers recommendations for the creative design of civics curricula in colleges and universities. In 39.59% of colleges and universities, the development style for online civics courses is based on a social public platform, in 37.32% on a hybrid teaching platform, and in 19.35% of colleges and universities, on a self-developed online platform. It is clear that in the age of the Internet, colleges and universities rely on the Internet platform for online instruction in order to implement the innovation of civics and political science courses and alter the conventional teaching approach.

## KEYWORDS

College Civics; Teaching mode; Online teaching; Curriculum innovation; Internet platform

## 1. INTRODUCTION

The fast advancement of information network technology and the onset of the Internet era, as well as the Internet's tight relationship to several facets of human social existence [1-2]. Among these, Internet education creates a new paradigm in the field of education by fusing Internet technology with pertinent instructional materials, changing and modernizing educational practices, and enhancing educational outcomes [3-4]. The online classroom education mode of the ideology course has emerged, bringing new changes to the teaching and development of the ideology course in colleges and universities [5-6]. The focus of innovation in the Civic Science course in modern colleges and universities has been the integration of the Internet with ideological and political education, and the combination with the course. While the Internet promotes the teaching innovation of Civic Science course, there is still much to be done, it is also essential [7].

As a useful supplement to classroom teaching, online teaching focuses on guiding students to learn basic knowledge, basic theories and other contents [8-9]. To ensure that conventional teaching techniques may be naturally merged with contemporary information technology and that its form can be continually developed, it is necessary in the present day to examine the content design and function of online teaching.

## **2. INNOVATIVE TEACHING MODE PRACTICE OF CIVIC SCIENCE COURSE IN HIGHER EDUCATION**

### **2.1. TEACHING MODE OF CIVICS**

#### **2.1.1. SINGULARITY OF TEACHING SYSTEM**

Higher education institutions advocate independent learning, and teachers' classroom lectures play the role of refining and summarizing the core content, in order to effectively supplement the Civics and Political Science curriculum. To create a rich and varied teaching system for the civics and political science course, active introduction of Internet teaching and practical teaching should be made in addition to traditional classroom teaching techniques. The content of the Civics course is certainly theoretical, but its main value is to serve the growth of students. Diversified teaching methods can improve students' understanding of Civics theory and regulate their behavior and establish correct values according to the relevant requirements.

#### **2.1.2. LACK OF SCIENCE IN TEACHING**

Today's university courses focus mostly on theory, which is dry and abstract. As a result, professors must provide a lot of examples to assist students better understand the theoretical material. The classroom teaching of civics is deficient in theoretical and practical aspects due to the credit hour system adopted by universities, and students are unable to develop a rich understanding of the connection between this theoretical knowledge and study, employment, and personal growth. As a result, it is challenging to achieve good teaching results.

#### **2.1.3. THE PRINCIPLE OF EQUAL EMPHASIS ON THEORY AND PRACTICE**

Higher education institutions lack the awareness and conditions for high-quality practical teaching in the teaching of Civics, and many Civics teachers think that practical teaching in Civics is to organize students to write papers, participate in classroom discussions or conduct extracurricular investigations. Many students lack interest in civics classes because they are unable to articulate how these topics apply to everyday life. Due to the lack of high-quality practical Civics learning programs and the fact that the majority of practical courses have evolved into extensions of theoretical assessment, the level of attention given to the practice of Civic Education in higher education institutions is far from sufficient and even cannot keep up with the rhythm of the times.

### **2.2. CIVICS COURSES IN UNIVERSITIES BASED ON THE INTERNET**

#### **2.2.1. CIVIC THEORY CLASS ONLINE CLASSROOM**

In the traditional classroom teaching, the form of carrying out the Civics course is relatively single, and the application of network classroom brings a new form of experience to the Civics course, this increases the room for teaching civics courses at colleges and universities and gives the subject more flexibility. At the present stage, the close combination of online classroom and college Civics course, students love the online classroom teaching form of Civics course as shown in Table 1. There are 54.35% students choose recorded teaching, 36.12% students choose live teaching, and 8.53% students choose to refer to textual materials on the Internet. Colleges and universities are gradually mixing the forms of online classroom for Civics courses, combining the uniqueness of Civics courses themselves, gradually increasing the investment in the form of live streaming, effectively connecting live teaching with recorded teaching, and at the same time using the literature on the network platform as an auxiliary teaching.



**Table 1.** Students' favourite forms of online classroom teaching in Civics

Type	Number of people	Proportion
Recorded instruction	117	54.35%
Live Streaming	289	36.12%
Web reference text material	82	8.53%

### 2.2.2. MULTIPLE DEVELOPMENT MODELS TO IMPLEMENT ONLINE TEACHING

Universities cannot teach civics online in a classroom setting without the assistance of appropriate technological platforms, but the online teaching platforms now in use in universities have a significant influence on how online classes are implemented. The fundamental principles and fundamental notions of ideological and political education in universities are offered in this article through a study of the existing situation of online teaching of civics and political science classes in universities. Schools with social public platforms account for 39.59%, schools with mixed platforms account for 37.32%, and schools with independent research and development account for 19.35% of schools offering civics and political science courses online. The implementation of civics courses in online classrooms at universities may use a range of various development models or a combination of many development techniques.

**Table 2.** Modes of online teaching development for school Civics courses

Model	Number of colleges	Proportion
Self-developed by the university	86	19.35%
Social public platform	205	39.59%
Hybrid development model	197	37.32%

## 3. INNOVATIVE CONSTRUCTION OF CIVIC SCIENCE COURSES IN UNIVERSITIES IN THE INTERNET ERA

### 3.1. OPTIMIZATION OF TEACHING COURSE OBJECTIVES

It is feasible for educators to perform more effectively if they grasp the oriented ideological and political instruction that is implied in the creation of curricular objectives. We should understand the course goals and adhere to the laws of political and ideological work, teaching and education, student growth and success, etc. when carrying out ideological and political education in colleges and universities. Finally, in order to achieve the synergistic optimum of ideological and political course objectives at colleges and universities, we need develop a teaching style and methods that are student-oriented and teacher-assisted.

### 3.2. ADHERE TO THE MAIN CHANNEL OF COURSE TEACHING

Classroom teaching as the main channel of course teaching, when innovating the teaching mode of college Civics course, no matter what kind of teaching mode construction innovation, the most fundamental thing is to adhere to this main channel. In classroom teaching, teachers explain the lecture content through their professional theoretical knowledge, while students can directly communicate with the lecturer face to face in the process, and students' difficult and doubtful problems can be effectively solved in the classroom. The classroom-based teaching method has some positive significance for students to acquire new knowledge to a certain extent. There are still some problems in classroom teaching that need to be changed. While students are the targets of education in the teaching process, some classroom instruction merely emphasizes the "teaching" of teachers and minimizes the "learning" of students. In the classroom teaching, students' subjective status should be effectively played by using more easy-to-understand language, common examples in life, and open teaching

forms to cultivate students' independent thinking and independent learning ability. Only when classroom teaching is truly quality and effective, and the combination of student subject and teacher dominance is truly achieved, can the construction of the curriculum be truly put into practice.

### **3.3. INTERACTIVE E-LEARNING MODEL**

The current era is one in which network information is developing quickly. In this context, curriculum teaching should also be timely innovation. If educators want to achieve the innovation of teaching mode for civics and political science classes, network teaching should be the first thing they take into consideration. In teaching activities, network teaching refers to the creation of an interactive network learning education platform for instructors and students. In this method, students study online while teachers provide answers to their queries and work out difficulties. the development of a varied, all-encompassing learning style through a number of effective learning methods with the Civics course's "classroom teaching and practical teaching" manner of instruction. Combine it with reality, followed by the scientific approach to continual development, to increase the impact of political and ideological education.

## **4. CONCLUSION**

The most fundamental educational goals of civics classes are to mold students' perspectives on life, assist in enhancing their political philosophy and literacy, and cultivate their moral character. These goals are also of utmost importance to students' future development because they have a hundred advantages and no disadvantages. But in the traditional teaching model, there is insufficient integration between teachers' teaching processes and students' learning processes, which is evident in the Civic Science course's single teaching methodology and the weak connections between Civic Science teaching and professional courses. The teaching impact of civics courses in higher education institutions is influenced by two factors: the teaching activities of the teachers and the learning process of the students. However, in the traditional teaching mode, these two links are not sufficiently integrated, which lowers the quality of civics instruction. A variety of educational activities should be carried out, as well as the active development of a network education platform, in order to fully realize the role of civics in civics education. Colleges and universities should also constantly work to prioritize teachers and students as the primary body.

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# EXPLORATION OF SCHOOL-BASED MODEL FOR CULTIVATING EXCELLENCE IN JOURNALISM AND COMMUNICATION TALENTS IN UNIVERSITIES IN THE BACKGROUND OF INTERNET

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## ABSTRACT

By analyzing the cultivation of journalism communication talents in colleges and universities, this paper explores the current situation of contemporary teaching excellence in journalism communication based on three aspects: curriculum system and curriculum setting, the proportion of theory and practice courses and classroom teaching and journalism practice, and proposes a strategy for cultivating journalism communication talents based on school-based model according to the knowledge quality of journalism communication talents. The mean value of risk awareness is 4.87, the mean value of professional ethics is 4.26, the mean value of ideal is 4.25, the mean value of social value is 4.86, and the mean value of humanistic care is 4.26. Universities should closely follow the goal of cultivating journalism communication talents with excellence and create a school-based model for cultivating journalism communication talents with excellence.

## KEYWORDS

Journalism and communication talents; Talent training; School-based model; Knowledge quality; Training objectives

## 1. INTRODUCTION

Under the background of information communication globalization and media integration, journalism and communication industry is in urgent need of excellent journalism and communication talents [1-2]. As a university, it should follow the development of information technology and new changes in the industry, keep in mind the goal of cultivating excellent journalism and communication talents on the Internet, seek breakthroughs in the construction of curriculum system, reform of training mode, construction of practical training platform, and construction of faculty, and build an excellent journalism and communication talents cultivation mode with school-based characteristics [3-5]. Excellence in journalism talent cultivation is still a new topic for journalism education, which needs to be explored and enriched continuously [6]. Explore the exploration and practice of school-based model for cultivating excellence in journalism talents in universities in the context of Internet [7-8]. Under the influence of the reform and development era and the great change of media industry, how to cultivate journalistic talents of excellence in colleges and universities, based on reality, break through limitations, create characteristics, and cultivate journalistic talents who can tell Chinese stories and spread Chinese voices is an urgent problem to be solved [9].

## **2. EXCELLENCE IN JOURNALISM AND COMMUNICATION PERSONNEL TRAINING MODEL AND EXPLORATION**

### **2.1. MODEL OF EXCELLENCE IN JOURNALISM AND COMMUNICATION IN HIGHER EDUCATION**

#### **2.1.1. BASIC MODEL**

Excellence in journalism and communication talent training mainly consists of two models.

(1) It is to cultivate applied and composite talents with all-media skills.

(2) Cultivating international communication talents with international vision and cross-cultural communication ability.

The two models correspond to different talent specifications and reflect different levels of education. The journalism departments of the first batch of universities selected for the Excellence Program have carried out reforms in the talent cultivation mode, exploring new modes of cultivating excellence in journalism talents through such initiatives as building journalism colleges together with ministries and schools, and building internship bases through cooperation between schools and media, and their schooling philosophy and practical experience have provided inspiration and reference for journalism education in other universities.

#### **2.1.2. SCHOOL-BASED MODEL**

Since the universities are located in different regions and at different levels, there are bound to be differences in the cooperation resources and school conditions. Therefore, colleges and universities should clarify the media resources they have and establish a journalism and communication talent cultivation mode that meets their own conditions and has characteristics when formulating the mode. In the era of diversified interests, diversified public opinions and stratified society, we should select journalists with high sense of social responsibility, mission and public sentiment in terms of talent specification.

### **2.2. EXPLORING CONTEMPORARY EXCELLENCE IN JOURNALISM AND COMMUNICATION TALENT CULTIVATION**

#### **2.2.1. COURSE SYSTEM AND CURRICULUM**

There is an imbalance in the ratio of journalism major courses to non-major courses. Many journalism majors in local colleges and universities are established on the basis of Chinese language majors, which inevitably leaves traces of Chinese language majors in the curriculum. As a professional class under the discipline of literature, journalism and communication is the main disciplinary foundation, therefore, the curriculum of journalism cannot lack the support of basic courses in language and literature. But because journalism has its own knowledge system and ability requirements, if the curriculum is not targeted, it will lead to students' distraction in the learning process, superficial cognition of the profession, professional skills are not solid, and they cannot adapt to the requirements of media positions after graduation.

#### **2.2.2. WEIGHTING OF THEORETICAL AND PRACTICAL COURSES**

The traditional curriculum of journalism emphasizes theoretical courses, and the number of practical and skill courses and class hours are relatively small, and the methods and means of practical teaching are also relatively single. Although some practical courses are designed with practical links, they are constrained by the number of teaching hours and conditions, and cannot provide systematic and effective practical training in classroom teaching, resulting in an imbalance between the proportion of theoretical courses and practical courses.

### 2.2.3. CLASSROOM TEACHING AND JOURNALISTIC PRACTICE

One of the distinctive features of journalism is its practical nature. Compared with the traditional training mode which is mainly based on theoretical teaching, the training mode of excellent journalism and communication talents pays more attention to the implementation and effectiveness of practical teaching. The gap between journalism education and the demand of journalism media talents is obvious, and there is a significant gap between journalism students' cognition, adaptability and practical ability of media and media requirements. The root cause of this is the separation of theory and practice in professional education.

## 3. RESEARCH ON THE EXPLORATION OF EXCELLENCE IN JOURNALISM AND COMMUNICATION TALENT CULTIVATION

### 3.1. RELIABILITY AND VALIDITY ANALYSIS

Before conducting data analysis, the evaluation of reliability and validity was carried out to ensure the validity and reliability of the results of this data collection. The reliability test coefficient proposed by Cronbach is a widely used reliability index, which can more correctly show the degree of internal consistency and the goodness of internal structure of the tested object. Generally speaking, Cronbach's test coefficient is greater than 0.7 that is a test with a better coefficient, and the results of data reliability calculation are shown in Table 1. The test coefficients are all higher than 0.9, indicating that the subjects have good internal consistency and the experiment meets its required reliability requirements.

**Table 1.** Cronbach's reliability analysis

Variables	Number of items	Cronbach
Quality and Awareness	9	0.929
Personality and Motivation	18	0.973
Knowledge Qualities	15	0.933
Skill Qualities	25	0.953

### 3.2. KNOWLEDGE QUALITY ANALYSIS

In order to explore the importance of professional literacy in the cultivation of current excellence in journalism and communication talents, a study was conducted on the professional literacy of contemporary journalism and communication talents, and the mean values of the quality factors of journalism knowledge were analyzed as shown in Table 2. The mean value of cultural cultivation is 3.60, the mean value of news sensitivity is 4.12, the mean value of social justice is 4.27 the mean value of professionalism is 3.79, the mean value of risk awareness is 4.87, the mean value of professional ethics is 4.26, the mean value of truthfulness is 3.35, the mean value of ideal is 4.25, the mean value of social value is 4.86, and the mean value of humanistic care is 4.26. It reflects that under the Internet environment, excellent journalism communication talents should have a broad professional knowledge and the demand for knowledge quality should be not only professional but also comprehensive.

**Table 2.** Knowledge quality factors for excellence in journalism and communication

Intellectual factors	Average value
Cultural Cultivation	3.60
Journalistic sensitivity	4.12
Sense of social justice	4.27
Professionalism	3.79
Risk Awareness	4.87
Professional ethics	4.26
Truthfulness	3.35
Ideals	4.25
Social Value	4.86
Humanistic Care	4.26

#### 4. CONCLUSION

Faced with the current transformation of the news communication landscape, journalism and communication faculties in colleges and universities have begun to make corresponding adjustments to journalism and communication education and carry out the cultivation of excellence in journalism and communication talents in colleges and universities. They strengthen the connection and cooperation with the media industry and pay attention to the cultivation of students' practical ability. In addition, in terms of experimental and practical teaching platforms, some universities have gradually begun to pay attention to and increase the financial investment in the teaching hardware and equipment system, and have achieved initial results, providing valuable reference for the cultivation of journalism communication talents of excellence in journalism schools of other universities. Strengthen the design of practical courses. The design of the practical courses is based on the actual practice of journalism, including both in-class practice and extra-curricular practice. The in-class practice is closely coordinated with the content of practical courses, including news writing, work evaluation, news planning, newspaper editing, news photography, TV program production, graphic image processing and other practical training, focusing on cultivating students' professional thinking and operational skills. The university keeps up with the development of information technology and the new changes in the industry, focuses on the goal of training journalism and communication talents, makes good use of its own and local media resources, and creates a new model of training excellence in journalism and communication talents with school-based characteristics.

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# A REVIEW OF RESEARCH ON THE APPLICATION OF NEURAL NETWORKS IN IMAGE SEMANTIC SEGMENTATION

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## ABSTRACT

This paper describes the latest research results and methods of image semantic segmentation, reviews three common neural networks for semantic segmentation, namely, convolutional neural networks, probabilistic graphical models, and recurrent neural networks are used to highlight how neural networks have contributed to the area of semantic segmentation and to provide a summary of the most popular public datasets at the moment. The SBD dataset is broken down into a training set of 8490 photos and a validation set of 2850 images. The SiftFlow dataset is a subset of the LabelMe dataset, which has 33 semantic categories with 2683 labeled images. The semantic segmentation of pictures based on neural networks is examined and thoroughly researched in response to the more challenging condition of future application needs.

## KEYWORDS

Image semantic segmentation; Recurrent neural network; Convolutional neural network; Dataset; Validation set

## 1. INTRODUCTION

The effectiveness of semantic segmentation has been greatly enhanced by the deep learning technology's quick growth and widespread implementation in this area [1-2]. The disciplines of computer vision, pattern recognition, mapping and remote sensing, geographic information science, etc. have all seen an increase in research outcomes in recent years. Semantic segmentation, the subject of study in the aforementioned domains, has received considerable interest from academics and has a wide range of potential applications [3-5]. Semantic segmentation is a common computer vision challenge that organizes pixels or points in accordance with the many semantics represented by the raw data through a sequence of technical procedures. Raw data inputs include planar pictures and 3D point clouds [6-8]. In this paper, from the perspective of the application of semantic segmentation and the development of deep learning, we analyze and summarize some image semantic segmentation methods with more outstanding performance in terms of algorithm characteristics and model structure, and classify, sort and evaluate them to compare their segmentation effects on commonly used data sets [9]. Facing the future situation of richer application requirements and more demanding performance requirements, the development of semantic segmentation technology will also face more challenges.

## **2. NEURAL NETWORKS COMMONLY USED FOR SEMANTIC SEGMENTATION**

### **2.1. CONVOLUTIONAL NEURAL NETWORK**

The fundamental tenet of the attention mechanism is to dismiss unimportant information and concentrate on important information while performing. The attention mechanism uses a neural network to compute the gradient and learns to gain attention weights through backward and forward feedback. The fixed convolutional kernel structure of FCN-based semantic segmentation framework can only accept short-range contextual information. To capture long-range dependent information, scholars have proposed methods such as dilation convolution and spatial pyramids, however, these methods cannot generate dense contextual information. Introducing the attention mechanism to the semantic segmentation task, PSANet networks are proposed to learn to aggregate the contextual information at each location by predicting the attention graph. However, these attention mechanism-based approaches need to generate huge attention graphs to compute the relationship between each pixel, which has high computational complexity and occupies a large amount of GPU memory. A number of suggested network architectures, such as the crossover attention module, the BiSeNet network, the ACNet network, the HMANet network, etc., have been made in an effort to increase the effectiveness of semantic segmentation. The CCNet module can be inserted into any fully convolutional neural network to achieve efficient end-to-end segmentation. The ACNet network balances RGB image features and depth image features in RGB-D images using a three-parallel branching architecture with an integrated attention mechanism and an attention-assisted module. HMANet is a hybrid multi-attention network for semantic segmentation of aerial images. By introducing the attention mechanism into the semantic segmentation task, the attention mechanism module learns the contextual information and optimizes the attention mechanism to obtain the crossover attention module or self-attention mechanism module, it can increase the perceptual field and, as a result, lessen the reliance on external information by more readily catching the internal importance of data or characteristics.

### **2.2. PROBABILISTIC GRAPHICAL MODEL-BASED APPROACH**

Using pixel points as nodes and probabilistic correlations between pixel points as edges, CNNs serve as the basis for probabilistic graph models that efficiently capture the dependencies between pixel points, obtain global image information and pixel-level semantic information, and provide rich image contextual content for the semantic segmentation process. PGMs are often used and include conditional random fields, Markov random fields, Bayesian networks, etc. CRF model is one of the most commonly incorporated probabilistic graph models into deep learning frameworks. Researchers have combined the use of CRF with CNN for structured prediction to predict information during the transfer inference of information, avoiding the computation of additional learning or information evaluation, thus improving the speed and reducing the amount of operations, which is more scalable in the case of semantic segmentation of images with large data volumes. Although the above methods obtain richer contextual information, they only input images into CRF monadic and pairwise terms for structured prediction, while neglecting to make full use of higher-order potential terms in CRF, resulting in coarse results in image semantic segmentation. Thus, some researchers proposed to embed 2 types of HOPs into CNN for end-to-end training, which improved the segmentation performance.

### **2.3. RECURRENT NEURAL NETWORK BASED APPROACH**

Another popular deep learning model today is the recurrent neural network, which can not only learn information for the present but also draw on information from earlier sequences. This capability makes it possible to model global content, retain historical information, and

encourage the use of image contextual information.

Borrowing from the idea of RNN, the researcher proposed ReSeg network based on image segmentation model using the dependency of local features extracted by CNN and global space retrieved by RNN. The researchers proposed the LSTM-CF network, which can input both photometric and depth images. The LSTM-CF model employs a fusion layer based on long and short temporal memory (LSTM) to combine the contextual data from the photometric and depth channels in the vertical direction to finish end-to-end training and testing of the network. However, image processing using only LSTM requires cutting images into fixed-size blocks, which is inflexible. To solve this problem, some researchers propose Graph-LSTM networks, which simulate long-term relationships and spatial connectedness by creating distance-based superpixel networks and using LSTM to spread neighborhood information. These methods employ each arbitrarily shaped superpixel as a node and adaptively generate undirected graphs for pictures.

RNNs can quickly extract pixel sequence information from pictures, can recursively process historical information and model historical memory, can preserve previous knowledge, and can capture contextual knowledge by simulating long-term semantic relationships of images. In addition, RNNs can be embedded into deep neural networks by combining them with convolutional layers, which can be used to extract local spatial features on the one hand and pixel sequence features on the other hand.

### 3. PERFORMANCE ANALYSIS AND COMPARISON OF SEMANTIC SEGMENTATION ALGORITHMS

#### 3.1. COMMON DATASETS FOR IMAGE SEMANTIC SEGMENTATION

In this paper, we have compiled the commonly used large public datasets, and the common public datasets for semantic segmentation are shown in Table 1. The SiftFlow dataset, a subset of the LabelMe dataset, contains 33 semantic categories with 2683 annotated images, most of which are taken from 8 different outdoor scenes, each with a pixel value of  $256 \times 256$ . The KITTI Autonomous Driving Scene is the most commonly used dataset, containing images collected from German countryside, cities, and highways, for challenges such as road detection, visual ranging, 3D object detection, and tracking. The SBD dataset extends the PASCAL VOC dataset and inherits 11340 semantically annotated images from PASCAL VOC. The dataset is separated into an 8490 picture training set and a 2850 image validation set, which have gradually replaced the PASCAL VOC dataset in practical applications. Originally created as an international competition for target detection tasks, PASCAL VOC has evolved from 2005 to 2012, producing a series of high-quality data, with PASCAL VOC 2012 currently being the most commonly used. There are 21 categories (with context) in the dataset, including people, animals, vehicles, indoor objects, etc.

**Table 1.** Common datasets for semantic segmentation

Data set	Time	Number of categories	Training set	Validation set	Test set
Stanford background	2009	8	745		
SiftFlow	2011	33	2683		45
KITTI-Ros	2015	11	163		115
KITTI-Zhang	2015	10	163		
SBD	2011	21	8490	2850	
PASCAL VOC 2012	2012	21	2850	1559	1459

## Performance Comparison of Semantic Segmentation Algorithms

Since only the points at the junctions predicted to be different classes on the segmentation graph have the possibility of being repaired, i.e., there are adjacent pixel points at the locations of these points in the current prediction graph that are different from the present pixel points, after taking 500 random images, Table 2 displays the results of the performance tests conducted on the official PASCAL VOC 2012 training set and validation set. Therefore, future semantic segmentation will explore how to further improve the segmentation speed while maintaining high accuracy.

**Table 2.** Performance comparison of PASCAL VOC 2012 and KITTI-Zhang measurement sets

PASCAL VOC 2012		KITTI-Zhang	
Method	Performance%	Method	Performance%
Large Kernel Matters	83.6	FCN-8s	82.5
Multipath RefineNet	84.2	PixelNet	87.8
PSPNet	85.7	Context-CRF	76.3
Deeplabv3	86.2	DeepLab-v2	87.2
SDN	87.8	Global-Context	84.1

## 4. CONCLUSION

As a mid-level task in image processing technology, image segmentation aims to extract the target of interest from a complex background, and it is widely used in many fields such as transportation, remote sensing, and medicine. However, it is still difficult to design suitable algorithms to achieve the best segmentation accuracy when segmenting different types of images. Traditional image segmentation techniques, such as pixel-level clustering-based segmentation approaches, etc., process and analyze pictures based on attributes including color, spatial organization, and texture information. The approaches of this era can only analyze some grayscale maps and segment by extracting low-level characteristics of pictures, which cannot achieve semantic segmentation due to limited computing power and no data training stage. Deep learning technology is extensively applied in image processing, computer vision, medical imaging, robot control, and other sectors because to the GPU's quick development, which effectively supports the advancement of semantic segmentation technology. Many image segmentation techniques based on particular theories have gained popularity in a variety of domains thanks to the ongoing research and refinement of ideas in related disciplines.

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# ANALYSIS OF THE SYNERGISTIC DEVELOPMENT OF INTERNATIONAL TRADE AND CROSS-BORDER LOGISTICS UNDER THE ENVIRONMENT OF E-COMMERCE

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## ABSTRACT

By examining the three components of logistics infrastructure, the degree of industry coordination, and the platform and system for cooperation, this paper examines the current model of global trade and cross-border logistics. It also examines the two sectors' complementary development strategies by examining the degree of synergy in the growth trajectory of global trade and cross-border logistics. With an average annual growth rate of 38.5%, cross-border e-commerce transactions have grown dramatically in size from 1.4 trillion in 2010 to 9.6 trillion in 2018. In 2010 and 2011, the transaction scale grew at a pace of roughly 30%, after which it began to slow down. Along with the ongoing status quo of expanding cross-border e-commerce gradually and smoothly, it is necessary to promote the expansion of cross-border logistics and international trade in a way that is mutually beneficial.

## KEYWORDS

International trade; Cross-border logistics; Synergistic development; Cross-border e-commerce; Transaction scale

## 1. INTRODUCTION

E-commerce has quickly evolved as a new trade model and increased its effect on several nations against the backdrop of global economic integration and more advanced Internet technology [1-3]. The fast rise of e-commerce has accelerated cross-border logistics, a vital link in the development of cross-border e-commerce, and the two are mutually beneficial and encourage one another [4]. In China, cross-border e-commerce is still in its infancy and is only beginning to flourish. How to promote healthy growth of both cross-border e-commerce and cross-border logistics and minimize mutual constraints between the two is a serious problem that needs to be addressed [5-7]. The government should take the lead in expanding the new logistics model, promoting the synergy of cross-border e-commerce and reverse logistics, concentrating on developing an integrated network platform, encouraging cooperation and synergy among various subjects, and increasing domestic demand in the market to realize the synergistic development of the virtuous cycle of cross-border e-commerce and cross-border logistics [8-10].

## **2. E-COMMERCE INTERNATIONAL TRADE AND CROSS-BORDER LOGISTICS EXISTING MODEL**

### **2.1. CROSS-BORDER LOGISTICS AND INTERNATIONAL TRADE**

#### **2.1.1. LOGISTICS INFRASTRUCTURE**

China's logistics sector didn't get off to a quick start, and despite its rapid growth, it still lags behind more industrialized nations in this area. E-commerce international trade has high requirements for any one of storage, transportation, distribution and information, but at present, a variety of transportation methods are not closely connected, the logistics system is unreasonable, and the infrastructure is still not very perfect. This restricts the development of international trade in e-commerce, so it is urgent to improve the logistics environment and improve the infrastructure.

#### **2.1.2. DEGREE OF COORDINATION OF RELATED INDUSTRIES**

At present, some trade enterprises have an old concept of international trade, and the concept of trade industry chain and enterprise development synergy is still not deep enough. Some businesses find it challenging to adjust to the rate of expansion of cross-border e-commerce, and they struggle to market and sell new items in the new industrial state brought about by the development of digital technology. Cross-border e-commerce and global commerce firms now have a low degree of coordination and integration, and cross-border e-commerce's potential to take the lead in promoting the coordinated growth of global trade enterprises is yet to be fully realized. Industry to industry synergy isn't very strong.

#### **2.1.3. COOPERATION PLATFORM AND SYSTEM**

The ongoing effects of the epidemic, as well as the persistence and repetition of trade frictions, have had a significant impact on the integration and growth of cross-border e-commerce and international trade in the post-epidemic era. Additionally, there is still room for improvement in the system and platform development for international e-commerce. It mostly consists of the following elements. On the one hand, there is a need to strengthen the international trade dispute resolution process as cross-border e-commerce develops. Cross-border e-commerce problems are now difficult to settle through trade dispute systems and communication across borders, which would, in part, hold down the rate of coordinated expansion of electronic commerce across borders and international trade.

## **2.2. INTERNATIONAL TRADE COORDINATION AND CROSS-BORDER LOGISTICS DEVELOPMENT STRATEGY**

### **2.2.1. CROSS-BORDER E-COMMERCE LOGISTICS MODEL**

With the continuous development of science and technology, various support policies proposed, and the gradual improvement of infrastructure, more new logistics models will emerge. The new logistics model has the characteristics of modern logistics, which can meet the needs of enterprises and consumers more conveniently and efficiently. However, this does not mean that traditional logistics models should be eliminated. Businesses that rely on established cross-border logistics models for survival should incorporate new components into their already developed logistics system, perfect it over time, offer high-quality services, increase customer satisfaction, In order to achieve the coordinated expansion of logistics companies across borders and international e-commerce firms, it is necessary to strengthen the synergy among cross-border logistic and cross-border e-commerce.

### **2.2.2. BUILD A CROSS-BORDER E-COMMERCE PLATFORM**

Cross-border e-commerce is one of the new avenues for the growth of international trade

and is one of the developing modes of foreign trade development on a worldwide scale. Enterprises carrying out international trade should actively build cross-border e-commerce system to achieve optimization and allocation of multilateral resources and establish interconnection and win-win cooperation mode with foreign enterprises. In terms of platform mall, enterprises should build a multi-platform model. preventing foreign cross-border e-commerce from functioning as a barrier to growth and, to some extent, effectively integrating cross-border e-commerce. To help create a new development pattern, encourage the expansion of international trade integration and cross-border e-commerce on all fronts.

### 2.2.3. IMPROVE THE EFFICIENCY OF CROSS-BORDER LOGISTICS TRANSPORTATION

To encourage the synergistic growth of cross-border e-commerce and global trade and to increase the degree of connection between the two, cross-border shipping and logistics efficiency should be improved, and the construction of warehouses abroad should be strengthened. A platform for international cross-border logistics commerce should be created, and the platform should take the lead in integrating the status of goods transit. Cross-border goods transportation data is promptly analyzed using GIS, GPS, and other global positioning systems (GPS), enabling the exchange of such data and offering logistics and transportation assurance for the growth of commerce.

## 3. SYNERGY AND DEVELOPMENT TREND DATA ANALYSIS

### 3.1. ECONOMIC SCALE

Revenue comparison between international social logistics and e-commerce. Figure 1 shows the upward trend in China's social logistics income and cross-border electronic commerce over time. Of these, the scale of cross-border e-commerce transactions develops significantly, from 1.4 trillion in 2010 to 9.6 trillion in 2018, with an average yearly increase of 38.5%. The growth rate of the transaction scale in 2010 and 2011 is also very fast, at approximately 30%, but after that the growth rate starts to slow down. Although the overall income generated by the logistics sector as a whole exceeds that of international e-commerce transactions, the sector's growth rate is just 9.67% on average annually, which is not a significant gain.

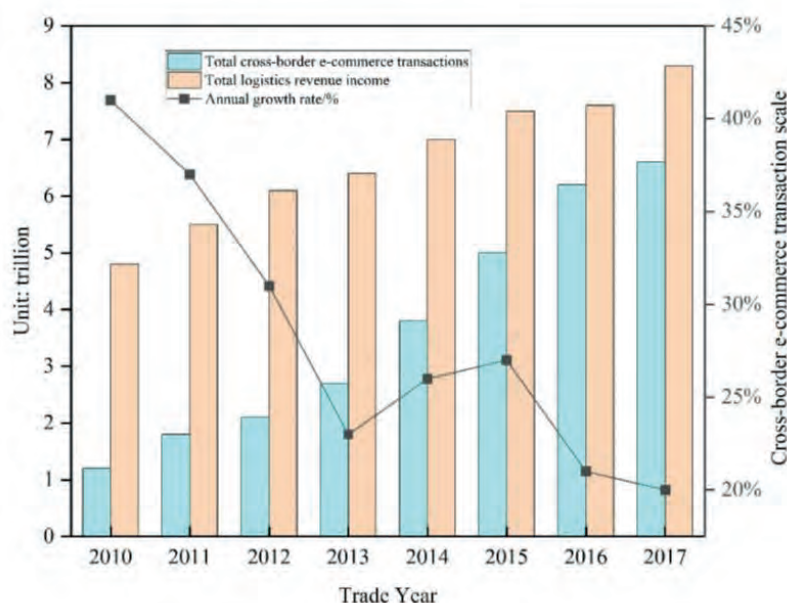


Figure 1. Cross-border e-commerce and social logistics revenue comparison



### 3.2. LOGISTICS DEVELOPMENT

Since 2010, affected by the deep-rooted international financial impact, external demand continues to be sluggish, the growth rate of foreign trade has dropped significantly, the cost of domestic factors has risen, and the corresponding international logistics has been greatly affected, part of the development of logistics as shown in Figure 2, the average annual growth rate for coastal major cargo throughput is just 2.51%, and the pace of growth decreased after 2013. In 2010, the coastal major port throughput was 5.4 billion tons, rising to 7.1 billion tons in 2013 and 7.6 billion tons in 2016. Cargo turnover on international routes showed a decline in 2010 and continued for two years, standing at 12.7 billion ton-kilometers in 2010, 11.7 billion ton-kilometers in 2012, and 10.7 billion ton-kilometers in 2013.

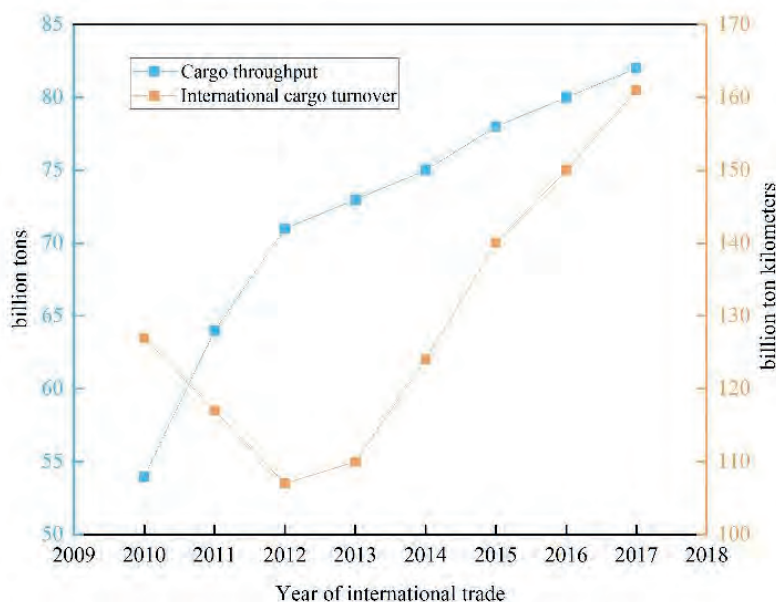


Figure 2. Partial logistics development status

### 4. CONCLUSION

Cross-border e-commerce is a tangible example of "Internet + Foreign Trade," the development trend in global trade, and a new engine of growth for e-commerce in the context of national strategic growing industries. Cross-border e-commerce development may help individuals fulfill their expanding material and cultural requirements, expand the market for small and medium-sized businesses, and advance the nation's economy. E-commerce that is conducted across borders creates new company development chances and is essential for the expansion of the national economy. Understanding the factors influencing the expansion of cross-border e-commerce is essential for businesses and governmental organizations to make choices. Raising the threshold for its development, international politics and the new crown pneumonia pandemic's heightened unpredictability make the expansion of international logistics riskier and subject it to developments that haven't been witnessed in a century.

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# A STUDY ON THE INTEGRATION STRATEGY OF IDEOLOGICAL AND POLITICAL EDUCATION AND THE CONCEPT OF RULE OF LAW FOR COLLEGE STUDENTS BY APPLYING MULTIPLE INFORMATION FUSION

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## ABSTRACT

In this essay, examined is the impartial underpinning of contemporary political and ideological teaching on the rule of law. Additionally, a framework for assessing political and ideological instruction at colleges and universities is created. Through legalizing the views of instructors and college students, the melding of ideological and political instruction with the concept of the rule of law is also investigated, and the comparison and evaluation of students' evaluations of the teaching effects of doing so is also discussed. The students' ideological and political awareness was 78.5% before the combination and 87.4% after the combination, the political concept was 76.2% before the combination and 81.8% after the combination, and the ideology and morality was 69.8% before the combination and 87.9% after the combination. It demonstrates how the application of the multiple information integration model to ideological and political education in colleges and universities completely integrates with the idea of the rule of law and has certain benefits for raising students' political awareness.

## KEYWORDS

Ideological and political education; Concept of rule of law; Evaluation of teaching effectiveness; Integration of multiple information; Political literacy

## 1. INTRODUCTION

The construction of a socialist system of law government and a communist rule of law framework with Chinese characteristics is the primary goal of the rule of law formation process [1]. Strengthening schooling on the socialist idea of the rule law is an essential requirement to advance the rule of law construction process in China, and one of the main functions of political and ideological education within higher education institutions is to cultivate excellent talents with a rule of law awareness [2-3]. Ideological and political instruction in higher education institutions presently faces the urgent and pressing challenge of assisting college students in developing a solid grasp of the rule of law [4-5] as it directly impacts whether a full socialist state of the law of law can be constructed. Due to the continual development and improvement of rule of law construction, college students' understanding of rule of law training has completely changed from "legal education" to "rule of law education" [6]. The goal of education, according to the contemporary legal system's perspective, is to promote a theoretically sound knowledge of law and to teach individuals how to know, understand, and uphold the law [7-8]. In higher learning institutions that are constructed from the standpoint of the rule of law, students may take lessons in the theory of politics and ideology that develop their grasp of the law and their perception of identity [9]. Their notion of the rule of law is strengthened and their legal literacy is improved, establishing a strong basis for them to enter society by

understanding the authority of the law and its significance in social life.

## **2. OBJECTIVE BASIS FOR THE INTEGRATION OF IDEOLOGICAL AND POLITICAL EDUCATION WITH THE CONCEPT OF RULE OF LAW**

### **2.1. EDUCATION ON THE CONCEPT OF RULE OF LAW UNDER THE DIMENSION OF IDEOLOGICAL AND POLITICAL EDUCATION**

#### **2.1.1. PERIODIC REQUIREMENTS**

To properly educate college students, schools and universities should integrate the needs of the period with the features of ideological and political education. Students at colleges participate in and carry out social construction. College students who have received instruction in the socialist notion of the rule of law have come to understand that this concept is essential to the growth of socialism because it ensures social change and advancement. The objective of political and ideological learning in colleges and universities ought to be to raise students' knowledge of the law, encourage them to apply it, and gradually instill the notion of the rule of law in their beliefs and actions. Strong rule of law students have a variety of positive personal traits, and if they enter the workforce within the future, they'll not only actively adhere to the rules while adapting to the situation, but they will additionally be able to influence the ones around them and further advance the cause of the supremacy of law.

#### **2.1.2. PRACTICAL REQUIREMENTS**

The ultimate purpose of political and ideological instruction is to raise "four new men" who have strong moral principles and adhere to social norms. It is practical in nature. The effect of rule of law education upon the ideological and political operations of colleges and universities can only be assessed when the learning experience of undergraduates is placed in the context of rule of law practice. It is necessary to integrate social reality into ideological and political education in colleges and universities if we are to improve the content of rule of law education, encourage college students to actively engage in rule of law practice, learn about the law, cultivate legal literacy, and enhance the ability of rule of law in practice.

#### **2.1.3. INTRINSIC PROPERTIES**

The rule of law serves as the theoretical foundation for political and intellectual education. The subjects of ideological and political instruction are actual living beings, because everyone has his own moral standards and behavior standards in his heart, if there is morality first and then there is law, everyone will first deal with the world according to his inner moral standards, then the construction of the legal order will also lose balance, which makes it simple to recognize that the legal system is the theoretical forerunner of political and ideological education.

Political and ideological education is an essential element of the rule of law. The rule of law encourages making compliance with the law into a religious and moral necessity in order to change college students' attitudes of law-abiding from passive to proactive and their comprehension of it from compulsory to conscious. College students should be taught political and ideological principles that will encourage them to intentionally follow rules and regulations. Rule of law education should begin and finish with the development of students' legal concepts.

## **2.2. EXPLORING WAYS OF INTEGRATION STRATEGY**

### **2.2.1. RULE OF LAW FOR TEACHERS**

The rule of law should be better understood by teachers. Teachers need to have a strong belief in the rule of law as well as the essential understanding of teaching and learning in order to be loyal defenders of the socialist legal system. With an innovative fighting force team,

political and ideological education activities cannot be implemented. Teachers should use the main teaching strategy in the classroom to its fullest potential. Classroom education is the most effective way to promote the ethos of the letter of law and legal concepts. In order to more effectively educate students about the rule of law for the parts where they have rule for law awareness and the parts where they have imprecise legal knowledge, college lecturers should positively and actively interact in students' lives. College students should be guided by legal principles and the formation of a rule of law spirit more in the instructional materials.

### **2.2.2. RULE OF LAW FOR UNIVERSITY STUDENTS**

(1) Increase student understanding of the concept of socialist rule of law. In order for the concept of the rule of law to be broadly accepted among college students, it is crucial to raise legal awareness among them and teach them about the importance of rule of law education.

(2) Students should be encouraged to develop a love for their own legal studies. College students who study law are expected to have a thorough awareness of the legality of their acts as well as the importance of the state preserving the rule of law. Through the promotion of the rule of law, the study of law also seeks to promote the ideas of justice and gain..

Let the rule of law constantly encompass college students in its humane care, by encouraging students to uphold the law and allowing them to experience the depth and breadth of the rule of law dimension in the political and ideological training provided by colleges and universities, is an effort to raise college students' understanding of the law and actively instill a sense of legal faith.

## **3. CONSTRUCTION OF IDEOLOGICAL AND POLITICAL EVALUATION MODEL OF UNIVERSITIES UNDER THE FUSION OF MULTIPLE INFORMATION**

### **3.1. DETERMINATION OF WEIGHTS OF EVALUATION INDICATORS**

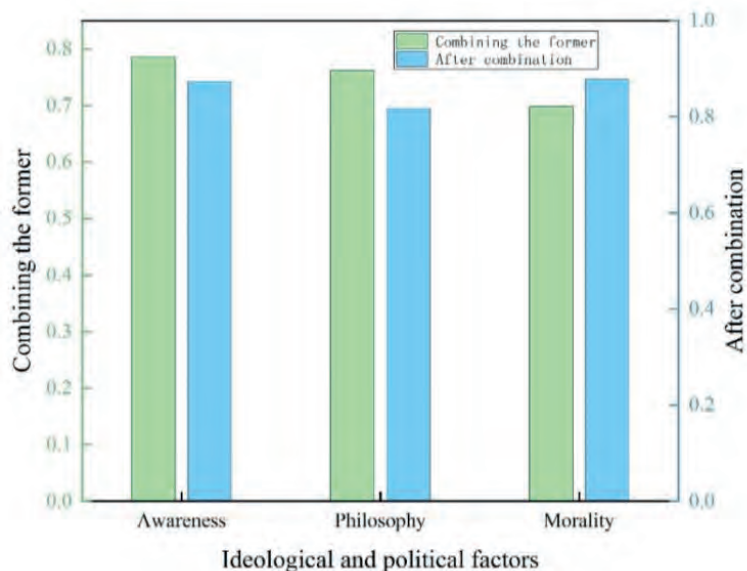
As a part of the integration of the idea of the rule of law and the intellectual and political training of college students, the assessment system of students' intellectual and politics quality is displayed in Table 1 below. Using the row average method, and after normalizing the calculation results, we get the secondary index set political quality weight of 0.356, ideological quality weight of 0.312, moral quality weight of 0.343. Tertiary indicators for importance comparison rating, to teachers tertiary indicators judgment matrix, using language evaluation set  $S_1 = \text{Difference}$ ,  $S_2 = \text{General}$ ,  $S_3 = \text{Excellent}$ ,  $S_4 = \text{Merit}$  to compare the degree of importance between the two indicators each person evaluated a judgment matrix. The consistency of the direct and indirect information of these four judgment matrices was calculated, and the evaluation opinions were assembled according to the strength of consistency of the elements, and then calculated using the row-weighted average method.

**Table 1.** Students' ideological and political quality evaluation system

Primary Indicators	Primary Indicators	Primary Indicators	Primary Indicators	Primary Indicators
Ideological and political quality	Political quality	Political Theory Contest	0.205	0.032
		Political Attitude	0.225	0.031
		Scientific worldview	0.255	0.037
		Enterprising spirit	0.265	0.039
	Quality of thought	Hard work and dedication	0.176	0.025
		Dormitory Construction	0.163	0.022
		Volunteer Activities	0.243	0.034
		Integrity	0.185	0.027
	Quality of Rule of Law	Discipline	0.283	0.036
		Law-abiding	0.183	0.025
		Legal concept	0.265	0.028
		The concept of rule of law	0.237	0.027

### 3.2. EFFECTIVENESS EVALUATION ANALYSIS

Figure 1 illustrates how students' influence on the instruction of political and ideological lessons combined with the rule of law idea depends on the topic of the study, which is students. Students' ideological and political consciousness before combining is 78.5%, after combining is 87.4%, political concept before combining is 76.2%, after combining is 81.8%, ideological and moral before combining is 69.8%, after combining is 87.9%. Since it is obvious that students' political and ideological training, together with their comprehension of the concept of the rule of law, is gradually expanding, it is vital to increase the influence of ideological and politics teaching at universities and colleges.



**Figure 1.** Effect of teaching ideological and political education

### 4. CONCLUSION

The political and ideologically-based courses given at higher education institutions are currently the main source of advise for college students. If the ideas taught in ethics and rule of law teaching are coupled with those taught in political and ideological instruction to form a holistic framework, rule of law school may play a stronger role. College students may expand

their understanding of the law, its authority, and its significance in social life by taking courses in political and ideological principle, which is very advantageous for bolstering their understanding of the rule of law, enhancing their legal literacy, and laying the groundwork over their future success. The majority of students at colleges and universities are college students, therefore improving their knowledge of the concept is crucial to improving the rule of law's overall structure in such institutions. Additionally, it may guarantee the early accomplishment of the goal of vigorously supporting the rule of law.

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# CONSTRUCTION OF UNIVERSITY LIBRARY INFORMATION SERVICE SYSTEM IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper describes the connotation of university library information service, carries out library informatization construction based on the three aspects of information construction hardware and software, personalized information service and information database feature construction, builds a big data library informatization service system, and analyzes the satisfaction of using intelligent library equipment. In terms of equipment related to electronic reading room, 73.87% of students are satisfied, 12.15% of students think it is average, and in terms of using self-service library equipment, the percentage of dissatisfied is 10.43%, the percentage of average is while the percentage of satisfied is 89.57%. Therefore, the scientific planning of the construction of the information library makes it serve the students and teachers better.

## KEYWORDS

University library; Information construction software and hardware; Personalized service; Information database; Intelligent equipment

## 1. INTRODUCTION

With the rapid development of knowledge economy and the rapid progress of science and technology, university libraries have become an important social information resource with their rich library materials [1-2]. Especially in the background of informationization, the traditional service mode of libraries gradually fails to meet the demand for cultural knowledge and information of teachers and students in colleges and universities [3-4]. Instead of a single demand for knowledge, more personalization, specialization and diversification are pursued. Therefore, it is urgent for libraries to change the old service mode [5-6]. In this background, university libraries are greatly challenged in service concept and service mode [7]. Therefore, in the informatization construction of university libraries, the advantages of digitalization, networking and the library's own characteristics should be given full play to the effective development and utilization of information resources [8-9]. Only by applying personalized service method through innovative service mode, university libraries set up personalized information service channels according to users' information demand behavior and meet users' potential information needs by analyzing and studying users' habits of information needs and personal own characteristics in order to push information service needs to users actively [10].

## 2. INFORMATION SERVICE CONSTRUCTION OF UNIVERSITY LIBRARIES

### 2.1. INFORMATION SERVICE OF UNIVERSITY LIBRARY

#### 2.1.1. PERSONALIZED SERVICES

Personalized service in the context of informationization is the development vision of



university libraries. Personalized service is a way to change the fixed service of “providing information mechanically and receiving information passively” in university libraries, but a way to recommend information to users actively. The library in the background of informationization, through the network, obtains the preferences, habits and interface requirements formed by the fixed users of the library in the process of using information, and provides users with personalized information needs of a kind of integrated information push service. User-oriented library personalized service is a targeted service. Different information resources are provided to different users, and different latest information is recommended to different information users.

### **2.1.2. INFORMATION SERVICE OF UNIVERSITY LIBRARY**

The information service of university library is to acquire a large number of ordered information resources as the starting point and explore the needs of users in order to be able to provide information and services that meet the needs of users. The library processes, researches, analyzes, and synthesizes the collected information to form orderly and directly usable data resources, and provides them to users using specific technical means to meet their needs.

## **2.2. INFORMATION CONSTRUCTION OF UNIVERSITY LIBRARIES**

### **2.2.1. INFORMATION CONSTRUCTION SOFTWARE AND HARDWARE**

In the university education system, the library plays an important role and is an important guarantee foundation for the school’s professional construction, teaching and research, and scientific research work. Therefore, it is necessary to increase the investment in hardware and software in the informatization construction in combination with library characteristics and informatization features, to maintain the sense of being ahead of the curve, to always keep in line with the frontier of social development and library informatization development, and to be able to complete the matching and updating of library informatization management system in the process of network information development. In addition, library informatization management and service system should have its own independent system and at the same time be able to achieve compatibility with social systems, which requires the advantages of local area networks and the Internet to unify software and hardware standards for information sharing and utilization.

### **2.2.2. PERSONALIZED INFORMATION SERVICE**

With the popularization of network, university libraries gradually expand their service scope under the promotion of informatization and network construction and go out of campus into society, which requires their service mode to adapt to the market-oriented development trend and be able to provide personalized information services, which is also an important trend of digital library development and a necessary path of informatization construction. We make full use of the advantages of network technology, increase the construction of information services in the informatization construction, provide personalized services, customized services and recommended services to readers by relying on the informatization system, and better provide diversified forms of information services for the majority of users.

### **2.2.3. INFORMATION DATABASE FEATURE CONSTRUCTION**

On the one hand, the informatization construction of university library should reflect the characteristics of electronic, digital, virtualization, network, platform and sharing, on the other hand, it should also closely combine with the characteristics of university library itself, highlight the characteristic advantages of the library itself and build a digital library with the characteristics of the university itself. Relying on the university’s own characteristics and advantages for accurate positioning, pay attention to the construction of characteristics, deal

with the relationship between the current demand and potential demand, and can highlight the special advantages of universities and students' research results, so as to achieve the target, and then meet the needs of the majority of teachers, students and social readers.

### 3. BIG DATA LIBRARY INFORMATION SERVICE SYSTEM CONSTRUCTION

#### 3.1. INFORMATION RETRIEVAL SERVICE

In the information service of university library, the construction of information retrieval service based on the background of big data is crucial, and the analysis of information retrieval usage frequency is shown in Table 1. Students know that it is often used by 27.59%, teachers know that it is often used by 35.6%, students who know but do not use it by 23.46%, teachers by 31.70%, students who do not know but would like to try it by 15.30%, teachers by 28.68%, and students who do not know by 13.26%, teachers by 9.52%. This percentage indicates that there is a high demand for information retrieval among teachers and students, and a small number of teachers and students do not know about this service, revealing that the library's efforts to publicize and offer special lectures are insufficient, and timely improvement of the service system is needed to improve the quality of services for retrieving information and the frequency of teachers' access to information through the use of retrieval.

**Table 1.** Frequency of information retrieval use by faculty and students

Identity	Situation	Proportion
Students	Knowing the frequent use of	27.59%
	Known but not used	23.46%
	Don't know but would like to try	15.30%
	No idea	13.26%
Teachers	Knowing the frequent use of	35.68%
	Known but not used	31.70%
	Don't know but would like to try	28.68%
	No idea	9.52%

#### 3.2. LIBRARY SMART DEVICES

Under the conditions of the construction of the library information management system, the hardware and software equipment of the library information construction is updated, and the satisfaction with the use of intelligent library equipment is shown in Table 2. In terms of equipment related to the electronic reading room, 73.87% of students are satisfied, 12.15% of students think it is average, and 8.98% are dissatisfied with it. Regarding the use of self-service library equipment, 10.43% of students are dissatisfied and 89.57% of students are satisfied. Overall, the informatization service construction of university libraries based on the background of big data can help improve the satisfaction of library services.

**Table 2.** Satisfaction with the use of smart devices in the library

Aspect	Aspect	Aspect
Related Equipment	Satisfied	73.87%
	General	12.15%
	Unsatisfactory	8.98%
Self-service equipment	Satisfied	76.57%
	General	13%
	Unsatisfactory	10.43%

#### 4. CONCLUSION

With the rapid development of social informatization, digitization and networking, the construction of university library informatization service has become an important part of social informatization. With its rich library materials, the university library has become an important social information resource. Therefore, in the construction of university library informatization, the advantages of digitization, networking and the library's own characteristics should be given full play, and effective information resources should be developed and utilized. In today's knowledge economy society, people's work and life are increasingly dependent on the network, and the demand for information and knowledge resources is increasing, and the demand of university users is even greater. The users of information utilization are different and their needs for information are also different. The university library is also the information resource center of school and society, and should provide different information sources for users.

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# RESEARCH ON THE CURRENT SITUATION AND MODEL INNOVATION OF COLLEGE PHYSICAL EDUCATION BASED ON BP NEURAL NETWORK

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## ABSTRACT

This study provides a method for evaluating physical education teachers and use hierarchical analysis to ascertain the relative weights of each component in the medium physical education teaching model. The focus of the study is college physical education. The teaching assessment model for college physical education courses is built using the nonlinear mapping capability of the BP neural network. The consistency indexes obtained from the program operation are management mechanism = 0.0708, teaching concept = 0.0325, curriculum system = 0.0914, teaching method = 0.0923, supporting facilities = 0.0537, and quality of teachers = 0.0842, all of which are less than 0.1. The concept was built on the foundation of college physical education, and it has the potential to encourage more innovation in this field.

## KEYWORDS

College physical education; BP neural network; Teaching evaluation model; Hierarchical analysis method; Consistency index

## 1. INTRODUCTION

Teaching physical education is a crucial component of higher education, and evaluating the quality of the instruction is the cornerstone of educational evaluation [1]. Correct physical education teaching quality evaluation is crucial in fostering the growth of physical education teaching in the direction of student-centered and teacher-led education and instruction [2-4]. College and university physical education programs must adapt to the modernization of sports concepts and the demands of social development, make constant advancements and innovations based on the original teaching model, raise the bar for students' fundamental sports knowledge and abilities, and encourage the development of positive sports concepts and habits [5-7]. The most popular neural network model is called the BP neural network, which is a multilayer feedforward neural network trained using the error backpropagation technique. The heart of educational assessment in faculties of physical education and a crucial component of educational administration is teaching quality evaluation [8-9].

## **2. COLLEGE PHYSICAL EDUCATION AND BP NEURAL NETWORK**

### **2.1. THE CURRENT SITUATION OF PHYSICAL EDUCATION IN COLLEGES AND UNIVERSITIES**

#### **2.1.1. THE OBJECT OF PHYSICAL EDUCATION IS BLURRED**

As humanistic education has evolved into a fundamental requirement and principle of higher education under the direction of scientific development concepts, college sports should pay more attention to its implementation and shoulder the responsibility of the times to cultivate the humanistic spirit of contemporary college students. The teaching mode of "I teach you to learn, I demonstrate you to imitate" in colleges and universities, which emphasizes repetitive exercises, not only destroys the life of sports as an organism, but also neglects the emotional experience and creativity cultivation of college students. This teaching mode is not only far from sports itself, but also far from the spirit of university education, which makes physical education class become an exercise class that most university students reject, and ignores the humanistic attributes that physical education should have.

#### **2.1.2. TEACHING EVALUATION PURSUIT**

The evaluation of physical education instruction at colleges and universities is a crucial component of the physical education teaching system in these institutions, and it plays a crucial role in creating a comprehensive and efficient teaching procedure. The participation of physical education teaching evaluation as an essential operation step to be evaluated is required for all questions regarding the validity of the development of the physical education teaching plan, objectives, and principles as well as the viability of the specific physical education teaching process implementation methods and the quality of the students' learning outcomes. Instead of continuing with the evaluation of each student using a particular type of index as the standard, the evaluation of physical education in colleges and universities should establish and improve the evaluation system for physical education as well as the comprehensive evaluation of the academic performance of physical education.

#### **2.1.3. TEACHING OBJECTIVE TENDENCIES**

Physical education in higher education has lost its specificity and independence, deviated from the essence of physical education, and become a tool for learning a certain skill. Physical education in higher education does not exclude the learning of sports skills, which is a basic element of physical education, but if this technical learning exists independently of the students' emotional experience of physical education, it defeats the original purpose of physical education. The goal of physical education in colleges and universities is to "establish human beings," and this is the fundamental tenet of physical education. However, the entire development of the university, which is at its center, has been overlooked due to the highly technical and rational view of physical education in contemporary colleges and universities.

## **2.2. BP NEURAL NETWORK**

### **2.2.1. BP NEURAL NETWORK ALGORITHM**

Artificial neural networks come in a variety of varieties and take on many shapes. Artificial neural networks may be categorized into two types: forward neural networks and feedback neural networks, depending on how the neurons are linked. Artificial neural networks may be separated into tutored and tutorless neural networks based on how they are trained, and they can also be categorized into fitting neural networks, classification neural networks, and other types of artificial neural networks based on the purposes they are used for. Neurons are often arranged into layers, and neural networks have numerous layers. Its capacity to learn intricate mappings is significantly improved by the complicated layered structure. The

forward-proceeding, error-back propagation, self-learning, and high adaptive properties of the BP neural network method. In order to acquire the best network structure model, the training error may be minimized by continuously self-learning correcting the weights and thresholds corresponding to the neurons in each layer.

### 2.2.2. BP NEURAL NETWORK TRAINING

The BP neural network is a type of feed-forward neural network that may be repeatedly rectified by determining the appropriate input-output relationships by repeatedly training the network's weights and thresholds. The most popular type of three-layer neural network has just one implicit layer and has three layers total: input, output, and implicit. By conducting BP neural network training with known data samples from schools as the foundation for generating the final comprehensive index weights, it is possible to decrease the complexity of the comprehensive assessment process. To build the BP neural network by AHP assignment and calculate the physical education evaluation scores, the original data sub-indicators are utilized as input samples and the evaluation scores are used as output samples.

### 2.2.3. EVALUATION MODEL OF PHYSICAL EDUCATION TEACHING IN COLLEGES AND UNIVERSITIES

Evaluation of physical education that is effective Higher education's endeavor to oversee practical teaching's efficient operation also serves as a catalyst for teaching innovation and reflection. Based on student evaluations of the courses and routine inspections by the teaching administration, physical education courses are now being evaluated. The assessment standards are comparable to those for theoretical courses, which makes it difficult for them to successfully match the requirements of physical education courses and stifles new approaches to teaching physical education in colleges and universities. Establishing a model of a college physical education teaching assessment system based on BP neural network algorithm is therefore necessary.

## 3. APPLICATION OF BP NEURAL NETWORK COLLEGE PHYSICAL EDUCATION TEACHING MODEL INNOVATION

### 3.1. CALCULATING THE COMBINATION OF INDICATORS

For each index of the physical education teaching mode variables, a graded index judgment matrix is built in order to realize the innovation of the BP neural network-based college physical education teaching mode, and the weights of sub-index combinations are displayed in Table 1. The consistency indexes obtained from the program operation are management mechanism = 0.0708, teaching concept = 0.0325, curriculum system = 0.0914, teaching method = 0.0923, supporting facilities = 0.0537, and teacher's quality = 0.0842 all of which are less than 0.1 and meet the consistency test requirements.

**Table 1.** Combination weights of sub-indicators

Sub-indicators	Portfolio weights
Management Mechanism	0.0708
Teaching Philosophy	0.0325
Course System	0.0914
Teaching Method	0.0923
Supporting facilities	0.0537
Quality of Teachers	0.0842

### 3.2. SIMULATION PREDICTION

The Neural Net Fitting toolbox in MATLAB software was used to implement 4-layer neural network training and prediction. Thirty groups of data were imported into the toolbox, and the

number of nodes was modified to 2. The neural network reached its convergence after 15 iterations of training, and a linear correlation of 0.96269 was found between the training output and the predicted output. Following the training, the remaining 6 groups of data were simulated using the sim function, and the results of the BP prediction, anticipated output, and relative errors are displayed in Table 2. It shows that the model has a high rate of accuracy and that the assessment procedure is straightforward and quick, allowing it to be used to the subsequent evaluation of college physical education courses.

**Table 2.** BP predicted values and expected output results and relative errors

Serial number	Serial number	Serial number	Serial number
1	5.6269	5.4741	0.073%
2	5.3157	5.2848	-0.362%
3	6.1928	6.3198	0.215%
4	6.4094	6.2867	0.318%
5	5.2661	5.4287	-0.738%
6	5.8795	5.6493	-0.083%

#### 4. CONCLUSION

New demands for the development of skills in colleges and universities as well as new difficulties in the teaching of physical education have been posed by the current economic and social growth. The new system for evaluating physical education should be based on the idea of students' growth, reduce the amount of summative evaluation at the end of the semester, increase the amount of evaluation of students' performance during instruction, and use various evaluation techniques. To encourage teachers' ongoing development of their teaching strategies and techniques and to increase the efficacy of physical education instruction, the evaluation of teachers' instructional effectiveness within the evaluation system has to be steadily enhanced. In order for students to learn about their strengths and shortcomings in the evaluation process and exercise in a focused way, it is important to establish an evaluation system that they are willing to accept and actively engage in.

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## ABSTRACT

This paper investigates the two current problems of personal subjective consciousness and professional role dysfunction of teachers' values in colleges and universities, discusses the role and connotation of teachers' values, studies the values of college teachers, and analyzes the factors of teachers' career choice in the digital context. The factors of teachers' choice of the profession are 77.4% knowledge, 45.4% money, 19.7% status, 77.9% health, 39.4% fame and 77.5% career. The value orientation of college teachers is directly related to the value theory construction of the school, so the construction of contemporary college teachers' values has an important role in the enrichment of the content and extension of the meaning of the socialist core value system.

## KEYWORDS

Teachers' values; digital context; career choice factors; value orientation; value theory construction

## 1. INTRODUCTION

The values of college teachers are not only related to their own development, but also to the direction of the school and the healthy growth of current college students [1-3]. The values of college teachers are a stable view or a thinking posture about the value of objects based on their needs and interests, which reflect the current feelings, wishes and needs of college teachers and stipulate the attitudes and behaviors taken by current college teachers [4-6]. In the context of digital era, college teachers' their values have been strongly impacted [7-8]. As far as the current actual situation is concerned, the current values of college teachers are still in the stage of basic maturity, perfection and consolidation, and although their mainstream is positive and healthy, there are still many problems [9].

## 2. THE ROLE AND INVESTIGATION OF TEACHERS' VALUES IN HIGHER EDUCATION

### 2.1. THE ROLE OF VALUES

#### 2.1.1. ROOTS OF NATIONAL COHESION

Each nationality has a different national culture due to the influence of its regional environment, economic development and living customs, and thus each nationality has its own unique values that are compatible with its own culture. Values are the product of the long-term life and practice of the members of the nation for generations, and they are the reflection and deep accumulation of their practice in the spiritual field. Because values are not only national, but also contemporary. If we demand development and progress, we must have the

consciousness of actively striving for and innovating. If a nation takes the courage to explore, not to lag behind, and to keep up with the times as its esteemed values, and faces up to the current situation of the nation with a correct and sincere attitude, then even the greatest difficulties and disadvantages will surely turn into the driving force of progress and development, and become the advantage of society.

### **2.1.2. HUMAN ACTIVITY INDICATOR**

Value orientation is the orientation and direction of people's value choices according to certain values. The role of values in guiding people is comprehensive and profound; the direction and manner of individual activities permeate the values held by individuals. Different values play a decisive role in each person's choice of life path. Correct values will guide people in a good direction, while wrong values are not conducive to personal development and the realization of self-worth, and may even lead people astray. Therefore, it is extremely important to promote the development of positive and correct values for each individual to grow and develop.

### **2.1.3. CONNOTATION OF HIGHER EDUCATION TEACHERS' VALUES**

Education is divided into primary education, secondary education, higher education and vocational education. Among them, the quality of teachers is crucial for higher education, which directly delivers construction talents to the society. Teachers in contemporary universities should not only enrich their professional knowledge and understand the latest educational concepts and models, but also keep abreast of the times, actively exert their subjective initiative in teaching and educate students creatively, and continuously improve their scientific research level and enrich their scientific research achievements to promote the prosperity of talents and science and technology.

## **2.2. SURVEY ON TEACHERS' VALUES IN KORAN SCHOOLS**

### **2.2.1. PERSONAL SUBJECT AWARENESS**

Subject consciousness means self-awareness with the ability of autonomy and self-reliance, including the spirit and ability of self-reliance and self-emancipation of the subject. While opening up to the outside world and the market economy have awakened people's individual subject consciousness, they have inevitably awakened people's greed and materialistic desires. The values and beliefs of collectivism, which used to be respected by the society and people, have been impacted, and people have become confused, and their ideals have been placed in front of reality. This state of confusion and disorder makes college teachers, as senior intellectuals, feel anxious.

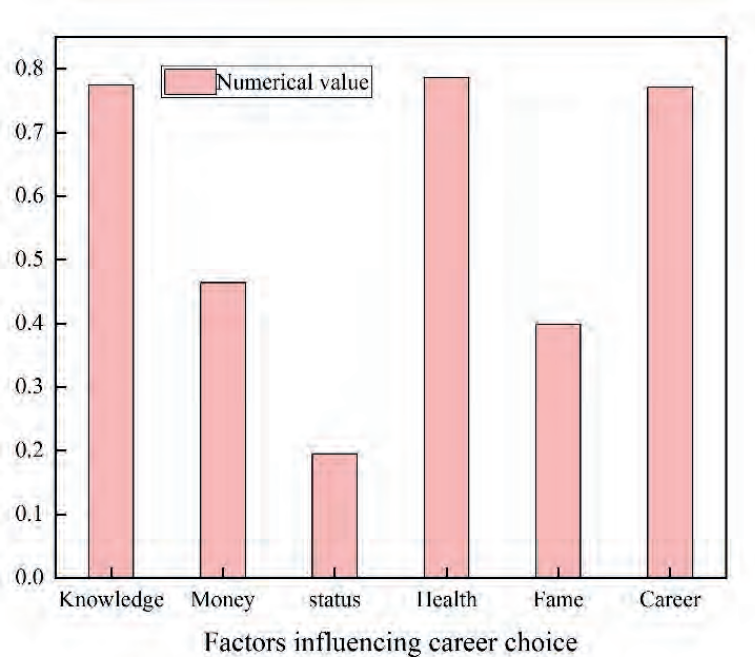
### **2.2.2. PROFESSIONAL ROLE MALFUNCTION**

The existing salary level cannot satisfy all teachers, which largely causes the loss of professional ideals and value guidelines of college teachers and the deviation of educational behaviors, which are the manifestations of the professional role of college teachers' misconduct. Many college teachers' professional role consciousness begins to fade, their spiritual pursuit and professional ideal are more lacking, and their social responsibility of being a teacher is missing, which seriously damages the professional image of college teachers and even affects the formation of students' correct outlook on life and values. In the process of education and teaching, there is a lack of professionalism and a serious attitude of treating academics cautiously and seriously, and there is no dedication in treating teaching.

## **3. RESEARCH ON THE VALUES OF UNIVERSITY TEACHERS IN THE CONTEXT OF THE DIGITAL AGE**

### 3.1. ANALYSIS OF CAREER CHOICES

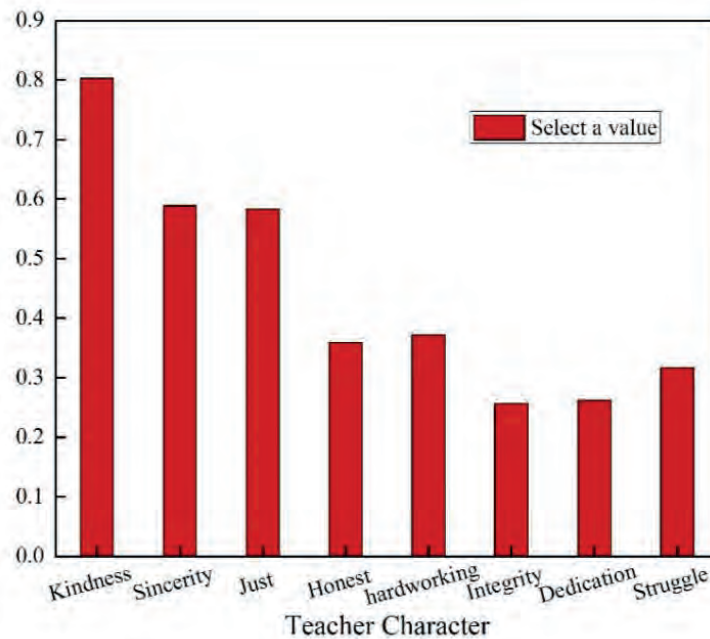
Life view, the most basic value, is the driving force that inspires people's struggle. The factors influencing the career choice of college teachers in the digital era are shown in Figure 1. Among them, knowledge accounts for 77.4%, money accounts for 45.4%, status accounts for 19.7%, health accounts for 77.9%, fame accounts for 39.4% and career accounts for 77.5%. From this, we can see that at this stage, college teachers are more concerned about their health and career, the value of knowledge and career success, and the role of "money" in social life. This shows that under the background of digital era, it has become a basic development trend for college teachers to pay attention to their health and pursue their career success, improve their living environment and upgrade themselves continuously.



**Figure 1.** Factors influencing the career choice of college teachers in the digital age

### 3.2. ANALYSIS OF TEACHERS' ETHICAL LEVEL

The virtues revered by college teachers at this stage are shown in Figure 2. Among them, kindness accounts for 80.3%, sincerity accounts for 58.9%, justice accounts for 58.3%, frankness accounts for 35.9%, diligence accounts for 37.2%, honesty accounts for 25.7%, devotion accounts for 26.2% and hard work accounts for 31.7%. In the background of digital era, with the deepening of reform and the reform of university system, contemporary university teachers pay more and more attention to their own interests, and more and more of them agree to "balance righteousness and profit". This indicates that seeking the value of unity between giving and taking has become the goal to which college teachers aspire at this stage.



**Figure 2.** Virtues espoused by college teachers at this stage

#### 4. CONCLUSION

Values are people’s fundamental views on value issues and play an important role as behavioral guidance, emotional stimulation and evaluation criteria in people’s value activities, thus the issue of values has been one of the main contents of philosophical research. In the context of the digital age, the state of values of university teachers has received extensive attention. Values, a major topic in academia. It depends not only on teachers’ pursuit of self, their efforts to improve their own cultivation and their teaching and research abilities, but also on the motivation of the whole society and schools to guarantee the smooth reconstruction of core values of university teachers. Therefore, it is of great importance to investigate and study teachers’ values and guide them to establish correct values.

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# MECHANISM AND EMPIRICAL ANALYSIS OF THE ROLE OF BIG DATA TECHNOLOGY-BASED BUSINESS PERFORMANCE IMPROVEMENT OF ENTERPRISES

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## ABSTRACT

This paper explores the concept of big data technology and business performance improvement as a basis for analyzing the mechanism of the role of enterprise commodity model, in which enterprise operation process and business model innovation are the main factors. The impact of big data technology on business performance improvement is analyzed, and the hypothesis of business performance improvement of enterprises is constructed. The Cronbach's  $\alpha$  value of big data technology is 0.887, and the Cronbach's  $\alpha$  values of its three dimensions, i.e., real-time insight and prediction capability, in-depth analysis capability and resource integration capability, are 0.813, 0.804 and 0.852, respectively, and the Cronbach's  $\alpha$  value of business model innovation Big data has become an opportunity for modern enterprises to improve productivity.

## KEYWORDS

Business performance improvement; Commodity model; Forecasting capability; Productivity; Modern enterprise

## 1. INTRODUCTION

As the country with the highest number of Internet users in the world, China faces an explosive growth of data every day, and there is rich information behind these massive user data, and more and more enterprises are beginning to realize the importance of fully mining the rich information behind these big data [1-3]. Therefore, developing their own big data analysis capabilities has become a key concern for enterprises [4]. How enterprises can achieve superior corporate performance or build competitive advantage in a complex and changing business environment has been one of the hot topics of research among academics and practitioners [5-7]. The widespread use of next-generation information technologies such as the Internet of Things and artificial intelligence has led to the explosive growth and massive concentration of data worldwide, and big data has gradually penetrated into enterprise business performance improvement [8-9]. How to empower enterprise performance improvement with big data and realize business value addition has become a real problem that most enterprises need to solve urgently [10].

## 2. THE VALUE OF BIG DATA AND ITS IMPACT EFFECTS

### 2.1. BIG DATA TECHNOLOGY AND BUSINESS PERFORMANCE IMPROVEMENT

#### 2.1.1. BIG DATA TECHNOLOGY

The main goal of big data technology is to help enterprises optimize operation management and respond to market changes through the analysis of data resources, so it is more relevant

to analyze from the perspective of dynamic capabilities. Big data resource acquisition capability is the ability of enterprises to acquire big data itself and resources such as data equipment and talents, and update them in a timely manner. Big data analysis and integration capability refers to the ability of enterprises to screen and process diversified data and realize data integration. Big data application capability mainly emphasizes the enterprise's ability to use big data to achieve internal decision optimization and market value mining.

### **2.1.2. CORPORATE COMMODITY PERFORMANCE**

Big data technology is the whole process of acquiring, analyzing and integrating big data resources and realizing their application based on a dynamic perspective. Although the construction of big data technology requires additional capital investment in digital infrastructure and human resources, it can also improve operational efficiency and decision-making science, and ultimately achieve comprehensive benefits. Big data technology enhances SME performance through cost reduction and profit point increase. Digital capabilities help SMEs to expand existing business areas, and the sale of data resources in advantageous areas also forms a new point of interest growth.

## **2.2. MECHANISM OF THE ROLE OF ENTERPRISE COMMODITY MODEL**

### **2.2.1. BUSINESS OPERATION PROCESS**

Big data technology improves SME performance through operational process improvement.

(1) Big data technology integrates diverse data to form a new value network containing various stakeholders. For example, consumers are no longer passive recipients, and multidimensional data such as transactions, emotions, and communications make them participants of the value network.

(2) Big data technology has changed the previous decision-making method dominated by managers' experience, making information a supporting element and improving the scientificity of decision-making.

(3) Big data technology helps SMEs break through the data barriers of different systems such as production and sales, realize data interoperability and sharing, and thus improve the level of refinement management. The new value network, scientific decision-making paradigm and the development of refined management all play a positive role in promoting the improvement of enterprise operational efficiency and performance.

### **2.2.2. BUSINESS MODEL INNOVATION**

Business model innovation gains focus advantage and enhances SME performance through value proposition. Tapping into potential customer needs and focusing on niche markets not only meets the current situation of companies with limited capacity to implement diversification strategies, but also provides conditions for SMEs to carry out product innovation. In addition, the focus on products can also provide the subsequent advertising investment. Customer loyalty maintenance, traffic monitoring, etc. lock the target and direction, and thus improve the enterprise performance. Business model innovation gains low-cost advantages and improves enterprise performance through value transfer and creation. In the absence of independent R&D capability, business model innovation creates new relationship network, which is conducive to collaborative cooperation among value chain participants and reduces R&D risks and transaction costs. Optimization of cost structure and change of revenue model in business model innovation is the key to gaining differentiation advantage and thus improving enterprise performance.

### 3. ANALYSIS OF ENTERPRISE BUSINESS PERFORMANCE IMPROVEMENT BASED ON BIG DATA TECHNOLOGY

#### 3.1. DATA RELIABILITY TEST

The reliability and validity of the data are important indicators of the value of the scale, and the quality of the data will be directly affected by the research design, which will ultimately affect the research results. To study the impact of big data technology on business performance improvement, Cronbach's  $\alpha$  coefficient values between 0-1 were used, and the results of the data reliability test are shown in Table 1. The Cronbach's  $\alpha$  value of big data technology is 0.887, and the Cronbach's  $\alpha$  values of its three dimensions, namely, real-time insight and prediction ability, in-depth analysis ability and resource integration ability, are 0.813, 0.804 and 0.852, respectively, and the Cronbach's  $\alpha$  value of business model innovation What can be seen is that the Cronbach's  $\alpha$  values of the above variables range from 0.860 to 0.960, which are all higher than the critical value of 0.70, and the CR values of each variable are are greater than 0.80, indicating that the data reliability is good.

**Table 1.** Data reliability test

Variables	Dimension	Cronbach's $\alpha$ value for each	CR value	Cronbach's $\alpha$ value for each variable	Experimental Cronbach's $\alpha$ value
Big Data Technology	Predictive capability	0.813	0.8324	0.887	0.950
	In-depth analysis	0.804	0.8461		
	Resource Integration	0.852	0.8137		
Strategic Orientation	Market Orientation	0.817	0.9047	0.973	
	Entrepreneurial orientation	0.912	0.8824		
Corporate Performance			0.8261	0.864	
Business Model Innovation			0.8695	0.869	

#### 3.2. BUSINESS PERFORMANCE IMPROVEMENT HYPOTHESIS ANALYSIS

The hypothesis testing of big data technology and enterprise performance was realized by SPSS25.0 linear regression, and the results of enterprise performance hypothesis testing are shown in Table 2. Model 1 examines the impact of each control variable on enterprise performance, and models 2~4 are based on model 1 by adding three dimensions of big data technology: real-time insight and prediction capability, in-depth analysis capability and resource integration capability, respectively, to test their impact on enterprise performance. The results show that the regression coefficient value of real-time insight and prediction ability is  $\mu=0.528$ ,  $p<0.001$ , indicating that real-time insight and prediction ability has a significant positive impact on enterprise performance, and the regression coefficient value of resource integration ability is  $\mu=0.426$ ,  $p<0.001$ , indicating that resource integration ability will have a significant positive impact on enterprise performance.



**Table 2.** Analysis of the impact of big data technology on business performance

Variables		Corporate Performance			
		Model 1	Model 2	Model 3	Model 4
Control variables	Business Age	0.139	0.041	0.083	0.119
	Enterprise nature	-0.095	-0.063	-0.058	-0.098
	Enterprise scale	0.025	0.037	-0.007	-0.053
Independent variables	Timely Forecast		0.417		
	In-depth analysis			0.453	
	Resource Integration				0.379
Model Fitting	R <sup>2</sup>	0.037	0.319	0.273	0.217
	Ad-R <sup>2</sup>	0.028	0.267	0.218	0.183
	F	2.847	25.86	26.17	16.38

#### 4. CONCLUSION

The rise of Big Data has driven both academic and business communities to focus on the impact of Big Data on management theory and business practice, with major research findings focusing on the role of Big Data as a driver of business model innovation. Big data has gradually blurred the boundaries of the enterprise and brought it closer to the consumers, thus making it possible to create disruptive, disruptive and customized business models. To a certain extent, this helps enterprises to establish competitive barriers and further expand their value-added space. In this paper, we explore the mechanism of the effect of enterprise big data technology on enterprise performance, and introduce the typical moderator “environmental uncertainty” into this mechanism. The moderating effect of environmental uncertainty is explored. This study fills a theoretical gap and provides a certain degree of insight and guidance for business practice.

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# IMPROVEMENT AND INNOVATION OF THEORETICAL SYSTEM OF ARCHIVES MANAGEMENT IN THE CONTEXT OF BIG DATA

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## ABSTRACT

In the era of big data, many archival theories have been unable to adapt to the changes and development of the whole information environment. This paper discusses the current changes in the theoretical system of big data archives management, analyzes the current situation of data-based archives user needs, and constructs a management system innovative metadata collation technology and non-metadata collation technology. The user demand for archives services information consulting service is 56.28%, online inquiry service is 92.59%, material storage service is 87.36%, and archival exhibition service is 42.55%. We should pay attention to the changes of archives management in the era of big data and actively improve the work level of archives management as well as the management capability practically with the help of big data technology.

## KEYWORDS

Information environment; Archival theory; Management system; Metadata organization; Service requirements

## 1. INTRODUCTION

Facing the advent of the big data era, all industries in society are facing the same opportunities and challenges [1-3]. The opportunity is that with the advanced technology and big data mindset of the big data era, the industry undergoes timely transformation and upgrading, which is an effective means for the industry to achieve sustainable development [4-5]. The rapid development of the information society has slowed down archival science, and the world development situation with cloud computing, big data, mobile Internet, and Internet of Things as the propositions of the times does not allow archival science to slow down and abandon its traditions [6-7]. Many archival data that can restore the original appearance of society have been neglected, and the material for constructing social memory has been missing [8]. Under this sense of crisis of the times, the exploration of archival organization theory has stimulated archival work to be managed and developed according to information technology, boldly abandoning the shackles and using information technology to achieve another upgrade of archival organization [9].

## 2. THEORETICAL SYSTEM OF ARCHIVES MANAGEMENT IN THE ERA OF BIG DATA

### 2.1. CHANGES IN THE THEORETICAL SYSTEM OF FILE MANAGEMENT

#### 2.1.1. BIG DATA THEORETICAL SYSTEM

With the dramatic increase in the volume of archival data, traditional work models and

management styles are stretched to the limit and encounter realistic data processing and analysis dilemmas. However, in the big data mindset, all data has the value to be utilized. In the current era, the data represents the archives, so the archives department should timely establish the big data theory system of archives management.

### 2.1.2. ARCHIVAL THEORY SYSTEM

On the one hand, all data generated in the society with preservation value and use are archives, and the object of archives management is open. In the age of the Internet, more timely information is generated in society, and timely information is fleeting, so the awareness and scope of archival management should be extended to these grassroots and grassroots information. On the other hand, data exists in all corners of the Internet, which is completely different from the traditional information actively linked and stored in the archives. It is usually the subject who is required to perform the search and the target data is presented.

## 2.2. STATUS OF DATA-BASED ARCHIVE USER NEEDS

### 2.2.1. FILE MANAGEMENT SERVICES

To improve and innovate the theoretical system of archives management and to understand users' demand for archives' services, users expect archives to provide service types as shown in Figure 1, among which 56.28% are information consulting services, 92.59% are online inquiry services, 87.36% are material storage services, and 42.55% are archival exhibition services, and users' preferred archival inquiry method is remote inquiry. Based on the current background of the big data era, it is only logical that users expect archival services to be online search services. Archives should respond to the needs of archives users, actively explore digital full-text scanning of archives, open archives on the Internet, provide online search and retrieval of archives, and continuously innovate service means so that archives users can search for the information they need without leaving home and improve the utilization rate of archival resources.

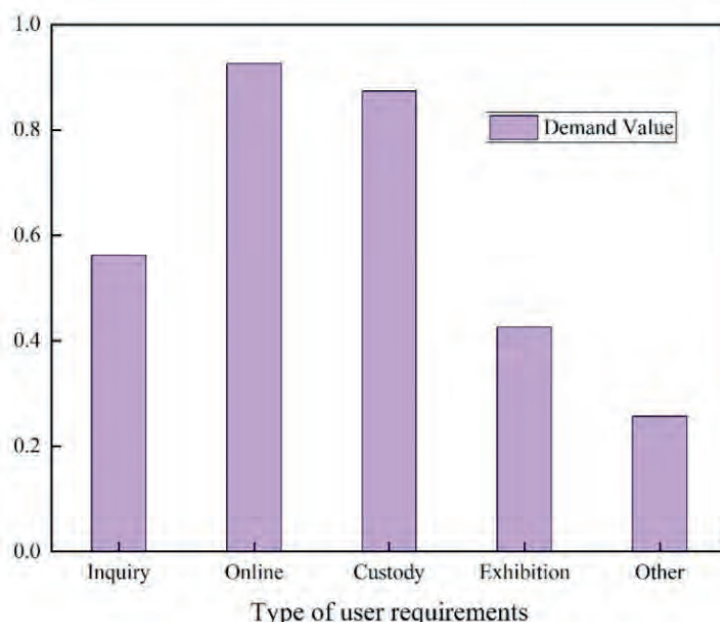
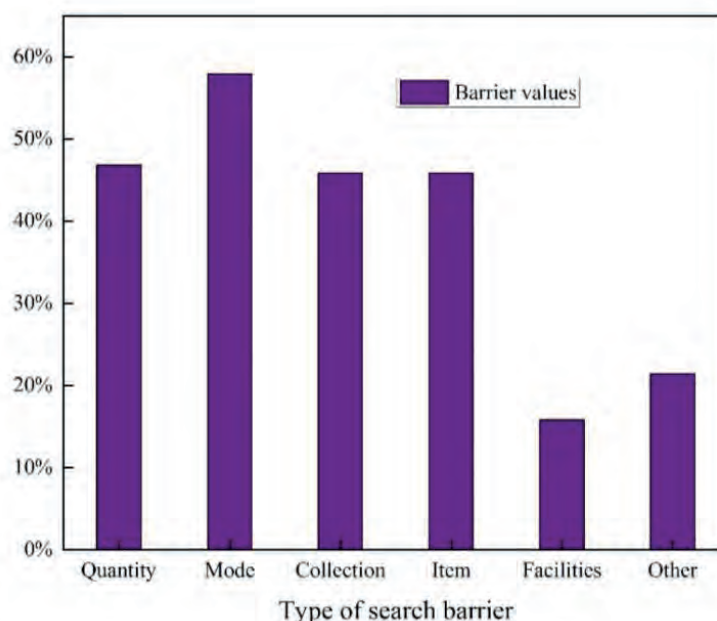


Figure 1. Services that users expect from the archive

### 2.2.2. BARRIERS TO FILE ACCESS

Not all archival users will get 100% of the archival resources and services they need, so analyzing the user access barrier situation provides ideas for archives to improve their work. The barriers to user access to archives are shown in Figure 2. It can be seen that the main

obstacles encountered by users in searching archives are 46.82% for less digitized archives, 57.95% for a single search method, 45.83% for not enough rich collections, etc. Archives should reflect on these aspects to provide better services to the public, improve the problems embedded in the archives management system, and promote system improvement and innovation.



**Figure 2.** Analysis of obstacles to user file search

### **3. INNOVATION OF THEORETICAL SYSTEM OF ARCHIVES MANAGEMENT IN THE CONTEXT OF BIG DATA**

#### **3.1. METADATA COLLATION TECHNIQUES**

Metadata is the data that defines and describes other data, where the first data represented is the information object to be described, and the second data is the relevant information stored for understanding this information object. Metadata organizing technology is to record and construct the metadata of archival documents when they are formed, and to use the metadata in organizing them to build up the connections between archival documents and realize the organizing of archival documents. Metadata provides the background information of social practice at the time of electronic document generation, and there is a correspondence between it and the process of social practice. By collecting and organizing metadata of electronic documents, it is actually organizing electronic documents, and the dual structure of archival material entities is embedded in the electronic document entities.

#### **3.2. NON-METADATA COLLATION TECHNIQUES**

Non-metadata collation techniques mainly include mixed collation techniques of different carriers, double-set collation techniques, collation techniques with pieces as collation units, and other non-metadata collation techniques shall be carried out for archival entity collation, and the entity referred to here means that archives are material entities rising into an archival existence, which not only contains the physical entities that can be traditionally rolled and shelved, but also contains entities in the form of binary codes such as electronic documents. This sheds new light on the reconceptualization of the material entity of electronic documents. It is a rational understanding and summary of the practice model of “business contractor-archive-archive”, and the exploration made in the face of electronic document arrangement, and the non-metadata arrangement technology may be more suitable for the current status of

archival arrangement.

#### 4. CONCLUSION

Archival science is a highly practical science. Classical archival science believes that documents without archiving are unconnected materials that cannot record and restore history, and cannot be called archives, so archival arrangement is destined to become a key concern of archival science. The core theories of archival science, from the principle of provenance and the theory of the whole archive to the theory of the document life cycle, are all closely related to archival arrangement, a link that lies at the heart of the archival management process. In the information environment, a new research philosophy has gradually emerged in the study of electronic documents, and two archival research forms, archival information resources research and knowledge management research, have taken on more characteristics of librarianship intelligence research. This has prompted us to reflect and discover that archives are a unity of logical and historical connections, and that the organization of archives is not only the organization of historical connections, but also the organization of logical connections.

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# RESEARCH ON HYBRID INFORMATION-BASED TEACHING OF COLLEGE CIVICS COURSES IN THE ERA OF BIG DATA

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## ABSTRACT

In this study, the hybrid information teaching conundrum is investigated, the teaching design concept for a civics course is covered, the constructed evaluation index system is subjected to a reliability analysis using SPSS software, and finally a more rigorous evaluation index system for civics course instruction in colleges and universities is developed. The evaluation index teaching technique is known to have a consistency ratio of 0.0998, which is less than 0.1, according to the yaahp software. The greatest eigenvalue, max, is 5.4047, and it is regarded to meet the consistency test requirement in accordance with the consistency test concept. By creating an assessment index system for civics and political science instruction in college courses, we want to enhance the hybrid information-based instruction of civics and political science in colleges.

## KEYWORDS

Information-based teaching; Teaching of Civics courses; Evaluation index system; SPSS software; University Civics

## 1. INTRODUCTION

The widespread use of new generation technology in education has had a significant impact on instructional reform and innovation as well as the educational environment [1-2]. Teachers of religious and political science courses in colleges and universities must keep up with the times, speed up the pace of teaching informatization, changes the conventional instructional concept, and encourage innovation in the delivery of ideological and political theory courses in order to successfully teach in such a diverse environment [3-5]. To achieve a deep and comprehensive educational impact on students [6]. An essential component of creating an ideological and political science course is assessing its effectiveness as a teacher. Additionally, an in-depth analysis of the course's teaching evaluation index and the development of its teaching evaluation index system are both important components of the ideological and political science course development [7-9]. It can assist to play a part in the establishment of moral education in addition to offering direction for the teaching of civics and political science classes in colleges and universities.

## 2. HYBRID INFORMATION-BASED TEACHING DESIGN AND DILEMMA

### 2.1. TEACHING DESIGN CONCEPT OF CIVICS COURSE

#### 2.1.1. HUMAN-CENTERED CONCEPT

We view the establishment of ethical education as an essential task, build an entire curriculum system and teaching style primarily for the acceptance of students, establish an

open learning environment using the modern age of information technology, create excellent teaching materials that meet the educational needs of college students, change students' attitudes toward learning, and enhance their capacity for independent learning.

### **2.1.2. CONSTRUCTIVIST CONCEPT**

Civic and political science courses are taught in a constructivist learning environment, which modifies the traditional teaching model by allowing professors to be more than just lecturers and information imparters, students are no longer passive recipients and objects of theoretical indoctrination, teachers and students are equal subjects and can communicate and discuss with each other.

### **2.1.3. CURRICULUM DEVELOPMENT CONCEPT**

Curriculum choreography is a product of the integration of multiple fields such as technology, education and art. Information-based teaching is a comprehensive process, and teachers of Civics and Political Science courses, as course writers and directors, should not only complete the work of excavating, choreographing, editing and developing high-quality teaching resources, but also follow consistent design principles, cross-fertilize related theories such as communication theory and film creation theory, and construct a new curriculum teaching system.

## **2.2. HYBRID INFORMATION-BASED TEACHING DILEMMA**

### **2.2.1. FACULTY TEACHING COMPETENCY**

The elements of competency that professional teachers should possess include a combination of personal characteristics, ideological and political awareness, knowledge and skills, values and attitudes, which are the elements and structure of competency as explained by competency theory and the "iceberg model". Some teachers lack philosophical and ideological concepts, have not received training in systematic political and ideological education theories, lack political aptitude and theoretical resolve with the capacity to distinguish the right from the wrong as fundamentally, and their ideological characteristics are weakened. Lacking the concept and awareness of carrying out implicit ideological and political education, they pay significantly less attention to students' learning dynamics and ideological cognition. In addition, teachers' informatization teaching literacy, information technology ability, and ability to adapt to the information society are uneven, and the design problems and tasks of online teaching of ideology and politics are unreasonable. Teachers use a single information technology resource platform, have poor classroom interactivity, and pay insufficient attention to higher-order thinking activities.

### **2.2.2. HYBRID TEACHING EVALUATION SYSTEM**

The assessment and guarantee systems are the main factors that influence how blended learning is used in civic education courses. At this time, however, the evaluation system for the integrated teaching of citizenship to professional programs in colleges and universities is not ideal; it lacks an evaluation standard, an evaluation content, and a strong institutional support system. The relevant assessment and evaluation system focuses on achievement assessment, less on the effectiveness of teaching in moral education of students, and the process evaluation and result evaluation are difficult to be put into practice. The teachers' mixed teaching effectiveness in Civics and Political Science courses gradually tends to be formalized and insufficiently focused due to the difficulty of quantification.

### **2.2.3. HOLISTIC INTEGRATION OF BLENDED LEARNING**

Some of the professional courses in higher education Civics body system and reasonable



realization of hybrid teaching integration is not deep. Although the blended teaching of civic and political science courses can successfully blend systematic learning and fragmented learning, there are still problems like excessive resource allocation on the teaching division, poor connection between online and offline civic and political science course elements, poor grasp of the integration of information platform technology and course teaching strength, and failure to mix, interoperate, and collaborate. It is difficult to establish a completely closed loop in education.

### 3. TEACHING EVALUATION INDEX WEIGHTING ASSIGNMENT

#### 3.1. TEACHING METHOD WEIGHTS

In order to explore the hybrid information-based teaching method of the college Civics course, SPSS software hierarchical analysis was used to determine the index weights and investigate the importance of each index, and finally the index weights were determined using yaahp10.1 software to evaluate the weight of teaching method factors as shown in Table 1, which was used to construct the Civics course teaching evaluation index system. According to yaahp software, it is known that the consistency ratio of evaluation index teaching methods is 0.0998, and the consistency ratio is less than 0.1, according to the consistency test principle, it is considered to meet the consistency test requirements, and the maximum eigenvalue  $\mu_{max}$  is 5.4047.

**Table 1.** Weighting analysis of factors for evaluating teaching methods

Teaching Method	Didactic	Inspirational	Seminar	Problem-based	Case Study	Wi
Didactic	1.0000	0.3000	0.3223	0.2500	0.2500	0.0555
Inspirational	4.0000	1.0000	2.0000	0.4000	1.0000	0.2500
Seminar	3.0000	0.2333	1.0000	0.5000	0.5000	0.1510
Problem-based	5.0000	2.0000	2.0000	1.0222	0.5000	0.2525
Case Study	4.0000	2.0000	1.0000	2.0000	1.0000	0.3025

#### 3.2. VALIDITY ANALYSIS OF THE EVALUATION INDEX SYSTEM

The evaluation index system was created using the information in Table 1, and an experiment using factor gravel plots created using SPSS software and spinning the makeup of the matrix as described in Table 2 was carried out to test the structural validity of the system. The total column of initial eigenvalues is greater than 1, which is a common criterion for useful factors, that is, components 1 to 5 are shown, indicating that these 5 factors can explain the overall variables. From the rotated sum of squares, we can find that the variance explained by the five principal components are 25.568%, 18.325%, 19.836%, 15.986%, and 18.250%, respectively, and the cumulative variance explained is 74.684%, which is more than 60%. It indicates that these five principal components can replace the overall data better.

**Table 2.** Rotated component matrix

Serial number	Initial Eigenvalue			Rotating Sum of Squares		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	7.526	45.542	41.672	3.185	27.558	26.795
2	2.033	12.636	52.128	2.328	15.035	42.723
3	2.091	13.276	62.407	2.258	18.586	58.179
4	1.942	10.269	75.151	2.641	12.886	72.065
5	1.109	6.313	81.544	2.203	16.590	85.574

#### 4. CONCLUSION

The teaching of civics courses faces previously unheard-of opportunities and difficulties as a result of education reform. We concentrate on developing a set of efficient quantitative methods that may assess the instruction of Civics courses in higher education institutions in order to comprehensively enhance the development of these courses. While teachers of civics courses actively practice, update the concept of information technology education, change the teaching method, and promote innovative aspects of civics course teaching, turn civics courses into influential courses, and achieve a profound and comprehensive effect on college students, educational institutions should build a platform, create conditions, and build a team for informatization teaching.

Civics course education is a thorough and organized effort. The hybrid teaching reform integrates elements of hybrid teaching and the development of the Civic Science instruction, which helps to improve the teaching system of the Civic Science curriculum and realize the goal of nurturing people by enhancing the Civic Science curriculum. It is an efficient way of implementing the Civic Science curriculum in colleges and universities.

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## **ABSTRACT**

In this paper, based on the current situation of big data mechanical design research, two configuration module partitioning methods, modular product configuration design rules and product family module fuzzy clustering, are divided, and non-uniform granularity module clustering is optimized, and intelligent tape conveyor product features and corresponding redirected roller module family feature data are collected as sample data. The values of the normalized matrix feature parameters are 0.0887, 0.0544, 0.2319, 0.1353, 0.0020, 0.4622, 0.6383, 0.1787, 0.2176, and 1.083. This research is of great importance for building a modular configuration design method system for complex mechanical products based on artificial intelligence, and its engineering application technology.

## **KEYWORDS**

Normalization matrix; Mechanical design study; Modular product configuration; Product family; Non-uniform granularity module

## **1. INTRODUCTION**

With the development of network technology and its application in various industries, the data traces left by people on the network have been increasing, and the amount of data on the network shows a trend of massive growth [1-2]. The widespread application and deep integration of information technology such as the Internet and information systems of manufacturing enterprises have accumulated and formed manufacturing big data with the characteristics of massive, high speed, diversity and value [3-4]. Effective analysis and research of manufacturing big data is of great significance to accelerate the promotion of intelligent manufacturing [5-6]. And big data analysis can provide rich information resources for each industry, which is beneficial to the development and decision making of each industry [7-8]. For mechanical product manufacturing enterprises, the application of big data technology also has a certain role in promoting mechanical product design [9]. However, from the current stage of application, the application of big data in mechanical product configuration design is still inadequate, for which the relevant personnel should pay attention to the characteristics of the current mechanical product configuration design information for effective mechanical product configuration design in the big data environment.

## **2. BIG DATA MECHANICAL PRODUCT CONFIGURATION DESIGN TECHNOLOGY**

### **2.1. CURRENT ISSUES IN MECHANICAL PRODUCT CONFIGURATION DESIGN RESEARCH**

#### **2.1.1. DATA MODEL REPRESENTATION INFORMATION**

The application of the existing data model for mechanical product configuration design lacks relevance in the extraction of unstructured data, and the expression of unstructured data is unclear and inaccurate, making it difficult to clearly show the relationship between the extracted data and mechanical product parts.

#### **2.1.2. UNSTRUCTURED DATA MODEL**

The attributes extracted for unstructured data are rather broad and not very specific. They extract attributes that are unique to unstructured data, but some of these attributes are not applicable to the mechanical product configuration design domain. For example, the file hotness attribute in the galaxy model behavior attribute class indicates information about the frequency of operations on the unstructured data files themselves, and this attribute information is of little use in the mechanical product configuration design process.

### **2.2. MECHANICAL PRODUCT CONFIGURATION DESIGN MODULE DIVISION METHOD**

#### **2.2.1. MODULAR PRODUCT CONFIGURATION DESIGN RULES**

The development of various industries in the context of the development of the new era emphasizes innovation, and manufacturing production is also facing the double test of personalization and scale production. From the macro analysis of product production, it is necessary to divide the products into different module forms with little coupling between modules, which can form personalized product patterns through sequential arrangement between modules. From the micro analysis, the structure within a module has a strong degree of aggregation, so it is possible to use the assembly line high volume production method, which can ensure the stability of production quality, but also effectively reduce production costs. For production companies, the main task is to build standardized and complete product configuration design rules through the integration of the original product configuration scheme, combined with customer demand mining configuration design rules.

#### **2.2.2. PRODUCT FAMILY MODULE FUZZY CLUSTERING**

The field of informatics considers granularity as a relatively small sub-domain or kind of study, formed after classification according to a certain theoretical domain from a certain system of functional relations, uncertain relations. Combined with the principle of granularity, the clustering operation can be understood as an equivalence between samples in a sample set, that is, the equal weight occupied between different subsamples in the sample set based on a certain threshold value. The clustering process is generally described by means of a clustering spectrum map, and the corresponding granularity aggregation scheme can be obtained by extracting different threshold constraint mappings, and different schemes can satisfy the analysis of different equivalence relations of granularity. The granularity of the clustering results is uniform with the same threshold values, and on the contrary the granularity obtained with different threshold constraints will have large differences.

### 3. NON-UNIFORM GRANULARITY MODULE CLUSTERING AND OPTIMIZATION

#### 3.1. MODULE CLUSTERING AND OPTIMIZATION PROCESS

The tape conveyor is the most used aggregate conveying equipment in concrete mixing plant. The tape conveyor basically consists of tape, drive unit, drive drum, redirecting drum, rollers, pull-in unit, discharge unit, brake unit and sweeper. For an enterprise production of intelligent fixed tape conveyor, through the analysis of product features, the collection of the establishment of pan-product family, further through the market demand analysis, the use of the platform to divide the grid as a tool to divide the resulting pan-product family to generate a number of subdivision product family, intelligent fixed tape conveyor product family characteristics of parameter values as shown in Table 1. Here, one of the subdivision product family  $SPF = \{P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9, P_{10}\}$  is composed of nine functional modules, including tape, drive unit, drive roller, reversing roller, rollers, tensioning device, unloading device, braking device and sweeper. Now we have to build a product platform for this subdivision product family, and complete the bottom-up product platform construction according to the process of mapping, clustering and matching analysis in turn. The various thresholds involved in the platform design process are determined for specific cases, and the values are given here directly:  $\mathfrak{R} = 10, \delta_1 = \delta_2 = 0.65, \delta = 8, \eta = 7$ .

**Table 1.** Intelligent tape transporter sub-product family characteristic parameter family

	$P_1$	$P_2$	$P_3$	$P_4$	$P_5$	$P_6$	$P_7$	$P_8$	$P_9$	$P_{10}$
$t_1$	550	500	550	700	650	650	700	850	800	800
$t_2$	0.9	1	1.5	1.8	0.9	1.2	1.52	1.1	1.2	1.4
$t_3$	32	40	50	65	53	67	84	110	120	174

#### 3.2. FEATURE PARAMETER VALUES

The neural network requires large sample data for training, and the intelligent tape conveyor product features and the corresponding redirected roller module family feature data are collected as the sample data. The implicit layer nodes are set to 10 and other parameters are defaulted, and the network is built and trained with the sample data as input. The data in Table 1 is input to the trained network structure, and the values of the feature parameters are calculated. The “product-function module parameters” matrix is shown in Table 2. The  $t_1$  values of the normalized matrix characteristic parameter  $P_1 \sim P_{10}$  are 0.0887, 0.0544, 0.2319, 0.1353, 0.0020, 0.4622, 0.6383, 0.1787, 0.2176, and 1.083. It shows that this bottom-up product platform construction method can fully form a product platform based on the existing enterprise design resources, which ensures a high It also helps to find a good balance between the generic requirements for mass production and the performance requirements for individual customization, which makes the established product platform have good representativeness and rationality.

**Table 2.** Values of feature parameters taken by mapping analysis

Products	Initial Matrix		Normalization matrix	
	$t_1$	$t_2$	$t_1$	$t_2$
$P_1$	347	7811	0.0887	0.2311
$P_2$	320	7818	0.0544	0.2931
$P_3$	370	9631	0.2319	0.1384
$P_4$	320	10390	0.1353	0.4872
$P_5$	350	11063	0.0020	0.2348
$P_6$	320	17045	0.4622	0.1345
$P_7$	470	21028	0.6383	0.3148
$P_8$	514	11103	0.1787	0.4812
$P_9$	318	2016	0.2176	0.0600
$P_{10}$	426	22025	1.083	1.0000

#### 4. CONCLUSION

Modularity-based product configuration design technology is the core and key to realize rapid product customization under mass customization production mode. This paper proposes a non-uniform granularity module clustering method, which solves the problems that the traditional uniform granularity-based module identification and formation method is difficult to achieve the best module division results and the lack of flexibility in module clustering, and establishes a multi-objective optimization model for module clustering. By normalizing the existing design resources and exploring the possibility of forming a product platform, the method achieves the full utilization of existing design resources, ensures a high reuse rate of resources, and makes the established product platform have good inheritance and innovation.

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# TRANSMISSION OF CHINESE CULTURE UNDER CROSS-CULTURAL COMMUNICATION-A CASE STUDY IN THE FIELD OF "WE MEDIA"

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## ABSTRACT

This paper examines the necessity of international communication of Chinese culture, explores the characteristics of openness and speed of cultural communication in self-media under cross-cultural communication, analyzes the effect of Chinese cultural communication in self-media, and explores the relationship between content tendency and communication effect. In all 2000 samples, there are 473 videos with 0 likes, 1527 videos with the remaining number of likes greater than 0, and there are 213 videos with 0 likes or stomps. There are 1,787 videos with the number of likes, 1,527 videos with the number of stomps, 1,787 videos with the number of stomps, 213 videos with the number of stomps greater than 0, and 1,452 videos with the number of likes or stomps of 0 in the ratio of the number of likes divided by the number of stomps. The results based on the empirical analysis can provide support for the optimization of Chinese culture international communication practice.

## KEYWORDS

Chinese cultural communication; Intercultural communication; Self-media; Content tendency; Communication effect

## 1. INTRODUCTION

With the increasing comprehensive strength of China, its status and influence in the international arena are rising, and exchanges with other countries are increasing [1-2]. How to present China's development achievements and ideology to the world in a comprehensive and vivid way and how to promote the international communication of Chinese culture is getting more and more attention from the state [3-4]. The continuous development of the self-media industry has brought new opportunities for the international communication of Chinese culture [5-6]. How to effectively disseminate Chinese culture under international cross-cultural communication and how to establish a national image that matches Chinese civilization [7]. To let more foreigners understand Chinese culture and know China correctly, to promote understanding and communication between countries, to give China more discourse power in the international arena, and to better convey the voice of China, has become a topic of the times and is receiving more and more attention from the state [8-9]. Short videos in the era of self-media, from the perspective of cross-cultural communication, unlike their intentional weakening of their own cultural identity as communication subjects, many short videos reflecting the culture of different countries focus on showing cultural differences instead.

## **2. INTERNATIONAL COMMUNICATION OF CHINESE CULTURE IN THE CONTEXT OF SELF-MEDIA**

### **2.1. THE NEED FOR INTERNATIONAL CULTURAL COMMUNICATION**

#### **2.1.1. SPREADING THE VOICE OF CHINA**

As a national “soft power”, culture has gradually become an important embodiment of the core competitiveness of countries around the world and a symbol of national comprehensive strength, and attaching importance to the foreign communication of culture helps China’s excellent culture to go out better, stand on the international stage and make its voice heard, and become a medium for peaceful communication and emotional communication between China and people of different regions and languages in other countries around the world. It has become a medium for peaceful exchange and emotional communication between China and people from different regions and languages in the world. By insisting on cultural outreach and giving full play to the pioneering and fundamental role of cultural communication in the great rejuvenation of the Chinese nation, we will gradually realize the country’s wealth and strength and the nation’s revitalization. Through the international communication of culture, we will tell Chinese stories, explain Chinese characteristics and show Chinese style to people all over the world.

#### **2.1.2. NATIONAL INFLUENCE**

Cultural communication plays an important role in promoting economic cooperation, enhancing the country’s international status and expanding China’s influence in the international arena. People all over the world are increasingly enthusiastic about learning Chinese and have a growing need to understand Chinese culture, making full use of China’s excellent and profound, extensive cultural resources to show the world the unique style and charm of Chinese culture. The international dissemination of culture can not only highlight China’s great power sentiment, but also demonstrate the country’s comprehensive national power, which has profound strategic significance for the realization of the great rejuvenation of the Chinese nation. Cultural communication creates a more harmonious and favorable soft environment for China’s economic and diplomatic development, provides more powerful “soft protection” and helps to improve China’s international status.

### **2.2. SELF-MEDIA CULTURE DISSEMINATION**

#### **2.2.1. STRONGER OPENNESS**

Compared with traditional media, self-media using network and digital technology has a strong openness, which enhances the two-way interaction between communicators and audiences. People gain the initiative in receiving information, can subscribe to the information content they are interested in on the platform, and can express their opinions and attitudes anytime and anywhere. The audience can also interact and communicate with each other, so that the influence of cultural communication has been greatly enhanced. At this stage, the audience of self media is young people, with more open minds, facing multi-culture, with strong interest, and at the same time with extremely strong acceptance ability. Positive and good presentation and guidance should be carried out to make the audience group form a good impression of Chinese culture and be willing to pass it on to people around them.

#### **2.2.2. DISSEMINATION SPEED**

The rise of self-media has not only provided audiences with convenient and fast access to information, but also broadened the avenues for cultural communication. In terms of speed of dissemination, self media has unparalleled advantages compared to traditional media. Self-media has made up for the shortcomings of traditional media, and the culture dissemination



vehicle has changed from national schools, international radio stations, and cultural magazines and journals to the Internet and cell phones for all people to participate and spread online. The large number of daily video views, along with audiences' rebroadcasting or enthusiastic comments, break the boundaries between countries and regions, and between people, and realize the organic combination of cultures, so that the plurality and openness of cultural communication are fully enhanced.

### 3. ANALYSIS OF COMMUNICATION EFFECT AND ITS INFLUENCING FACTORS

#### 3.1. CONTENT TENDENCY AND COMMUNICATION EFFECT

Using the number of times the video of a post in Twitter was clicked and watched as an indicator to examine the effect of dissemination, the video evaluation tendency on the number of views for these 2000 sampled videos was analyzed by multiple linear regression as shown in Table 1. The posts were set with options for viewers to like and step on them, and they reflected the tendency of the content of the post. Among all 2000 samples, there were 473 videos with 0 likes and 1527 videos with the remaining number of likes greater than 0. There were 1787 videos with 0 likes and 213 videos with the remaining number of stomps greater than 0. The ratio of the number of likes divided by the number of stomps had 1452 videos with 0 likes or stomps, and there were 548 videos with this value not being 0. The distribution of the number of likes, the number of stomps and the number of likes/stomps of the videos is as follows: the mean number of likes is 253, the median and the plural is 0, and the mean number of stomps is 893.5. The analysis by Pearson correlation showed that both the number of likes and the number of stomps were correlated with the communication effect at the significance level of 0.01. The analysis by meta-linear regression (using a stepwise strategy) was consistent with the Pearson correlation analysis with correlation coefficients of 0.85 and 0.895, respectively, which showed the association between the emotional color and the degree of tendency of the posts and the communication effect.

**Table 1.** Multiple linear regression of video rating propensity on the number of views

Models		Non-standardized coefficient		Standard coefficient	<i>t</i>	<i>Sig.</i>
		<i>B</i>	Standard Error	Trial version		
1	constant	1386.245	5876.9		0.046	0.854
	Number of steps	2673.479	64.125	0.858	30.584	0.000
2	constant	153.475	23652.5		0.005	0.927
	Number of steps	1446.996	241.2	0.517	14.512	0.000
	Number of likes	36.712	5.724	0.357	10.328	0.000

#### 3.2. COMMUNICATION LINKS AND COMMUNICATION EFFECTS

The variability of spreading recommenders in the process of post dissemination is shown in Table 2. Among the 2000 valid samples, the number of those with recommenders was 38. The independent sample *t* test shows that there is no significant difference between the number of video posts with and without recommenders, although the mean difference in the number of clicks and views is 1839 and 52104, respectively. *Sig.* is 0.629. That is, the factor of having or not having recommenders in the dissemination process has no significant effect on the dissemination effect of video posts.

**Table 2.** Effect of the presence or absence of referrer on the effect of communication

Independent sample test		Levene's test for variance equations		<i>t</i> -test for the mean equation						
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig.</i>	Difference of means	Standard error value	Lower limit	Upper limit
Click to watch number	Equal	0.571	0.342	0.383	2651	0.732	5335.00	1531.92	-3423.52	2314246
	Unequal			3.764	2477.727	0.000	5321.00	1473.87	-2674.87	87452

#### 4. CONCLUSION

At present, the development of new media forms such as self-media, integrated media, and social media is flourishing and rising strongly in the world. Twitter is a new global powerful media space with the characteristics of self-media, social media and integrated media, and is an important field for international media discourse. As a new vehicle for the international communication of Chinese culture, it should seize the opportunity of the times and make full use of its advantages in cultural communication to show the world a true, three-dimensional and comprehensive image of China. Let people from all over the world understand China and get to know China, enhance foreigners' recognition and goodwill towards China, clarify China's willingness to live in harmony with all clogiountries in the world and develop together, and create a good international atmosphere for China's development, which is of great strategic significance and promotion to improve China's status in the international arena and achieve the great rejuvenation of the Chinese nation.

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# RESEARCH ON THE INNOVATION OF FILM COMMUNICATION AND CONSUMPTION BASED ON INTELLIGENT TERMINAL DEVICES

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## ABSTRACT

This paper firstly analyzes the definition of intelligent terminal devices oriented to film communication, and selects intelligent terminal devices in a narrow sense based on the research content. Secondly, it gives the analysis of movie dissemination effect and marketing, including the connotation of word-of-mouth marketing, consumer culture and new consumerism. Finally, the data analysis is carried out with the example of movie dissemination data on the Tik Tok short video platform under the smart terminal device. The results show that through the Tik Tok platform, consumers can more clearly understand the theme, word-of-mouth, main actors, and highlights of the movie. In turn, it promotes consumers to go to cinemas or other viewing methods to realize the consumption of movies, further expanding the scope of movie dissemination.

## KEYWORDS

Intelligent terminal device; Communication effect; Marketing analysis; Consumer culture; Tik Tok; short video platform

## 1. INTRODUCTION

In the historical context of the gradual increase of national per capita income, continuous supply-side structural reform and the continuous development of new media technology, new industries and new models driven by digital technology are promoting the upgrading of consumption structure of Chinese residents, new concepts of consumption are breeding new culture of consumption, and new phenomena of consumption are creating new social changes [1-2]. At present, China has entered a new consumer society, and short videos on smart terminals are not only an important channel for people to obtain consumption information, but also a major source of content consumption. It plays an important role in advocating new consumption concepts, shaping new consumption values, spreading new consumption culture and guiding new consumption behaviors [3-4].

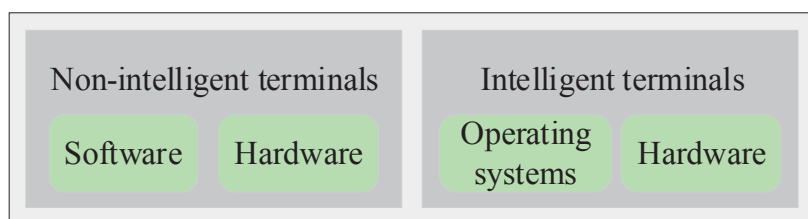
The push of mobile smart terminal devices, as a new media form formed by the combination of short video and self-media, short video self-media under smart terminals integrates the advantages of both [5-6]. It is able to disseminate rich information content related to movies in a more intuitive and three-dimensional way, which meets the current consumer demand for shorter, faster, and easier to understand information and conforms to people's fragmented

information consumption habits [7-8]. Along with many favorable factors such as favorable policy guidance, huge consumer market, and increasing economic level, Chinese domestic movies have been given great opportunities for development, and box office results have reached record highs.

The article takes the definition of intelligent terminal devices for film communication as the starting point, analyzes the difference between terminal devices in a broad sense and terminal devices in a narrow sense, and selects intelligent terminal devices in a narrow sense for analysis based on the research content. For the analysis of film communication effect and marketing, the theory of communication effect and word-of-mouth marketing are given, and the connotation of consumer culture and new consumerism is also proposed. The quantitative analysis of data based on the Tik Tok short video platform on smart terminal devices shows that the smart terminal devices can effectively enhance consumers' curiosity about movies and promote consumers to enter cinemas to pay for movies. The smart terminal devices can also further expand the scope of movie dissemination and give more consumers a way to learn about movies.

## 2. DEFINITION OF INTELLIGENT TERMINAL DEVICES FOR FILM DISSEMINATION

Smart terminals, in a broad sense, refer to all terminals with reconfigurable features, and in a narrow sense, they come with an operating system, provide APIs, and can install and run applications developed by third parties, which are discussed in this paper in a narrow sense. Therefore, developers other than terminal manufacturers can also develop third-party applications for smart devices with these operating systems, as shown in Figure 1.



**Figure 1.** The architecture of the terminal

From the operating system to study, the mainstream operating system of intelligent terminal includes Android operating system led by Google, IOS operating system of Apple, windows phone operating system of Microsoft, etc. In addition, there are Symbian, B1ackBerry OS, etc.

## 3. FILM COMMUNICATION EFFECT AND MARKETING ANALYSIS

### 3.1. COMMUNICATION EFFECT THEORY AND WORD-OF-MOUTH MARKETING

Communication effectiveness theory, in a broad sense, refers to the impact of all information produced by the mass media on the recipients, and in a narrow sense, to the psychological, attitudinal and behavioral changes induced in the recipients by communication behaviors with persuasive motives. The psychological, or cognitive, level is mainly the level of awareness and familiarity, the attitudinal level is mainly the level of values, and the behavioral level is mainly the level of action. These three levels usually show a progressive relationship, and the deeper the level reached, the better the communication effect.

Word-of-mouth marketing refers to the oral, written or electronic communication between people about the benefits or experiences of buying or using a product or service. Word-of-mouth exists as a spontaneous propaganda and promotion between people, spreading information about personal experience of using a product or brand, attitude perceptions, etc., prompting the recipient of the information to spontaneously experience, try or buy it. Based on the personal trust endorsement of the promoter, word-of-mouth marketing far exceeds other

marketing methods in terms of credibility.

### 3.2. INTELLIGENT TERMINAL DEVICES AND CONSUMER CULTURE

As a new consumption phenomenon emerging from the new change of media, the new consumption means the birth of a new consumption culture. The study of the construction of film communication and consumption reality by self-media under smart terminals includes the study of the construction of film consumption culture by media.

In the face of the rise of new consumption in film communication, the emergence of new consumption concepts and culture, and the booming development of short videos on smart devices as the main content form of film communication. What are the connotations and characteristics of the new consumption, how does the short video media on smart devices construct the new consumption, what are the characteristics in the construction process, and what are the specific construction methods, strategies, paths and construction models. In the context of the current government's strong advocacy and promotion of new consumption, what are the inspirations for the construction of new consumption in film communication under short-form video media?

### 3.3. CONNOTATIONS OF NEW CONSUMERISM

The new consumerism is an ideological expression of the new consumption, unlike the new consumption which is a process of consumption behavior. It can be understood as a new way of life, values and culture of consumption bred out of the new consumption behavior, consumption pattern and this new social phenomenon. At present, scholars mainly divide into three research paradigms when studying the new consumerism: the inheritance-critical paradigm, the inheritance-construction paradigm, and the fragmentation-rebellion paradigm.

## 4. INNOVATION OF TIK TOK IN SMART TERMINAL DEVICES ON THE WAY OF FILM DISSEMINATION AND CONSUMPTION

Based on the previous analysis, this chapter focuses on the marketing communication of domestic movies in Tik Tok, therefore, people who have not used or downloaded Tik Tok are not included in this survey. Among the 550 questionnaires distributed and filled out through the Internet from January 2021 to December 2021, there were 50 invalid questionnaires and 500 valid questionnaires, with an effective rate of 90%.

### 4.1. DATA ANALYSIS ON THE COGNITIVE LEVEL

At the cognitive level, we mainly investigated the audience's awareness of movie content on Tik Tok and their perception of frequency. In this section, we analyzed the data with the question "Have you ever swiped a movie-related video on Tik Tok", and the results are shown in Figure 2.

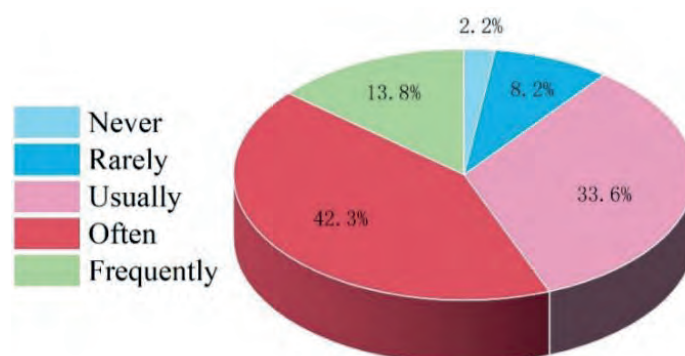


Figure 2. Cognitive level data analysis

From the analysis of the cognitive data, 42.3% of the respondents chose “often”, 33.6% chose “generally”, 12.8% chose “frequently” and 8.2% chose “rarely”. The percentage of “rarely” is 8.2%. It can be seen that there are more movie contents on Tik Tok, and the audience has higher awareness and familiarity with it.

#### 4.2. DATA ANALYSIS ON ATTITUDE LEVEL

The attitudinal questionnaire mainly investigated the audiences’ enjoyment, trust and attractiveness of movie content. In this section, we analyzed data from the question “What kind of movie content do you think is attractive to you”, and the results are shown in Figure 3.

From the analysis of the attitudinal data, “movie highlights” has the highest proportion, followed by “movie shooting footage”, “movie theme song”, “movie word of mouth”, “movie star” and “director promotion”, “movie word-of-mouth”, “movie starring” and “director’s publicity”. The movie clips are far ahead, which shows that audiences have the highest recognition of this content. When marketing and disseminating Chinese movies in Tik Tok, they can focus on this content as the main promotional content and make full exposure.

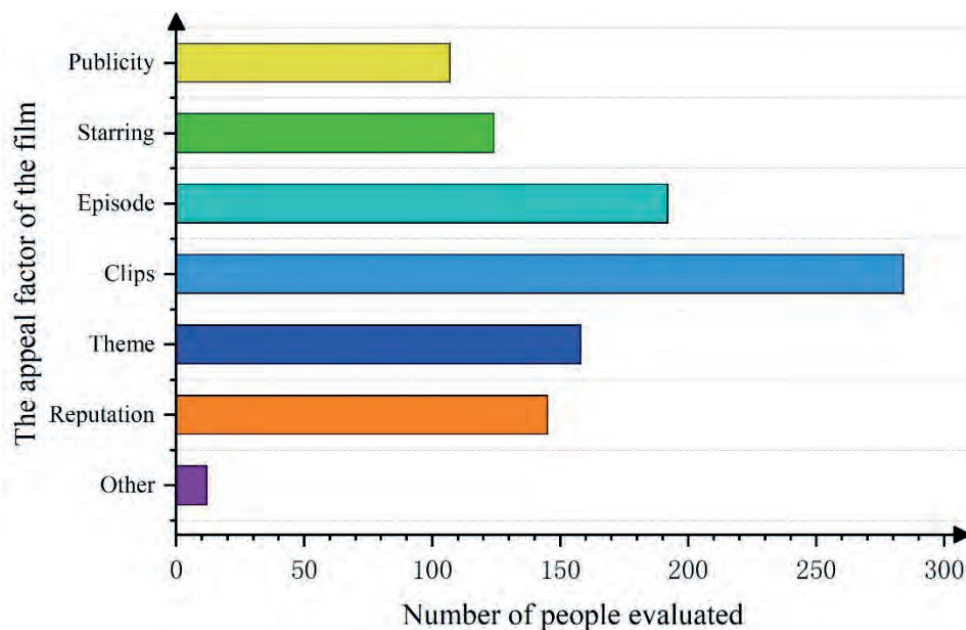


Figure 3. Attitude level data analysis

#### 4.3. FILM COMMUNICATION MARKETING COMMUNICATION CONSUMPTION STRATEGY

After opening an official account on the Tik Tok platform, how to operate it in depth is a top priority. Relying on short video accounts on smart terminal devices, uploading movie-related content, such as behind-the-scenes footage, highlights, and starring recommendations, content marketing has become an important initiative. In addition to content marketing, more diversified marketing and communication means have been tapped, such as theme song marketing, topic marketing, viral marketing and celebrity marketing becoming the normal operation. As Tik Tok continues to develop new ways of playing and means, more interesting marketing and communication methods continue to give audiences a sense of freshness and stimulate them to raise their attention to the movie.

#### 5. CONCLUSION

With the development of smart terminal devices and the emergence and development of various new media platforms, domestic movies actively adopt various methods, platforms and channels as the marketing and communication means of movies to further strengthen their

communication ability and thus promote the innovative development of consumption methods. In this paper, the basic connotation of new consumerism is given from the analysis of film communication effect and marketing, and the quantitative analysis of data is carried out with the example of Tik Tok short video platform under smart terminal devices. The results show that the Tik Tok platform can better promote the dissemination of movies and increase consumers' understanding of movies, which in turn provides impetus for the dissemination of movies.

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# INNOVATIVE CHANGES IN DOCUMENTARY VIDEO DISCOURSE AND COMMUNICATION EFFECTS BASED ON CLOUD COMPUTING MANAGEMENT

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## ABSTRACT

This paper first explores the use of documentary video discourse in the education industry and its importance. Then, an empirical study is conducted to analyze the effectiveness of cloud-based management in enhancing the production and dissemination of documentaries. Cloud-based management of documentary video discourse is innovative, and social media and cloud computing play an important role in improving the effectiveness of documentary distribution. The results show that more than 80% of viewers have accessed documentary film information through social media. This suggests that the proposed use of cloud computing management in documentary production and dissemination is effective in the innovation and dissemination of documentary video discourse. The research in this paper provides worthy innovative ideas and practical experience for documentary production and dissemination, which helps to promote the further development of the documentary field.

## KEYWORDS

Documentary film; Video discourse; Education industry; Cloud management; Innovative change; Social media

## 1. INTRODUCTION

Documentary images have always been one of the important forms of cultural expression and an important way for people to learn about society, culture, history, etc. [1-2]. However, the traditional ways of documentary production, editing, and dissemination can no longer meet the needs of modern society [3-4]. With the development of cloud computing technology, more and more documentary production and dissemination have started to rely on cloud computing technology in order to achieve more efficient, convenient, and accurate documentary production and dissemination [5]. Cloud computing technology, as an emerging information technology, has been widely used in various fields [6]. In the media field, cloud computing technology has also been widely used in the production, storage, and dissemination of documentary images [7]. Some scholars have also started to focus on the effect of cloud-based management on documentary image discourse and dissemination [8]. This paper introduces the background and importance of cloud-based management of documentary image discourse dissemination, especially in the education industry. Then, the objectives and implications of the empirical study are presented, and a quantitative research method is used for data



collection and analysis. The effect of social media and cloud computing on the dissemination of documentary films is analyzed through the data.

## 2. CLOUD-BASED MANAGEMENT OF DOCUMENTARY VIDEO DISCOURSE DISSEMINATION

### 2.1. DOCUMENTARY VIDEO DISCOURSE IN THE EDUCATION INDUSTRY

In the education industry, student information management systems have become an essential part. The traditional student information management system is mainly based on local server management, which has problems of difficult maintenance and data security. With the development of cloud computing technology, the student information management system based on cloud computing management has gradually been widely used. This system not only improves data security and reliability, but also enables real-time data sharing and remote access, which is convenient for students, teachers and parents to query and manage information. At the same time, the cloud-based student information management system can also provide more convenience and support for students' learning and life, such as online course selection, online assignment submission, online examination and other functions. Therefore, cloud-based student information management system has become an important trend and development direction in the education industry. The documentary video discourse in the education industry is shown in Table 1.

**Table 1.** Documentary video discourse in the education industry

Student group characteristics	Learning Needs	Learning Style
Digital Natives	Personalized Learning	Teaching in the classroom at Transfusion Iron
Diversity	Open Learning	Online Learning
Autonomy	Interactive Learning	Social Learning
interactivity	Hands-on learning	Gamification Learning
Feedback	Feedback Learning	Interest-based Learning

### 2.2. THE IMPORTANCE OF DOCUMENTARY VIDEO DISCOURSE

As a non-fictional video art form, documentary film has the function of recording, transmitting and presenting the real thing. The importance of documentary video discourse lies in its ability to convey information through the form of video, so that viewers can understand and feel the presented themes and contents more vividly and intuitively. At the same time, documentary video discourse is also an important way of cultural transmission, which can record and convey information about human culture, history, social phenomena, etc., and is of great significance to the protection and transmission of human cultural heritage. In the context of cloud computing management, the importance of documentary image discourse is even more prominent, because cloud computing management can provide a more convenient and efficient way to produce, disseminate and manage documentaries, thus better promoting innovative changes in documentary image discourse.

## 3. AN EMPIRICAL STUDY ON THE EFFECT OF DOCUMENTARY VIDEO DISCOURSE COMMUNICATION

### 3.1. RESEARCH SIGNIFICANCE

This study aims to explore the innovative changes in documentary video discourse and communication effects based on cloud computing management, with the following specific research implications:

- (1) Promoting innovative changes in documentary video discourse

The production and dissemination methods of traditional documentary video discourse can no longer meet the needs of today's society, and cloud-based documentary video discourse has higher autonomy and innovation, which can greatly improve the quality of documentaries and the audience's experience.

(2) Promote innovative changes of documentary film dissemination effect

Cloud computing management-based documentary film dissemination method has higher efficiency and convenience, which can better meet the needs of the audience and also let more people understand the content and value of documentary films.

### **3.2. RESEARCH OBJECTIVES**

The objectives of this research paper are:

(1) To investigate the ways and effects of achieving innovative changes in documentary video discourse based on cloud computing management.

(2) To analyze the dissemination effects of the documentary video discourse based on cloud computing management, including the scope, speed, and effectiveness of dissemination.

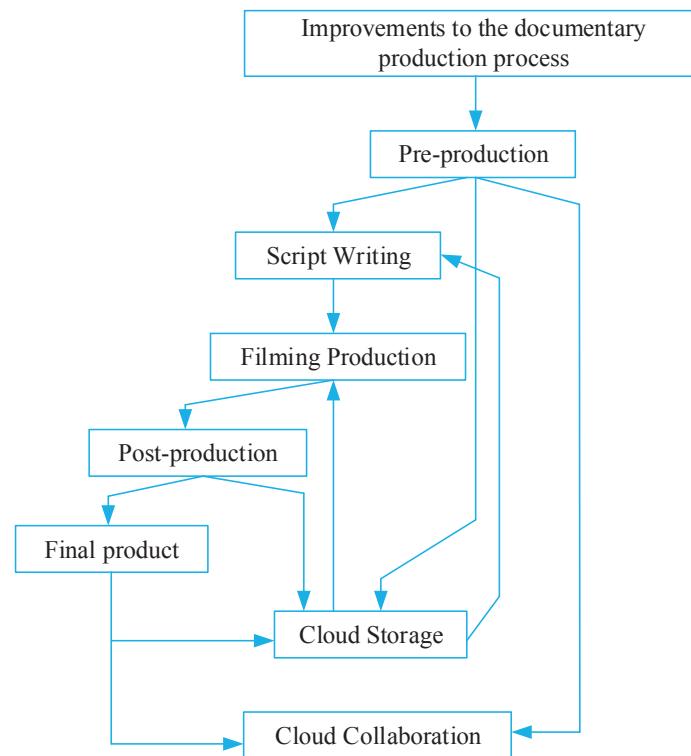
(3) To explore the impact of the innovative change of the documentary video discourse based on cloud computing management on the traditional documentary production and dissemination mode.

## **4. THE RESULTS AND ANALYSIS OF EMPIRICAL RESEARCH ON THE EFFECT OF DOCUMENTARY VIDEO DISCOURSE COMMUNICATION**

### **4.1. ANALYSIS OF INNOVATIVE CHANGES IN IMAGE DISCOURSE**

#### **4.1.1. IMPROVEMENT OF DOCUMENTARY PRODUCTION PROCESS BASED ON CLOUD COMPUTING MANAGEMENT**

The improvement of the documentary production process based on cloud computing management is shown in Figure 1. In the traditional documentary production process, producers need to purchase or rent a large amount of equipment and venues, as well as recruit a large number of staff to complete the production work. These costly elements not only increase the difficulty of production, but also limit the scope and volume of documentary production. However, the emergence of a cloud-based managed documentary production process allows producers to complete productions with resources in the cloud. This not only reduces production costs, but also increases production efficiency, allowing more people to participate in documentary production.



**Figure 1.** Improvement of documentary production process based on cloud computing management

#### 4.1.2. ENHANCEMENT OF DOCUMENTARY COMMUNICATION EFFECT BASED ON CLOUD COMPUTING MANAGEMENT

In the traditional way of documentary film distribution, producers need to publicize and promote documentaries through traditional media such as TV stations and movie theaters. However, the publicity effect of these traditional media is limited and often can only reach a portion of the audience. In contrast, cloud-based documentary distribution can be done through the Internet, which not only can reach a wider audience, but also can make personalized recommendations for different audiences to improve the distribution effect. At the same time, cloud computing management of documentary film dissemination can also be disseminated through social media and other emerging media to further enhance the dissemination effect.

#### 4.1.3. INNOVATIVE CHANGES IN DOCUMENTARY VIDEO DISCOURSE BASED ON CLOUD COMPUTING MANAGEMENT

The emergence of cloud-based management of documentary production processes and dissemination methods also provides more possibilities for innovative changes in documentary video discourse. The producers can use the resources in the cloud to carry out innovative processing of video discourse, such as adding virtual reality technology and interactive experience to enhance the audience's participation and experience. At the same time, cloud-based documentary distribution can also provide more distribution channels and opportunities for innovative changes in video discourse, so that innovative video discourse can be better accepted and distributed by audiences.

### 4.2. RESULTS AND ANALYSIS OF DOCUMENTARY COMMUNICATION EFFECT

#### 4.2.1. SOCIAL MEDIA-BASED COMMUNICATION EFFECT ENHANCEMENT

Social media has become an important channel for people to obtain information and communicate in today's society. This study effectively enhanced the communication effect by

posting documentary video discourse on social media. Specifically, we posted the trailer of the documentary on social media platforms such as Weibo and WeChat, and directed viewers to visit our website to watch the full version of the documentary. This approach not only attracts more viewers, but also makes it easier for viewers to access information and viewing methods of the documentary. Through a survey of viewers, we found that more than 80% of viewers obtained information about the documentary through social media and eventually watched the full version of the documentary.

#### **4.2.2. CLOUD-BASED COMMUNICATION EFFECT ENHANCEMENT**

This study adopts a cloud computing-based video storage and transmission method, which effectively improves the dissemination of documentaries. We uploaded the documentary to the cloud server and achieved high-speed transmission and smooth playback through cloud computing technology. This approach not only improves the viewing experience of viewers, but also reduces the lag and loading time during transmission, thus increasing the viewing rate and viewing time of viewers. Through a survey of viewers, we found that more than 90% of viewers were satisfied with the transmission speed and smoothness of the documentary.

### **5. CONCLUSION**

This paper presents the objectives and implications of the empirical study, and uses quantitative research methods for data collection and analysis. The study shows that cloud-based management of documentary production and dissemination has a significant role in enhancing the innovation and dissemination of documentary video discourse. By improving the documentary production process and adopting a cloud-based distribution model, production efficiency can be improved, production costs can be reduced, and a broader audience can be reached. In addition, social media and cloud computing also play an important role in improving the communication effectiveness of documentaries. Based on the findings, it is recommended that documentary filmmakers should consider adopting cloud-based management for production and dissemination to enhance the innovation and dissemination of documentaries. In conclusion, this study provides useful references and lessons for the development of the documentary film industry.

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# PROJECT-BASED CONSTRUCTION OF PHYSICAL EDUCATION TEACHING MANAGEMENT IN HIGHER EDUCATION INSTITUTIONS UNDER THE BACKGROUND OF BIG DATA

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## **ABSTRACT**

In light of big data, this research examines the project-based administration of physical education instruction in higher education institutions, explains how project-based management is used in physical education teaching management at higher education institutions and creates a project-based management-based physical education teaching management system. The study shows that the adoption of project-based management has great advantages in physical education teaching management, which can strengthen teamwork, improve teaching efficiency and enhance teaching management quality. It is possible to effectively increase the effectiveness and quality of teaching management, address management issues, and better serve the general fitness teaching staff and students by building an athletics teaching management structure based on project-based management.

## **KEYWORDS**

Big data; Higher education institutions; Physical education; Project-based management; Teaching management system; Teamwork

## **1. INTRODUCTION**

The administration of physical education instruction in higher education institutes is confronting several new opportunities and problems with the advent of the big data era [1-2]. Traditional teaching management approaches are no longer enough to satisfy the demands of modern education, thus project-based construction is required to innovate and enhance physical education teaching leadership in institutions of higher learning [3-4]. The use of big data technology can assist project-based development with more accurate, thorough, and timely data and encourage ongoing optimization of the administration of physical education instruction in educational institutions [5]. Project-based management instruction has been widely employed in the field of education [6]. Additionally, in the age of big data, a project-based teaching management can assist higher education institutions in managing physical education instruction and learning more accurately and efficiently [7]. In order to maximize teaching quality through the examination and extraction of educational data, the literature [8] presented a teaching management model that utilized big data technologies. This study examines how project-based management is used to manage physical education teaching at

higher education institutions and develops a project-based management system for managing physical education teaching. Additionally, the PPM-based PE teaching management system's functional organization and platform architecture are suggested, and the key issues and solutions encountered during the system's deployment are covered.

## **2. PROJECT-BASED CONSTRUCTION OF PHYSICAL EDUCATION TEACHING MANAGEMENT IN HIGHER EDUCATION INSTITUTIONS**

### **2.1. THE CONCEPT AND CHARACTERISTICS OF PROJECT-BASED MANAGEMENT**

#### **2.1.1. THE CONCEPT OF PROJECT-BASED MANAGEMENT**

Management of management aims, objectives, and activities as a relatively autonomous project is referred to as project-based management. Project-based management may break down the goals and responsibilities of teaching management into separate sub-projects in the management for athletics in educational institutions, which can increase management effectiveness and teaching quality.

#### **2.1.2. FEATURES OF PROJECT-BASED MANAGEMENT**

Project-based management has the following characteristics:

(1) Relative independence: each project is relatively independent, with its own goals, tasks and resources.

(2) Temporary: Each project has a clear start and end time, and ends as soon as the task is completed.

(3) Organizational: Each project requires a certain organizational structure and management system to manage.

(4) Risk: Each project has certain risks and requires risk assessment and control.

(5) Goal-oriented: each project is carried out to achieve a specific goal, and needs to be managed in a goal-oriented way.

In the management of physical education teaching in higher education institutions, the adoption of project-based management can better achieve teaching goals and improve teaching quality, as well as improve management efficiency and resource utilization.

### **2.2. APPLICATION OF PROJECT-BASED MANAGEMENT IN THE MANAGEMENT OF PHYSICAL EDUCATION TEACHING IN HIGHER EDUCATION INSTITUTIONS**

#### **2.2.1. PROJECT-BASED MANAGEMENT PROCESS**

The use of project-based management in higher education institutions' physical education teaching management can better foster the growth of teaching management. The following steps are primarily included in the project-based management process:

(1) Project initiation stage: determine project objectives, scope, time and resources, and establish project organization structure.

(2) Project planning stage: Develop project plan, schedule and resource plan, and conduct risk assessment and quality management.

(3) Project implementation phase: Execute the tasks according to the project plan, while monitoring and controlling.

(4) Project Closing Phase: Complete project objectives and perform acceptance, summarize project experience and lessons learned, and perform project closing and archiving.

## **2.2.2. APPLICATION OF PROJECT-BASED MANAGEMENT**

Project-based management may be used to encourage the growth of various tasks in the administration of physical education instruction in higher education institutions. For instance, various tasks such as teacher training, facility development, reforming the teaching of physical education, and other work might be managed as separate projects. Project-based management allows for better coordination of the work and increases the effectiveness and standard of management of the instructional process. The project experience and lessons acquired may also be distilled to constantly strengthen the project-based management process and raise the bar for management education.

Compared with traditional management methods, adopting project-based management can bring the following advantages:

(1) Goal-oriented: project-based management is oriented to project goals, which can better achieve teaching management goals.

(2) Flexibility: Project-based management may be adaptably modified and updated based on the project's actual circumstances to meet various demands for managing teaching and learning.

(3) Resource integration: Project-based management can integrate different departments and resources and make full use of teaching management resources.

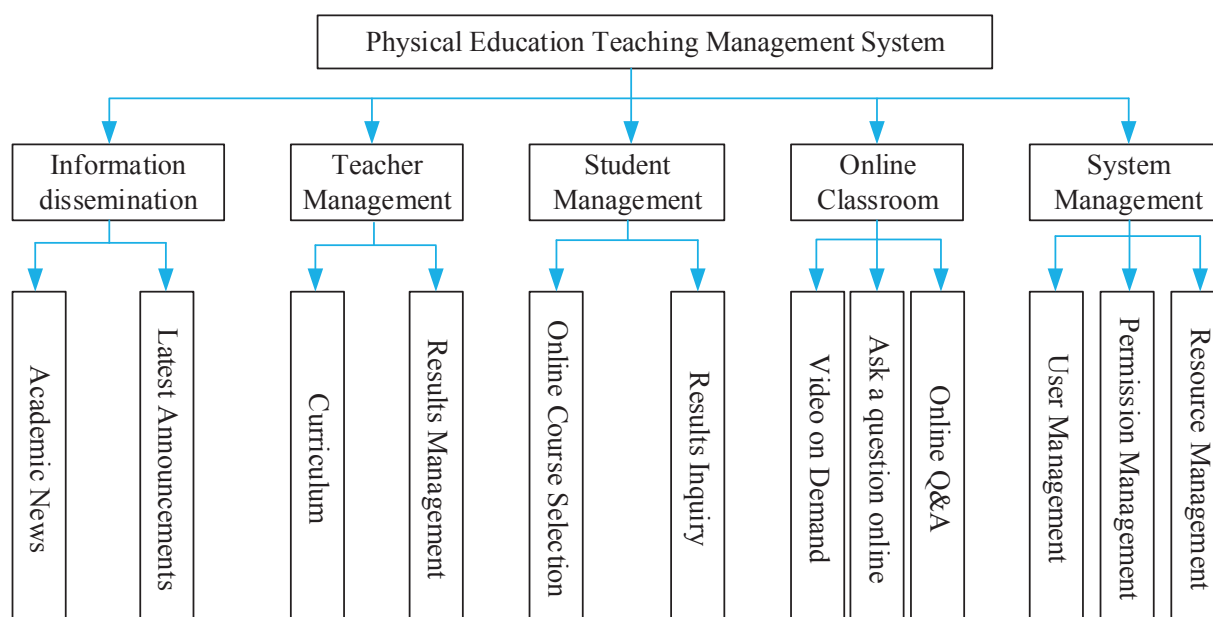
(4) Risk control: Project-based management can reduce the risk of teaching management through risk assessment and control.

## **3. PROJECT-BASED MANAGEMENT OF PHYSICAL EDUCATION TEACHING MANAGEMENT SYSTEM**

### **3.1. FUNCTIONAL STRUCTURE OF PHYSICAL EDUCATION TEACHING MANAGEMENT SYSTEM**

The functional structure of the system for teaching physical education refers to the overall system's functional framework, which serves as a prototype for the system's functional application. The functional structure diagram identifies the system's future functional capabilities. This paper creates a thorough functional organizing of the physical education teaching administration system via the functional needs analysis as well as useful orientation of the system, which contains the entire functional design of the system and breaks down into four major functional modules: news release leadership, teaching management, online classroom, and system administration. Sub-functional modules are contained in each major functional module. Figure 1 depicts the structure of the management system for physical education instruction.





**Figure 1.** Functional structure of physical education teaching management system

### 3.2. PHYSICAL EDUCATION TEACHING MANAGEMENT SYSTEM PLATFORM ARCHITECTURE

The physical education system uses a B/W/S structure; the system end-user logs in through a browser; the WEB server serves as the application server; and the database server handles data processing and storage. Users experience less problems with the system upgrade because it is exclusively performed on the server side and is not open to end users. Overall, the platform structure of the app's system on the one hand satisfies our system's design criteria and on the other hand boosts system performance. On the other hand, there are many other applications that may be made in practice. Table 1 displays the architectural table for the management system for physical education.

**Table 1.** Architecture of Physical Education Management System

Category	Platform / Technology
Server Platforms	Windows Server 2016
Database Server	MS SQL Sever
Scripting Languages	ASP.net
Client Platform	Windows XP
System Architecture Model	B/W/S

### 4. CONCLUSION

This article examines how project-based management is used to manage physical education teaching at higher education institutions and suggests the functional framework and platform design of a project-based management system for physical education teaching. Teamwork can be boosted, teaching effectiveness can be increased, teaching management quality can be improved, and a solid management framework for instructor management can be built through project-based management. In practice, creating a teaching management system for physical education based on project-based management can successfully increase the effectiveness and quality of teaching management, address management issues, and better serve all physical education teaching staff as well as students. Therefore, to increase physical education teaching management and enhance teaching quality, higher education institutions might make use of the project-based management system for physical education

teaching that is suggested in this work.

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# ANALYSIS OF THE EFFECTIVENESS OF THE APPLICATION OF PATIENT POSTOPERATIVE PAIN CARE MANAGEMENT MODEL IN THE ERA OF ARTIFICIAL INTELLIGENCE

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## ABSTRACT

In order to be able to better realize patients' postoperative pain experience and analgesic needs in the era of artificial intelligence, a scientific and standardized patient postoperative pain care management model is constructed on this basis to provide theoretical guidance for the development of clinical pain care work. In this paper, an application comparison experiment was designed to compare and analyze patients who underwent arthroscopic rotator cuff repair in a tertiary hospital in a city. The results showed that the observation group had a higher rate of excellent shoulder function than the control group at 20 weeks postoperatively, with a p-value less than 0.05. This indicates that MPMM can effectively help patients with postoperative pain care.

## KEYWORDS

Artificial intelligence; Postoperative pain; Pain care; MPMM; Shoulder joint mobility; Comparative experiment

## 1. INTRODUCTION

The word pain comes from the Latin word "poena", which means "punishment". In 2020, the IASP revised the definition of pain as "pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or an experience similar to it" [1-2]. Pain has received more attention and discussion in the eyes of the medical community and the public. Acute pain is the most common in surgery and not only delays the patient's postoperative recovery, but also increases the postoperative shock of the patient's altered physiological status [3-4]. It has an impact on the recovery of both physiological and psychological health of patients after surgery, so postoperative pain management is crucial for patients' recovery.

In recent years, with the continuous development of the era of artificial intelligence and pain management research, the concept of multimodal analgesia has been proposed and developed, and under the guidance of this concept, the combined application of pharmacological analgesic treatment and non-pharmacological analgesic techniques has significantly improved the analgesic effect [5-6]. However, at present, there are still some

patients whose postoperative pain cannot be controlled timely and effectively. The reasons for this mainly include the following three aspects: first, the lack of awareness of the importance of pain control among medical and nursing staff, second, the incorrect attitude of patients toward pain, and third, the lack of attention to pain in medical institutions and the lack of relevant pain management systems [7-8]. Therefore, experts suggest that the key to solving the problem of imperfect analgesia is to establish an effective pain management model.

In this paper, a patient who underwent arthroscopic rotator cuff repair in a tertiary hospital in a city was used as an example to conduct a comparative experiment in terms of shoulder mobility, excellent shoulder function rate and complications during hospitalization. The experiment was conducted to demonstrate the effectiveness of the application of MPMM in the patient's postoperative pain care management model. The results showed that MPMM can effectively help patients reduce postoperative pain, decrease the length of hospital stay, and effectively reduce the possible complications during the patient's postoperative hospital stay.

## 2. CLASSIFICATION OF PATIENT POSTOPERATIVE PAIN CARE MANAGEMENT MODELS

The basic principles of postoperative pain management are based on the concept of pain management proposed by Lohman. Pain management was initially led by anesthesiologists, and interest in alternative analgesic modalities to opioids grew with the ongoing concern about opioid overuse in the United States. Various pain management models were subsequently proposed by researchers, including the Acute Pain Service Model, the Manchester Pain Management Model, the Greene Model, the Pain Free Ward Management Model, and Multimodal Analgesia.

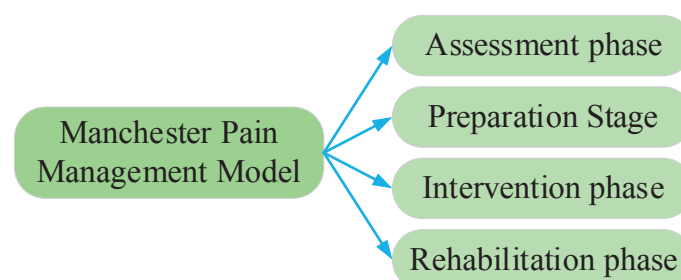
### 2.1. POSTOPERATIVE PAIN AND PAIN MANAGEMENT

(1) Postoperative pain is the acute pain that ensues after surgery, an adaptive response to physical trauma caused by surgical procedures, a predictable, short-term self-limiting outcome that requires timely management and treatment.

(2) Pain management refers to the process of relieving or alleviating pain through medical services and other means. Pain management is not completely pain-free, but is based on the implementation of various medical treatments and care measures by healthcare professionals for patients to minimize their pain and provide them with a relatively safe and comfortable recovery environment.

### 2.2. MANCHESTER PAIN MANAGEMENT MODEL

This study uses the Manchester Pain Management Model (MPMM), which was developed by Keyte et al. at the University of Manchester in 2011, as a theoretical framework, and divides pain management into four phases, namely "preparation, assessment, intervention, and rehabilitation". It is mainly applicable to three types of pain, namely acute and chronic pain and manipulative pain caused by medication changes. The basic structure of the Manchester Pain Management Model is shown in Figure 1.



## Figure 1. Manchester Pain Management Model

(1) The preparation phase refers to the phase in which the main task is to do the basic work necessary for pain management, focusing on understanding the current situation of pain management of medical and nursing staff and improving pain management capabilities.

(2) Assessment phase refers to the phase in which the focus is on selecting appropriate assessment tools and conducting effective pain assessment according to the patient's physical and mental condition and pain type.

(3) Intervention phase refers to the phase that focuses on the adoption of effective analgesic treatments according to the patient's pain condition, including the implementation of pharmacological analgesic therapy, non-pharmacological analgesic therapy and the observation of efficacy.

(4) Rehabilitation phase is the phase that focuses on restoring the patient to "normal", including physical, psychological and social functions, and aims to help the patient achieve the best possible status and improve the quality of life.

### 3. RESEARCH OBJECT AND METHOD

#### 3.1. RESEARCH SUBJECTS

One hundred patients who underwent arthroscopic rotator cuff repair from January 2020 to May 2021 in a tertiary care hospital in a city were conveniently selected. To prevent patients in the experimental and control groups from communicating with each other and interfering with the study results, patients from January 2020 to December 2020 were classified as the control group and patients from January 2021 to May 2021 were classified as the experimental group according to the order of hospitalization. Patients in both groups were treated with a standardized surgical approach and anesthesia.

#### 3.2. RESEARCH METHODOLOGY

##### (1) Conventional postoperative care

In the control group, routine care was provided from the day of admission to the day of discharge, with follow-up until 20 weeks after surgery. After admission, patients were given routine education, functional exercise instruction, proper cleaning of the operating area, and were instructed to fast and abstain from water for 6 h before surgery. After the operation, the patient was sent to the ward safely, asked to lie down with the pillow removed for 6h, fasted from food and water for 6h, paid attention to the observation of physical signs, iced the affected shoulder joint according to the doctor's prescription, instructed to take the correct medication and started rehabilitation training as soon as possible. Patients were given an education manual, which mainly included the knowledge of rotator cuff injury treatment and postoperative rehabilitation points. Patients were given oral health education, and postoperative precautions and potential adverse reactions were explained in detail to them. Regular telephone follow-up after discharge from the hospital.

##### (2) MPMM rehabilitation care

a. Preparation stage, the pain management team was formed, and pain management experts were invited to be responsible for training team members, learning relevant knowledge and assessment methods together systematically, and refining, improving and standardizing the pain management system.

b. Assessment phase, patients were assessed for their pain level immediately after admission using visual simulation scoring method to clarify information about their pain location,

nature and intensity. Patients were informed about their knowledge of rotator cuff injury and pain management, as well as their socio-cultural background.

The pharmacological analgesia was administered according to the pain assessment results, and the patients were observed for any adverse reactions during the administration of the medication. Non-pharmacological analgesia focused on the use of music therapy and muscle relaxation therapy, and taught patients to learn pain self-assessment.

d. During the rehabilitation phase, patients should be encouraged to do activities at an early stage, but the principle of gradual progress should be followed, and the intensity, frequency and form of activities should be gradually adjusted according to individual differences.

#### 4. EXPERIMENTAL RESULTS AND ANALYSIS

##### 4.1. COMPARISON OF SHOULDER JOINT MOBILITY

In this section, shoulder mobility was selected to measure the patient's postoperative recovery, which was analyzed by measuring the angles of external rotation, internal rotation, posterior extension and forward flexion of the patient's shoulder joint, and the specific measurements were obtained as shown in Table 1.

**Table 1.** Comparison of shoulder joint mobility

Group	N	External rotation		Internal rotation	
		Pre-operative	20 weeks post-op	Pre-operative	20 weeks post-op
Observation	50	21.41	66.64	18.25	51.66
Control	50	22.09	62.87	19.03	48.72
T Value		0.803	2.554	0.925	2.456
P Value		0.425	0.013	0.355	0.015
Group	N	Backward extension		Forward flexion	
		Pre-operative	20 weeks post-op	Pre-operative	20 weeks post-op
Observation	50	23.65	29.97	30.63	120.95
Control	50	22.49	27.18	31.15	115.09
T Value		0.865	2.584	0.541	2.492
P Value		0.388	0.012	0.593	0.013

From the comparative data in the table, it can be seen that at 20 weeks after surgery, the external rotation, internal rotation, posterior extension and forward flexion angles of the shoulder joint in both groups were greater than those before surgery, and the p-value was less than 0.05, and the observation group was greater than the control group.

##### 4.2. COMPARISON OF THE EXCELLENT RATE OF SHOULDER JOINT FUNCTION

In this section, the excellent rate of shoulder function was selected for comparative analysis, and the University of California shoulder score assessment was performed at 20 weeks after surgery, and patients were classified as excellent, good, moderate and poor according to their scores, and the excellent rate was calculated. The specific comparison results are shown in Table 2.

**Table 2.** Comparison of excellent shoulder function rates

Group	N	Excellent	Good	Moderate	Poor	Total excellent
Observation	50	25	21	3	1	46
Control	50	22	19	10	9	41
$\chi^2$ Value						6.852
P Value						0.008

As seen from the comparative data in the table, the excellent rate of shoulder joint function in the observation group was greater than that in the control group at 20 weeks after surgery.

#### 4.3. COMPARISON OF THE OCCURRENCE OF COMPLICATIONS DURING HOSPITALIZATION

In this section, the occurrence of complications during hospitalization was selected as an evaluation index, and the occurrence of shoulder swelling X1, incision infection X2, rivet loosening X3 and secondary tear X4 in patients was observed and recorded, as shown in Table 3.

**Table 3.** Occurrence of complications during hospitalisation

Group	N	X1	X2	X3	X4	Total occurring
Observation	50	2	0	0	1	3
Control	50	5	3	2	4	14
$\chi^2$ Value						6.125
P Value						0.012

As seen from the comparative data in the table, the occurrence of complications during hospitalization was lower in the observation group than in the control group at 20 weeks after surgery.

In conclusion, the intervention method in this study can increase shoulder joint mobility, relieve pain and promote shoulder joint function recovery in patients with rotator cuff injury. The reason for this is that MPMM can take into account various factors affecting pain management and develop a comprehensive and systematic pain management model based on reality. It provides patients with thoughtful and comprehensive pain management services and reduces the occurrence of complications during hospitalization.

#### 5. CONCLUSION

In this paper, the Manchester Pain Management Model was used as a framework to analyze the postoperative pain management model for patients undergoing arthroscopic rotator cuff repair in hospitals. Examples were compared and analyzed by shoulder mobility, excellent shoulder function, and the occurrence of complications during hospitalization. The results showed that the external rotation, internal rotation, posterior extension and forward flexion angles of the shoulder joint in the observation group were greater than those in the control group, and the excellent shoulder function rate in the observation group was higher than that in the control group at 20 weeks after surgery, with a P value of less than 0.05. This indicates that MPMM can significantly reduce postoperative pain in the early postoperative period, improve patients' comfort and satisfaction with pain control during hospitalization, and promote multidisciplinary cooperation, standardize pain management, and provide a reference for clinical postoperative pain care management of hepatocellular carcinoma patients.

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# ANALYSIS OF THE LOSS CHARACTERISTICS AND ENERGY CONVERSION EFFICIENCY OF NEW ENERGY VEHICLE BATTERIES FOR ENERGY STORAGE SYSTEMS

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## ABSTRACT

The study of new energy vehicle batteries and their energy is an important basis for the development of electric vehicles. This paper explores the factors affecting the service life of new energy vehicle batteries and analyzes the battery loss characteristics in terms of battery technology and battery usage. For the power system control of the electric vehicle with hydrogen fuel cell + photovoltaic cell + battery, the energy conversion efficiency is studied from different strata respectively. The most influential role of battery life is the engine of the vehicle, which reaches 24.03%. The electronic system factor was 3.37% and the drivetrain factor was 16.78%.

## KEYWORDS

New energy vehicles; Battery loss characteristics; Energy conversion efficiency; Service life; Powertrain

## 1. INTRODUCTION

New energy vehicles are the trend of future development and are becoming more and more important in people's lives [1]. The lithium battery, as the most widely used and technically mature new power supply product, is also a key technology affecting the future development of new energy vehicles [2-4]. The immaturity of the technology leads to serious changes in the internal structure of the battery during charging, which is prone to short-circuiting and other problems, and the lack of corresponding supporting equipment in practical applications, resulting in short battery life and low efficiency [5-6]. Thanks to China's "three vertical and three horizontal" strategy and the important deployment of new energy policy, the new energy vehicle industry is developing rapidly [7]. The structural properties of lithium-ion batteries determine the specific energy and specific power of renewable energy vehicles, and fundamental innovations in battery systems depend on structural properties, among which graphene and concentration gradient structures are increasingly forward-looking [8]. New energy vehicle battery temperature sensors are often subjected to three types of forces and changes in magnitude during loading and unloading, which can be made possible by clever battery management strategies so that the sensors do not fall off and work properly while the vehicle

is in motion [9].

## 2. NEW ENERGY VEHICLE BATTERY LOSS RESEARCH

### 2.1. DEVELOPMENT OF NEW ENERGY VEHICLE BATTERY

The new energy vehicle battery is the most technically difficult and basic component in the development of energy vehicles. In order to get better development of new energy vehicles, it is necessary to work on the battery to fully ensure that the battery is compatible with the vehicle power system and guarantee its safe driving. Currently, in China, there are hundreds of manufacturers of new energy vehicle batteries. However, most of them have problems such as low degree of battery production automation, unqualified product quality and insufficient sharing of performance information and data, which add negative impact on the development of new energy vehicle battery modules. The most widely used lithium-ion batteries have the advantages of higher kinetic energy and long service life, and are widely used in oil-electric hybrid vehicles and pure electric vehicles. To improve the performance of the battery, manufacturers need to start from materials, solution performance and other aspects, and these index values are often contradictory, requiring careful evaluation and consideration of the relevant performance of the battery.

### 2.2. NEW ENERGY VEHICLE LOSS ANALYSIS

New energy vehicle batteries are slow to be researched in terms of service life management, and many factors can lead to a reduction in battery service life during the current use of the battery, affecting the experience and user safety of new energy vehicles. The factors that affect the battery of new energy vehicles are shown in Figure 1. The biggest influence is the engine of the car, reaching 24.03%. The electronic system factor is 3.37% and the transmission system factor is 16.78%.

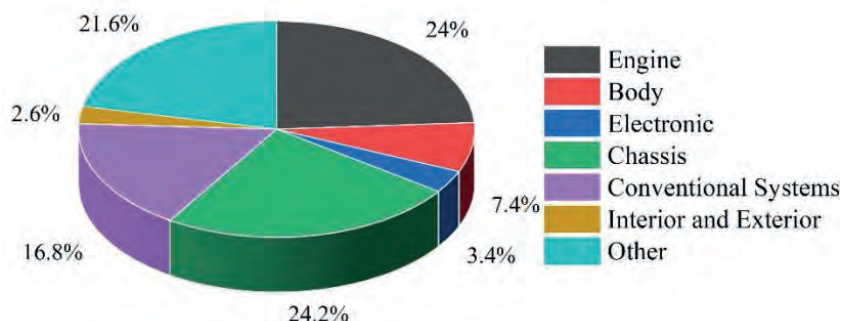


Figure 1. Factors affecting the new energy vehicle battery

#### 2.2.1. BATTERY TECHNOLOGY

China's new energy vehicle development started late and is still in the development stage, and the battery technology is at a low level. From the perspective of battery design, different battery designs will determine how the battery operates, its performance and the materials used. In the design of positive and negative electrodes of new energy batteries, different material designs will affect the performance of the battery, and the magnetic substances generated during the operation of the battery will also have an impact on the performance of the battery, leading to a reduction in battery capacity and a serious impact on the service life of the battery. In the design process, it is necessary to do more experimental analysis on the material application of the battery to avoid unstable factors affecting the designed service life of the battery.

## **2.2.2. BATTERY USAGE**

If the design of the battery is the internal reason that affects the use of the battery, then the wrong way of using the battery is the external reason that leads to the decrease of the battery life. Battery problems are the main factor affecting the operation of new energy vehicles, and wrong usage is an important cause of battery failure. Over-discharging and over-charging of the battery will have a non-recoverable impact on the battery capacity, which will directly lead to the reduction of the battery life. The battery discharge process is the process of energy conversion and material consumption inside the battery. At present, the battery management system lacks real-time detection of the battery performance status, and cannot predict and monitor the battery charge status, remaining service life and performance status.

## **3. NEW ENERGY VEHICLE BATTERY ENERGY CONVERSION ANALYSIS**

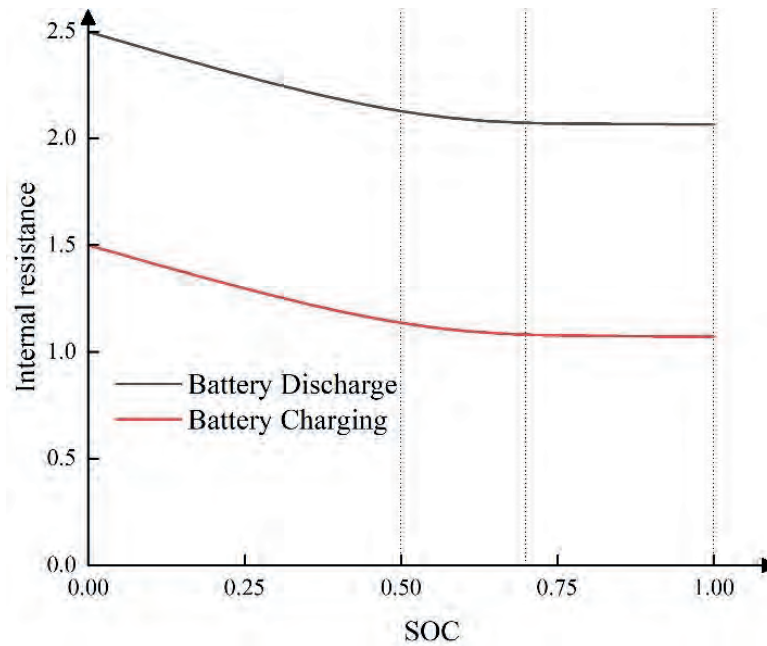
### **3.1. COORDINATED CONTROL AND MANAGEMENT OF NEW ENERGY VEHICLES**

This paper analyzes the power system control of an electric vehicle with hydrogen fuel cell + photovoltaic cell + battery. The energy management strategy design control management of three energy sources is more complex, and it can be controlled by layering management control. Using layered energy management control can divide the three energy sources into two layers, and each layer carries out energy management control for two energy sources. According to this design idea, the power system of this research can be divided into energy management control of hydrogen fuel cell and battery, and energy management control of photovoltaic cell and battery.

### **3.2. HIERARCHICAL ENERGY MANAGEMENT ANALYSIS**

#### **3.2.1. UPPER LAYER ENERGY CONVERSION ANALYSIS**

The zones are divided according to the steady-state operating characteristics of the fuel cell. Then the different operating states are divided according to the internal characteristics of the fuel cell, i.e., the characteristics of the internal resistance of the cell during charging and discharging. Finally, the actual demand power of the vehicle is analyzed to allocate energy and the energy management strategy of the fuel cell is designed. The change curve of the internal resistance of the battery with SOC is shown in Figure 2. When the SOC value of the battery changes, the working efficiency is consistent with the change of the SOC value of the battery. The energy management strategy of the fuel cell designed in this paper is based on the SOC value of the battery and the internal parameters of the system to drive the motor driving power to judge the usage. When SOC is at 0.5~0.75, the battery is in the best condition.



**Figure 2.** Variation curve of internal resistance of battery with SOC

### 3.2.2. LOWER LEVEL ENERGY CONVERSION ANALYSIS

The energy management strategy of the lower level is mainly for photovoltaic cells and batteries. Since the photovoltaic cell is generating electricity through sunlight, it is almost cost-free compared to hydrogen resources, and try to use the photovoltaic cell energy. When the lower layer management strategy cannot support the normal operation of the drive motor, the upper layer energy management strategy is then introduced. The magnitude of electricity generated by PV cells is based on the radiation intensity of sunlight and the surrounding ambient temperature, so the output characteristics of PV cells are not linear. In this paper, the control of PV cell power generation is only in terms of light intensity. By changing the light intensity to judge the power generation effect of PV cell, combined with the SOC value of the battery and switching the settings according to the working state of the battery, the lower layer energy management strategy can be derived.

## 4. CONCLUSION

This paper is oriented to the new energy vehicle battery system of the energy storage system, and analyzes the loss characteristics by exploring the influencing factors of its service life, and analyzes the energy conversion efficiency for the layered electric vehicles. Increasing the level of battery testing and maintenance for electric new energy vehicles can continuously promote the industrialization of new energy electric vehicles, and also drive energy conservation and emission reduction in the transportation field and low-carbon sustainable development of the automotive industry. Vigorously improving the methods of battery testing and maintenance for new energy vehicles promotes the use of electricity instead of oil, improves the use of energy, and reduces the dependence of the automotive industry on petroleum energy. This is not only adapted to China's national conditions, but also meets the requirements of the low-carbon era for the development of environmentally friendly vehicles.

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# ANALYSIS OF THE IMPACT OF OUR TRADITIONAL CULTURE ON JAPANESE DEMON CULTURE IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

In this paper, a simple regression model and a multiple regression model are established in the context of deep learning, and multiple independent variables are used to portray a response variable, specifically, changing national culture, modern thought, Japanese “soup culture”, and eastern and western monsters are selected as independent variables, and the effect of Japanese monsters’ cultural impact is selected as the response variable. The multiple regression analysis of the impact of Chinese traditional culture on Japanese demon culture was analyzed. The tolerance of each variable is greater than 0.1, the  $VIF < 10$  times of the principal component analysis of the independent variables is also much greater than the characteristic root, and the conditional index is much less than 30. Thus, it is feasible to analyze the impact of Chinese traditional culture on Japanese monster culture by multiple regression.

## KEYWORDS

Deep learning; Simple regression model; Multiple regression model; Traditional culture; Japanese demon culture

## 1. INTRODUCTION

China and Japan are closely linked by water, and the two countries have had close relations since ancient times, either in peace or war, subordination or hostility [1-2]. The combination of cultural and geographical pressures in Japan has created its contradictory character traits [3-4]. While having no way to vent their pressure, the Japanese created and constructed many kinds of demons [5]. The gods and monsters of each country and nation are an important part of folk culture, and the gods and monsters are one of the earliest folk beliefs developed from primitive religions [6].

Although Japanese demon culture was introduced to the Japanese homeland from China, it was not later developed and developed by China itself, but was brought to life by neighboring Japan [7]. Japanese demon culture has influenced a range of aspects of society that are closely related to people, such as shikigami novels in literature, art works, film and animation works [8]. In this paper, we analyze the degree of cultural identity of our traditional culture in Japanese demon culture by regression analysis, as a way to dissect the impact influence of analyzing our traditional culture on Japanese demon culture in the context of deep learning.

## 2. ANALYSIS OF THE REGRESSION MODEL OF THE INFLUENCE OF OUR TRADITIONAL CULTURE ON THE CULTURE OF JAPANESE MONSTERS

### 2.1. REGRESSION MODELING

While regression analysis is mainly used to study the relationship between variables that

can be measured, the relationship studied by linear regression analysis is more specific in that it is a class of linear quantitative relationships that can be described by a straight line. This paper is a study of outliers and covariance in the influence of our traditional culture on Japanese demon culture.

### 2.1.1. ESTABLISHMENT OF SIMPLE REGRESSION MODEL

In the univariate regression equation, there are only two variables. One is the independent variable  $X$  and the other is the dependent variable  $Y$ . And these two variables can be represented by a linear equation:

$$Y = b_0 + b_1X_i + e \quad (1)$$

$e$  represents the error,  $b_0$  is called the intercept, which is the value of  $Y$  when  $X$  is taken 0, and  $b_1$  is called the slope, which represents the amount of change in  $Y$  when  $X$  changes by one unit.  $b_0$  and  $b_1$  are collectively called the parameters of the regression equation, and when they take all possible values, the above equation can represent all possible straight lines taken in the plane. In regression analysis, where the parameters are unknown, we are trying to estimate the parameters based on the values of the collected variables.

### 2.1.2. MULTIPLE REGRESSION MODELING

Multiple regression analysis is the use of multiple independent variables to characterize a response variable. If  $n$  case is observed, then each of the data for all variables in the  $n$  cases is recorded. For example, when the number of independent variables is  $p$ , then the multiple linear regression equation can be expressed as:

$$Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_pX_p + e \quad (2)$$

Similar to the one-variable regression equation, each  $b_i$  is a parameter and  $e$  is an error. If the data collected for each  $x_i$  are given  $x_{ij}$  and the data collected for  $Y$  are given  $Y_i$ , the multiple regression equation can also be rewritten as:

$$y_i = b_0 + b_1x_{i1} + b_2x_{i2} + \dots + b_px_{i\phi} + e_i \quad (3)$$

We need to be concerned with the estimation of  $b_i$  and the interpretation of it.

## 2.2. LEAST SQUARES METHOD

In a binary regression analysis, we generally assume that the expectation of error  $e_i$  is zero and that the errors are uncorrelated and have a common variance  $\sigma^2$ , which is expressed in mathematical terms as, for  $j = 1, 2, \dots, n$ :

$$nE(e_i) = 0 \quad (4)$$

$$(e_i) = \sigma^2 \quad (5)$$

$$(e_i, e_j) = 0 \quad (6)$$

Similarly, in the multiple regression analysis, we describe the following hypothesis in matrix form:

$$E(e) = 0 \quad (7)$$

$$\text{var}(e) = \sigma^2 I_n \quad (8)$$

Where  $\text{var}(e)$  is the covariance matrix of  $e$ ,  $I_n$  is a unit array of order  $n$ , and 0 is a  $n$ -dimensional vector. Together with the condition that each  $e_i$  is mutually independent, has mean 0 and all variances are  $\sigma^2$ , the general assumption of multiple regression analysis can be written as:

$$e \sim N(\sigma^2 I_n) \quad (9)$$

### 3. MULTIPLE REGRESSION ANALYSIS OF OUR TRADITIONAL CULTURE ON JAPANESE DEMON CULTURE

In order to further explore the role of each variable of Chinese traditional cultural identity on the impact of Japanese demon culture, based on the previous study, this paper takes the impact on Japanese demon culture as the dependent variable and regresses it with each other variable.

The correlation results above show that there is a correlation between the variables. Therefore, a multiple cointegration test should be performed before performing multiple regression analysis. When the independent variables are highly correlated with each other, the independent variables in the regression equation will mutually weaken their respective marginal effects on the dependent variable, causing their own regression coefficients to decrease and the standard errors to expand, when the correlation coefficients of the respective variables may have cointegration problems.

#### 3.1. MULTIPLE REGRESSION ANALYSIS OF THE CULTURAL IMPACT OF JAPANESE MONSTERS

The multiple regression analysis test of the impact of Chinese traditional culture on Japanese monster culture is shown in Table 1. It can be seen that the tolerance of each variable of changing national culture, modern thought, Japanese "soup culture", and eastern and western monsters of Japanese monster culture is greater than 0.1, and the characteristic root of  $VIF < 10$  times of the principal component analysis of independent variables is also much greater than, and the conditional index is much less than 30, so it is reasonable to think that before regression analysis, there is no There is a problem of multicollinearity, and the regression analysis is meaningful.

**Table 1.** Multiple covariance test for multiple regression of Japanese demon culture shock

	Ethnic Culture	Modern thought	Japanese "hot spring culture"	Eastern and Western Monsters
1	1.000	1.000	0.056	8.095
2	0.949	1.728	0.086	5.871
	0.894	1.041	0.027	12.752

#### 3.2. REGRESSION ANALYSIS OF THE DEGREE OF IMPACT OF SHOCKS

In order to further explore the direct relationship between the impact influence of Chinese traditional culture on Japanese monster culture, the degree of impact influence of Japanese monster culture was tested for multiple covariance by multiple regression as shown in Table 2. We used the degree of impact on Japanese monster culture as the dependent variable, and the intensity of change of national culture, modern thought, Japanese "soup culture", and



eastern and western monsters as independent variables for the regression analysis.

It can be seen that all variables are normally distributed within the range and there is no problem of multiple cointegration, so multiple regression analysis can be performed.

**Table 2.** Multiple covariance test with multiple regression for the degree of impact of shocks

	<b>Ethnic Culture</b>	<b>Modern thought</b>	<b>Japanese “hot spring culture”</b>	<b>Eastern and Western Monsters</b>
1	1.000	1.000	0.099	16.571
2	0.990	1.402	0.058	10.619
	0.954	1.019	0.836	19.651

#### 4. CONCLUSION

Where there are people, there is culture, there is folklore, and folklore is alive and well and is a reflection of everyday life. The modern young people’s acceptance of demons and the change of people’s perception of demons, people’s acceptance of demons and the influence of demons on people are interactive. People’s perception of monsters will change with the times and a series of changes. Although the culture of monsters was formed earlier in the period and gradually influenced people’s lives, there is no shortage of topics linked to the culture of monsters and monsters in the current film and television works, which are analyzed from the ethnic perspective.

This paper is also an attempt to do a systematic exploration and sorting out of the influence of Chinese traditional culture on Japanese demon culture, revealing the main problems in Japanese demon culture, and on this basis, analyzing the regression model of the influence of Chinese traditional culture on Japanese demon culture.

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# THE CURRICULUM LOGIC AND PRACTICAL PATH OF INTEGRATING THE CONSTRUCTION OF CIVICS AND POLITICAL SCIENCE COURSES IN UNIVERSITIES AND SCHOOLS

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## ABSTRACT

In this paper, in exploring the curriculum logic and practical path of the integrated construction of the Civics course in universities and colleges, the theoretical basis of the Civics course construction is explored, the Civics teaching goal construction is constructed with the Civics teaching framework design based on the ADDIE model, and the implementation effect of the Civics teaching method of the ADDIE model is verified using  $t$  test to analyze the Civics teaching participation. Students were statistically significant in 3 dimensions of overall knowledge cognition degree and cognitive-emotional experience, and knowledge cognitive skills. This indicates that the Civics teaching method using the construction of ADDIE model is conducive to promoting the integration of Civics courses in universities and schools.

## KEYWORDS

Civics integration; Civics curriculum construction; ADDIE model; Teaching framework

## 1. INTRODUCTION

The ideological and political theory course is a key course for implementing the fundamental task of establishing moral education and forging the soul to educate people [1]. Using the systemic and holistic concept, it has an important contemporary value to promote the integrated construction of ideological and political science courses in universities and colleges [2]. The integrated construction of Civics and Political Science courses is conducive to the implementation of the fundamental task of establishing moral education, to the promotion of the spiral of Civics and Political Science courses, and to the realization of the connotative development of Civics and Political Science courses [3].

To truly realize the connotative development of ideological and political courses and the cultivation of talents with good ideological and political quality, the implementation of integrated construction of ideological and political theory courses in universities and schools is the way to go and the necessary policy [4]. Curriculum content is the soul of curriculum construction, and the integrated curriculum construction of ideological and political science courses in universities and schools is the key grasp to realize the integrated construction of ideological and political science courses in universities and schools [5-6]. In this paper, on the basis of in-depth analysis and research on the problem of integrated construction of ideology and politics courses and its causes, we insist on combining theory and practice, and launch a systematic

exploration around the specific path of integrated construction of ideology and politics courses. It is led by the systemic concept, followed by gradual and spiral progress, and based on the theory of cognitive development, while insisting on the unity of political and academic rationality, and the unity of global and stage [7]. With the design of Civics teaching objectives as the key, the system is constructed and promoted as a whole, with a view to achieving the integration of Civics courses in universities and schools [8].

## **2. CURRICULUM LOGIC OF THE INTEGRATED CONSTRUCTION OF CIVICS COURSES**

### **2.1. RATIONALE FOR CURRICULUM DEVELOPMENT**

#### **2.1.1. THEORY OF COMPREHENSIVE HUMAN DEVELOPMENT**

The theory of all-round human development is the highest value ideal of Marxism and the highest ideal realm of real human development. Based on the Marxist theory of comprehensive human development, the integrated construction of college and university thought and political science classes must take the comprehensive development of students as the starting point and end point of the integrated construction, must meet the internal and external development needs of students, to achieve the comprehensive development of students as the ultimate goal of education, planning the integrated construction system of college and university thought and political science classes to achieve its proper effect.

Education is a continuous process, which requires us to follow the law of physical and mental development and growth and the law of ideological and political education to orderly connect the content of the curriculum of the ideological and political courses of universities and colleges, to carry out ideological and political education in a variety of forms that students like, and to carry out targeted ideological and political education activities in accordance with the cognitive level and favorite preferences of students in each school period, so as to stimulate and motivate students' independent This will stimulate and motivate students' independent learning and promote their all-round development.

#### **2.1.2. SYSTEMS SCIENCE THEORY**

Systems science, as the study of the patterns, principles and laws of all systems, has the following distinctive features:

a) Integrity. All kinds of things and processes in the world are not a mechanical superposition of the functions and properties of the constituent elements, but an organic whole formed by an orderly combination of essentials.

b) Orderly. The development of the movement of the system and the internal behavior and function of the system can usually be unfolded as a process.

c) Dynamicity and openness. The two are interrelated, and any system is in motion and change, constantly adjusting its structure and elements under the interaction of the internal and external environment, in order to adapt to changes and development.

d) Optimization. The ultimate goal of systems science as a method of research is to achieve the optimization of things, which is essentially a kind of control of things.

#### **2.1.3. SPIRAL CURRICULUM THEORY**

Bruner's spiral curriculum theory, analyzed from a disciplinary logic perspective, is found to focus on the logic of arranging graded curriculum content, emphasizing basic disciplinary concepts and principles, and capturing the latest disciplinary knowledge. Taking a psychological perspective, it is found that it emphasizes the cognitive base and cognitive state

of learners, the transformation of subject knowledge into pedagogical knowledge, and the guidance and discovery of students' initiative and creativity.

In view of this, the integrated construction of Civics and Political Science courses in universities and colleges must be based on spiral curriculum theory, to ensure that the knowledge content of each school section goes from simple to complex, from shallow to deep, and ascends in a cycle, adhering to the principle of gradation and progression in content setting, and maintaining a reasonable gradient system, step by step.

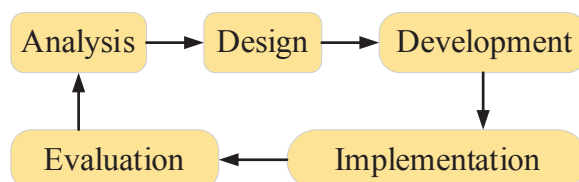
## 2.2. THE PRACTICAL PATH OF THE INTEGRATED CONSTRUCTION OF CIVIC STUDIES

### 2.2.1. DESIGN OF CIVICS TEACHING OBJECTIVES

Based on the ADDIE model, the teaching objectives, learning objects and teaching environment are comprehensively analyzed, and the teaching practice design is carried out in stages by combining the actual characteristics of Civics course learning. The teaching design of Civics and Mathematical Statistics based on ADDIE model includes the design of Civics teaching objectives, teaching mode design and teaching process design. Combining with practical problems or real life, we reasonably design vivid problem situations or course Civics situations and carry out exploratory teaching by using the form of questioning.

### 2.2.2. TEACHING FRAMEWORK DESIGN

The design of Civics teaching framework based on ADDIE model is shown in Figure 1. The Civics teaching model based on the ADDIE model is combined with the syllabus and teaching schedule of the Probability and Mathematical Statistics course to sort out the Civics teaching elements of the course. Using the above Civics elements, the pre-course learning scenario construction stage is guided by the engineering development theory of the analysis and design of the ADDIE model, and the pre-course knowledge of the Civics teaching primer in the teaching example of introducing the origin and development sources of probability theory.



**Table 1.** Framework of teaching Civics based on ADDIE model

## 3. IMPLEMENTATION AND EVALUATION OF THE INTEGRATED CONSTRUCTION OF CIVIC STUDIES

### 3.1. UNITE TO BUILD CONSTRUCTION MECHANISM

To build an effective mechanism for the integrated construction of the Civic and Political Science course, and insist on strengthening the ideological and political theory course in the improvement, it is necessary to uphold the concept of the Great Civic and Political Science, follow the “three logics”, and achieve integration and synergy. Follow the logic of vertical deepening of the discipline of education. Different schools, different grades, different regions of the Civic and Political Science class can not be conceptualized, one-sided, fragmented, but need to implement the “integration” concept. Follow the horizontal synergy of the same direction of common education logic. The company's main goal is to provide the best possible service to its customers. Follow the logic of spiral progressive cognitive progression. The construction of each school section of the Civics course should reflect the idea of “a chess game”.

### 3.2. ANALYSIS OF THE PARTICIPATION OF CIVICS TEACHING

Comparing the effectiveness of the implementation of the Civics teaching method based on the ADDIE model, a *t*-test was used to verify the differences in students' cognitive levels of classroom knowledge points before and after implementation as shown in Table 1. The students have statistical significance in 3 dimensions of overall knowledge recognition level and cognitive-emotional experience and knowledge recognition skills. It shows that the model has improved and enhanced the students' knowledge recognition and emotional recognition in Civics, and the effectiveness of the method will be enhanced in the future by increasing the frequency and depth of teacher-student and student-student interactions.

**Table 1.** *t*-test of involvement in teaching Civics

Cognitive dimensions	Pre-test Means	Post-test Mean	Mean value of change	<i>t</i> -Mean	<i>p</i> -Mean
Civic Knowledge Identity	3.82	3.26	0.11	2.62	0.005
Individual Cognition	3.81	3.14	0.06	0.74	0.358
Civic task cognition	3.49	3.60	0.30	1.85	0.629
Emotional identity	3.63	3.17	0.09	0.62	0.007
Metacognitive experience	3.74	3.63	0.13	0.75	0.005
Civic cognitive experience	3.95	3.37	0.21	2.18	0.293

### 4. CONCLUSION

Education is the great plan of the country and the party, and it bears the fundamental task of establishing moral education. The Civics course is the key course to implement the fundamental task of establishing moral education, and has been highly valued in all school sections. In the new era to promote the integration of the construction of the Civics course in schools and universities is a complex and systematic project, can not be achieved overnight, need to strengthen the Civics course integration of the operational mechanisms and institutional safeguards, the formation of a strong synergy, the need to dialectically deal with the relationship between all parties. As a fundamental part of the integrated construction of Civics and Political Science class, the integrated construction of Civics and Political Science teaching goal design should become an important grasp to promote the reform and innovation of Civics and Political Science class. When the integration of Civics and Political Science courses in universities, schools and colleges is realized, it can effectively enhance the scientific nature of Civics and the effectiveness of Civics and Political Science education and teaching.

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# CULTIVATION OF INNOVATIVE AND ENTREPRENEURIAL TALENTS OF ART AND DESIGN MAJORS IN INNER MONGOLIA IN THE CONTEXT OF DATA COLLECTION

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## ABSTRACT

This paper explores the cultivation of innovative and entrepreneurial talents in art and design majors in Inner Mongolia in the context of data collection, analyzes the demand for a web-based distance education system that meets the characteristics of Inner Mongolia, develops a platform for cultivating innovative and entrepreneurial talents in B/S mode, implements automated testing of the API data interface by combining Postman and Newman, and tests the performance of the platform data collection module. The response time of the interface of the course management module for a certain request sent was 88ms, and the response time of most interfaces was within 100ms. Therefore, the development of innovation and entrepreneurship talent cultivation platform in B/S mode helps ensure the quality of innovation and entrepreneurship talents in higher education institutions.

## KEYWORDS

Data collection; Innovative and entrepreneurial talents; Web-based distance education system; B/S model; Data collection module; Course management module

## 1. INTRODUCTION

With the onset of the employment wave, the problem of difficult employment is increasingly mentioned, and the state has begun to encourage college students to start their own business [1-2]. In this way to broaden the ways and channels of employment of college students employment is an important factor about social stability and harmony, and the return path of college students after graduation is an object that society needs to focus on [3]. Therefore, innovation and entrepreneurship coursework has also gradually come into the vision of the society, and regional governments have started to build the model of innovation and entrepreneurship talent training [4-5]. Higher education institutions in Inner Mongolia region are no exception, and several higher education institutions in Inner Mongolia region have started to explore the best way to cultivate innovative and entrepreneurial talents in order to cultivate high-quality innovative and entrepreneurial talents through high-quality innovative and entrepreneurial education, which can provide good knowledge accumulation for college students' entrepreneurship and richer prospects for college students' employment [6-7]. A practical research project about innovation and entrepreneurship teaching reform of art and design students in Inner Mongolia region in the context of data collection to improve their innovation and entrepreneurship ability [8-10]. In this paper, we start from improving the training program corresponding to social needs, building a curriculum system corresponding to industrial needs, reforming teaching strategies and methods, deepening teaching practice and practical training, strengthening the construction of innovative and entrepreneurial faculty,

and optimizing teaching evaluation and management [11-12].

## **2. DEVELOPMENT MODEL OF INNOVATIVE AND ENTREPRENEURIAL TALENT TRAINING SYSTEM IN INNER MONGOLIA REGION**

### **2.1. B/S MODE**

B/S, the so-called browser/server model, is now widely used in the development of information systems in various fields and is a new model of network architecture. WEB browser is the main application software for the client, the architecture is relatively simple, the client only needs to install a browser, and the server installs the database. With the help of Web server, the browser is connected to the database for data interaction.

The B/S architecture reduces the client workload, and the client does not need to install cumbersome client-side software. The data processing is done in the interaction between the browser and the server. Database access, application execution, and other tasks are more often done by the server. WEB SERVER is responsible for data request, processing, result return and dynamic web page generation. The B/S structure shifts the load to the WEB server, reducing the pressure on the client.

### **2.2. NETWORK DISTANCE EDUCATION SYSTEM REQUIREMENT ANALYSIS**

#### **2.2.1. FEASIBILITY OF EDUCATION SYSTEM DEVELOPMENT**

With the increasing degree of information technology, online courses are developing, and some schools are starting to implement online distance learning programs while building their own course websites based on traditional teaching.

Coupled with the continuous maturity of network technology, the art design course on the system page design through the use of software such as Dreamweave, while using SQLServer2005 for database design, using ASP.NET programming language and C# programming language technology to combine the specific design and implementation of the site.

In distance education, the networked system will play an irreplaceable role in the whole process, and the networked distance learning system will be an indispensable means to create new standards in education in the future.

#### **2.2.2. ART AND DESIGN COURSE PRACTICE**

Although the practice of art and design courses cannot completely replace art and design education, it is still an important part of learning for art and design students. The purpose of training art and design students is to enable them to better adapt to society, integrate into society, and provide products and services to society after completion of their studies. The domestic art and design curriculum still lacks the necessary connection with market demand, and this phenomenon is mainly related to the way the curriculum is set up, resulting in art and design schools having little opportunity to contact society in the process of teaching, especially online distance learning, and students basically have no opportunity to conduct relevant practical learning. In the design process of distance learning network, modules like “practice garden” must be set up, and modules like “school-enterprise home” can be set up according to their specific conditions, so that network distance learning can gradually come out from the traditional “academic” teaching mode.



### 3. PERFORMANCE TESTING OF THE INNOVATION AND ENTREPRENEURSHIP TALENT TRAINING PLATFORM IN THE CONTEXT OF DATA COLLECTION

#### 3.1. BACKEND INTERFACE TESTING

Postman and Newman are combined to automate the testing of API data interfaces. Several interfaces are selected for testing in the permission management module, personnel management module, course management module and competition management module respectively.

Test procedure: Using Posman software, we send request operations for each interface, save the requested records to the test.json file, and subsequently, run the json file through Newman software, set the number of runs to 200, and obtain the results of the response time of the bulk calls to the API data interface.

Interface response time test analysis is shown in Table 1. For Postman, the results of a certain request sent to the interface of the course management module, the response time of the interface is 88ms, and the response time of most interfaces is within 100ms. Therefore, the test results meet the requirements of the performance indicators for response time.

**Table 1.** Interface response time test analysis

Achieved function	Number of tests	Average response time
User role information call	200	78ms
Current role information for system teachers	200	37ms
Personal information management	200	72ms
List of student information details	200	91ms
Audit function call	200	86ms
List of related information	200	107ms
Get the list of course information	200	84ms

#### 3.2. DATA ACQUISITION MODULE PERFORMANCE TEST

For the measurement of keyword extraction algorithm, the method of comparing the results automatically extracted by the algorithm with those manually extracted is usually adopted, and the data such as accuracy rate, recall rate and  $F$  value are obtained as the measurement results.

The accuracy formula,  $P$ , is the algorithm's ability to extract the exact keywords:

$$P = \frac{|N \cap M|}{|N|} \quad (1)$$

Recall formula,  $R$  is the ability of the algorithm to extract keywords:

$$R = \frac{|N \cap M|}{|M|} \quad (2)$$

Reconciling the mean equation:

$$R = \frac{2PR}{P + R} \quad (3)$$

The test was conducted by manually labeling two to three keywords and setting the number of keywords extracted by the algorithm to three uniformly. According to the above formula,

three performance indexes such as accuracy  $P$ , recall  $R$ , and  $F$  values were used to evaluate the performance of the two algorithms in extracting keywords. Table 2 shows the test results of  $P$ ,  $R$ , and  $F$  values for keyword extraction by TF-IDF and TextRank algorithms.

**Table 2.** Algorithm test comparison results analysis

Algorithm	Accuracy	Recall	$F$ -value
TF-IDF	76%	87%	73%
TextRank	68%	73%	79%

#### 4. CONCLUSION

With the introduction of national policies to encourage innovation and entrepreneurship, the demand for innovative and entrepreneurial talents is increasing, and higher education institutions, as the cradle for breeding high-quality talents, have an important significance in the process of cultivating innovative and entrepreneurial talents. Although the concept of innovative and entrepreneurial talents cultivation has been accepted and recognized by major institutions, research on the quality and measures of innovative and entrepreneurial talents cultivation in higher education institutions is still in a blank stage. The study of the quality and measures of innovation and entrepreneurship training in colleges and universities is still in a gap. It indirectly solves the problem of lack of effect evaluation and dynamic monitoring of the quality measures for the cultivation of innovative and entrepreneurial talents in Inner Mongolia art and design. Thus, we can ensure the quality of innovative and entrepreneurial talents in higher education institutions and truly implement the policies related to the cultivation of innovative and entrepreneurial talents.

#### ABOUT THE AUTHOR

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# EXPLORATION OF ADDING KEY AUDIT MATTERS TO CORPORATE CLASS BOND AUDIT BASED ON THE BACKGROUND OF BIG DATA ALGORITHM

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## ABSTRACT

This paper discusses the addition of key audit matters to corporate class bond audits. Based on the concepts of key audit matters and decision-making framework, this paper discusses the application of key audit matters in bond audits, and analyzes and discusses the positioning of responsibilities, issues that should be paid attention to, and special provisions for considering special bonds in bond audits with regard to the addition of key audit matters. Finally, it is concluded that in the context of big data algorithm, bond auditing needs to consider more critical audit matters to protect investors' interests and stable market development.

## KEY WORDS

Bond audit; Key audit matters; Decision-making framework; Investor interest; Duty orientation

## 1. INTRODUCTION

In the era of big data, corporate class bond auditing has become one of the important financial auditing areas [1]. With the continuous development of information technology, various data collection, storage, and analysis technologies have been widely used in corporate class bond auditing [2]. The application of these technologies not only improves audit efficiency and accuracy, but also helps auditors to better understand the financial position and operations of the company [3]. Critical audit matters are important matters that affect the authenticity, integrity and reliability of a company's financial reports [4]. In the context of big data algorithms, key audit matters may involve multiple aspects such as data collection, processing, and analysis [5]. Therefore, strengthening the study of key audit matters can help auditors better grasp audit priorities and improve audit quality and efficiency [6].

The literature [7] explored aspects of disclosure of key audit matters, types and influencing factors. The results indicate that most listed companies in the Chinese A-share market have chosen to disclose critical audit matters and that these matters usually involve significant accounting estimates and accounting policies. The literature [8] found that the disclosure of critical audit matters increases auditor liability and there is some self-protective behavior of auditors in the disclosure of critical audit matters by analyzing the assessment reports of Thai auditors between 2018 and 2019. The literature [9] explored the definition, disclosure, and assessment of critical audit matters through in-depth interviews with 15 audit professionals. It was found that although the concept and requirements of critical audit matters have been clearly defined by the IAASB, in practice, their understanding and application still vary among auditors and companies.

This paper adopts a combination of literature review and case study for the study. First, by combing and analyzing the relevant literature, we summarize the key audit matters and their decision-making framework that need to be added in the audit of corporate class bonds based on the background of big data algorithm. Secondly, based on this, the application of key audit matters in bond auditing is explored, and the issues that bond auditors need to pay attention to when adding key audit matters and the positioning of responsibilities are analyzed in depth.

## **2. KEY AUDIT MATTERS AND DECISION-MAKING FRAMEWORK**

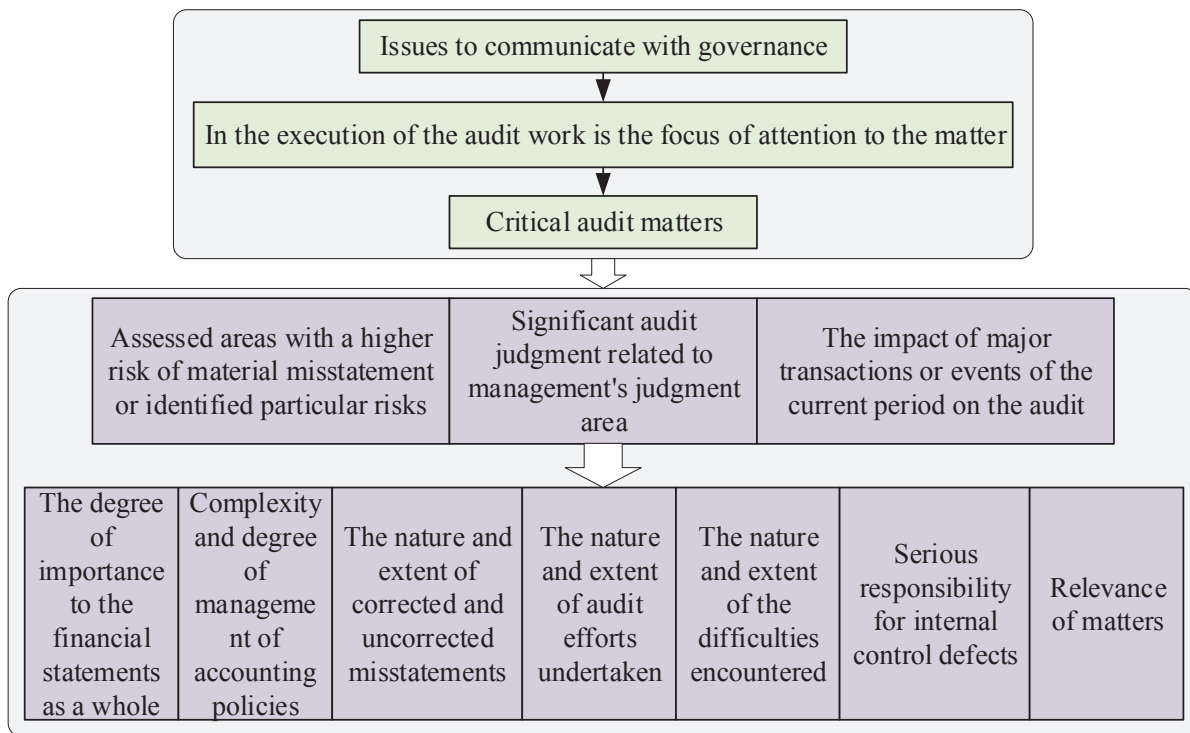
### **2.1. KEY AUDIT MATTERS**

A key audit matter is a matter that the CPA considers, based on professional judgment, to be the most important for the audit of the financial statements for the current period. The CPA is required to exercise professional judgment in determining critical audit matters and, after taking into full consideration the nature of the audited entity, industry conditions and other key factors, carefully select matters from among those matters communicated with the management of the audited entity and those matters that have been the focus of the audit work performed. Although critical audit matters, emphasis of matter and other matters all require the CPA to use professional judgment, critical audit matters are different from emphasis of matter and other matters. An emphasis of matter paragraph is a matter that is properly presented or disclosed in the financial statements and that, in the CPA's professional judgment, is critical to the financial statement user's understanding of the financial statements. An other matter paragraph is a matter that is not presented or disclosed in the financial statements and that, in the CPA's professional judgment, is relevant to the financial report user's understanding of the audit, the CPA's responsibilities, or the audit report.

### **2.2. DECISION-MAKING FRAMEWORK FOR KEY AUDIT MATTERS**

In determining the key audit matters, the CPA should first take the matters communicated with the governance as the starting point, and look for matters among them that the CPA has focused on in performing the audit work, and then combine the influence of all relevant factors to finally determine the key audit matters. The matters that CPAs have focused on in performing audit work are mainly in the following three areas:

- (1) Areas with a high risk of material misstatement or special risks identified.
- (2) Significant audit judgments related to areas of management judgment, usually involving difficult or complex CPA professional judgment.
- (3) The effect of significant transactions or events in the period on the audit. In identifying the most significant matters in these three major areas, special consideration is given to seven areas, and the decision-making process for key audit matters is shown in Figure 1.



**Figure 1.** Decision-making process of key audit items

### **3. EXPLORATION OF THE APPLICATION OF KEY AUDIT MATTERS IN BOND AUDITING**

#### **3.1. BOND AUDIT TO INCREASE THE POSITION OF RESPONSIBILITY FOR KEY AUDIT MATTERS**

Since debt financing instruments in the interbank bond market do not fall under the category of “securities” listed in the Securities Law, China’s largest corporate credit bond issuance and trading market is outside the regulation of the new Securities Law, and as a direct result, issuers of debt financing instruments are not included in the scope of implementation of the new auditing standards. However, since corporate bonds, corporate bonds and debt financing instruments are not different in terms of the nature of the bonds (they are all corporate credit bonds), regulators often combine them as corporate credit bonds. Based on the fairness of protecting the rights and interests of bond investors, every investor should enjoy the right to equal access to capital market information. Therefore, regulators (Ministry of Finance, PBoC, dealers’ associations, etc.) should clarify that in the annual audit of corporate credit bond issuers, CPAs should apply Standard 5104 and disclose key audit matters in the audit report to lay the foundation for the implementation of the standard at the policy level.

#### **3.2. ISSUES TO FOCUS ON WHEN ADDING KEY AUDIT MATTERS IN BOND AUDITS**

The recognition of asset impairment and income is closely related to the financial performance of listed companies and is also a high-risk area for financial fraud. Therefore, during the audit of a listed company, CPAs communicate more with the audited entity about the business related to income and asset impairment and often disclose them as key audit matters. However, when auditing debt-issuing companies, bond investors are more concerned about the company’s solvency, such as whether the cash flow is reasonable and whether there are enough funds to repay the principal and interest, than whether the company can achieve high profitability.

### **3.2.1. FOCUS ON RELATED PARTY TRANSACTIONS**

When auditing bond issuers, attention needs to be paid to their transactions with related parties, especially for corporate credit bond issuers, which are prone to audit risks such as irregular handling of related party transactions and untimely disclosure of information due to their complex related party relationships. The auditor needs to particularly review the related party transactions of the audited entity to exclude the risk of concealing or inflating the transactions. For non-listed issuers, there is a lack of supervision by regulators and more attention should be paid to this.

### **3.2.2. ATTENTION TO THE EXISTENCE OF MONETARY FUNDS**

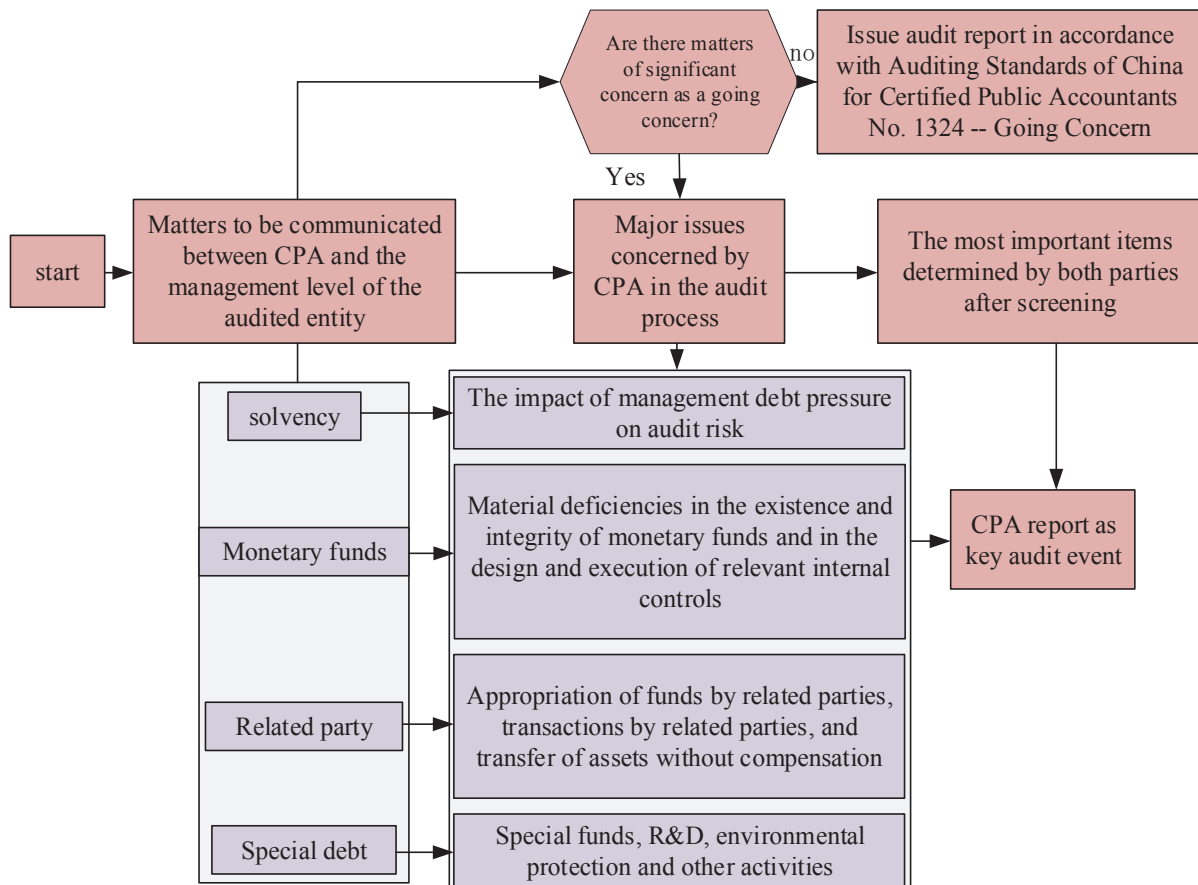
When auditors review the accounts of bond issuers, they need to focus on the authenticity and existence of the presentation of monetary funds, especially when the enterprise group adopts centralized fund management, which is prone to the risk of funds being tied up. Therefore, the auditor needs to focus on the centralized management of funds in an enterprise to determine whether monetary funds or internal controls related to monetary funds should be identified as a key audit matter.

### **3.2.3. FOCUS ON REFINANCING CAPACITY**

The nature of bonds is a fixed-term, fixed-income investment, and bond investors are more concerned about the refinancing ability of the bond issuer, i.e., its ability to repay its debts as they mature. Therefore, when auditing a bond issuer, auditors need to focus on its refinancing ability, which is affected by factors such as changes in the external business environment. The auditor needs to assess whether the issuer is facing operating difficulties and whether it has sufficient bank credit to determine whether it affects the issuer's ability to continue as a going concern or to service its debts.

### **3.2.4. CONSIDER SPECIAL PROVISIONS FOR SPECIAL DEBT**

In recent years, policy-oriented bonds, such as green bonds, carbon neutral bonds and innovation bonds, have become increasingly popular in China due to their low financing costs and the advantages of rapid registration and issuance. These bonds have special regulations, and auditors need to pay attention to issues such as the use of bond funds, project effectiveness and third-party certification when auditing a company's issuance of special bonds. For example, for green bonds, companies must establish a special fund account and use the funds only for specified purposes, or the company may face disciplinary action. Auditors should consider these factors when determining key audit matters for bond audits. Based on the relevant auditing standards, this paper draws a flow chart of the process and factors to be considered by CPAs in determining key audit matters for bond audits as shown in Figure 2 to help auditors in their bond audit work.



**Figure 2.** Process and concerns of key audit matters

#### 4. CONCLUSION

This paper discusses the exploration of adding key audit matters to corporate class bond audits based on the context of big data algorithms. Starting from the concepts of key audit matters and decision-making framework, this paper discusses the application of key audit matters in bond audits and provides an in-depth analysis of the positioning of responsibilities, issues that should be paid attention to, and special provisions for considering special bonds in bond audits by adding key audit matters. Therefore, adding key audit matters can improve the transparency and stability of the bond market and protect the interests of investors. In the future, as technology continues to advance and regulatory policies continue to improve, corporate bond audits will become more stringent and standardized.

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# RESEARCH ON ENTERPRISE ORGANIZATION STRUCTURE DESIGN AND MANAGEMENT CHANGE SYSTEM BASED ON ARTIFICIAL INTELLIGENCE BACKGROUND

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## ABSTRACT

This paper first analyzes the external and internal factors affecting the change of corporate organizational structure, including information technology, market competition, corporate strategy, size and development stage, organizational culture, and management factors. Then it proposes a design plan for optimizing the company's organizational structure, including strengthening the management control platform programmatic management, establishing a common belief system, rationalizing the team structure and paying attention to performance management and reshaping the compensation structure. Therefore, for companies, optimizing organizational structure is a process of continuous adjustment and improvement, and requires constant adaptation to changes in the market environment to achieve more efficient management.

## KEYWORDS

Business organizational structure; Shared belief systems; External factors; Internal factors; Performance management; Artificial intelligence

## 1. INTRODUCTION

In recent years, artificial intelligence has gradually penetrated into various industries and fields, and it has had a profound impact on the design and management of enterprise organizational structures [1-2]. Traditional enterprise organizational structures are often dominated by vertical hierarchies, with inefficient information transfer and slow decision-making processes that cannot adapt to rapidly changing market demands [3-4]. In contrast, the design of enterprise organization structure based on artificial intelligence can achieve rapid information transfer and processing, improve the reaction speed and decision-making efficiency of enterprises, and make management more efficient and targeted [5-6]. Therefore, exploring how to use artificial intelligence to optimize enterprise organizational structure design and management style is a current research hotspot in the field of business [7]. Kurpayanidi, K explored how to establish an effective management system for industrial enterprises in terms of organizational structure design, process optimization, and information technology application [8]. Foster, W. M used in-depth interviews with 10 managers, analyzed how corporate restructuring changes the nature of managerial work. The study found that corporate restructuring leads to changes in the scope of management work, increased responsibilities, and decreased job security, as well as negative effects on career paths, promotion opportunities, and compensation [9]. The purpose of this paper is to explore the organizational

structure design and management change system of companies in the era of artificial intelligence. In order to achieve this goal, we will first analyze the impact of external and internal factors on the organizational structure change of a company. Next, we will propose some feasible design options for optimizing the company's organizational structure and specify the implementation measures.

## **2. INFLUENCING FACTORS OF ORGANIZATIONAL CHANGE IN ENTERPRISES**

### **2.1. EXTERNAL FACTORS AFFECTING ORGANIZATIONAL CHANGE IN ENTERPRISES**

#### **2.1.1. THE IMPACT OF INFORMATION TECHNOLOGY**

Information technology, especially network technology, has triggered a global change in business. The word "network" is beginning to enter the life of the public, and it is performing the important function of changing people's concept of time and space, and influencing the structure and operation of business organizations. The improvement of enterprise information efficiency only provides the possibility of sharing, but to make it a reality, the cooperation of all members of the organization is indispensable, and it can only become a necessary condition for the change of the enterprise organization.

#### **2.1.2. THE IMPACT OF MARKET COMPETITION**

Market competition is becoming more and more intense, there are more ways to test the success or failure of an enterprise, and the time is shorter. For most enterprises, the life cycle keeps shortening, the frequency of enterprise creation and bankruptcy gradually accelerates, and the instability of market transactions increases. Facing the complex and changing market, if the enterprise organization structure cannot be adjusted in time, the probability of business failure or even bankruptcy will be increasing.

### **2.2. INTERNAL FACTORS AFFECTING ORGANIZATIONAL CHANGE IN ENTERPRISES**

#### **2.2.1. IMPACT OF CORPORATE STRATEGY**

Corporate strategy is a long-term goal and achievement strategy in the design of organizational structure, developed for factors such as market positioning, competitive advantage and growth objectives. A differentiation strategy focuses on improving customer perception and value of products and services, and is therefore better suited to a flexible organizational structure. Cost leadership strategy, on the other hand, requires a more prescriptive organizational structure to control costs. Corporate organizational structure must be adapted to the growth strategy and business characteristics of the company and take into account the actual changes in the ownership structure adjustment.

#### **2.2.2. THE INFLUENCE OF ENTERPRISE SIZE AND DEVELOPMENT STAGE**

Most companies are in the growth and transition period and need to learn from international corporate management experience. The different nature of enterprises leads to different organizational management characteristics, and they need to learn and understand other enterprises in all aspects to adapt to future development requirements and actual situation. In the learning process, we need to conduct discriminative analysis and find the suitable organizational structure model for ourselves.

#### **2.2.3. INFLUENCE OF CORPORATE ORGANIZATIONAL CULTURE**

Since each company has its own cultural history, corporate culture has a certain global dimension and is decisive for all levels of the company. Therefore, the organizational structure

of a company is a vehicle for the dissemination of corporate culture and the implementation of strategy, and is bound to be influenced by culture and strategy at the origin stage.

#### **2.2.4. INFLUENCE OF CORPORATE MANAGEMENT FACTORS**

In private enterprises, top managers centralize all kinds of rights in their own hands. And this over-centralized management mode, in the initial stage, has a certain promotion of the development of enterprises, but, with the development of the enterprise's scale bigger and bigger, the allocation of functions and staffing of various departments appear to be vague and inappropriate, and finally more and more detrimental to the development of enterprises.

### **3. COMPANY ORGANIZATION STRUCTURE OPTIMIZATION DESIGN PLAN**

From the perspective of the enterprise development stage, the optimized design of the organizational structure is as follows:

(1) First of all, we should set up additional human resources department to improve the modern enterprise management system.

(2) For the phenomenon of general manager, we can consider setting up several positions of deputy general manager to be in charge of engineering quality, operation, personnel, etc., and setting up three general masters to provide suggestions and decisions for the company's decision-making, and three general masters to act as managers of departments of various specialties.

(3) For the comprehensive consideration of the contribution and performance of the enterprise after the restructuring, some department managers are promoted to the position of deputy general manager. For reasonable departments to retain, there is a cross-functional part of the merger or split. For the merged departments, the managers of the main functional departments are retained based on the main functions.

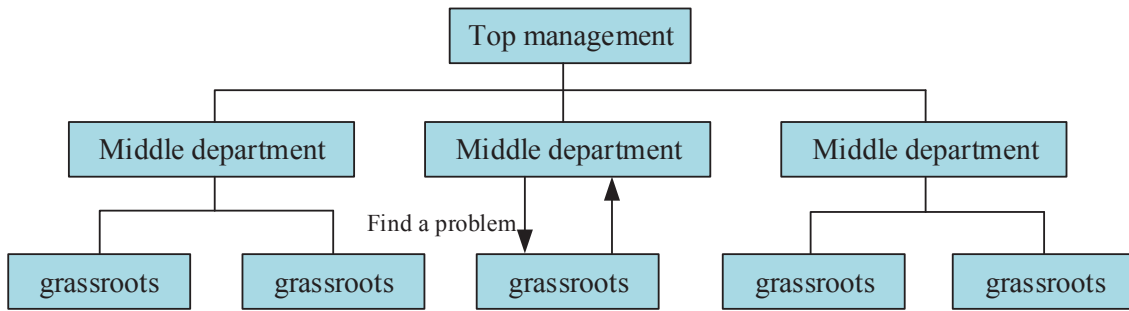
(4) The organizational structure of the project department will not be adjusted, but new recruits will be assigned to the project department every year for training and practice, and reasonable arrangements will be made according to individual performance and company needs for at least one year.

(5) set up a branch, in the past, some companies have the ability but not promoted most of their own outside the project or project, can be set up through the branch to let them serve as the branch leader, retain these people have the ability and relationship, but also to maintain and encourage their enthusiasm.

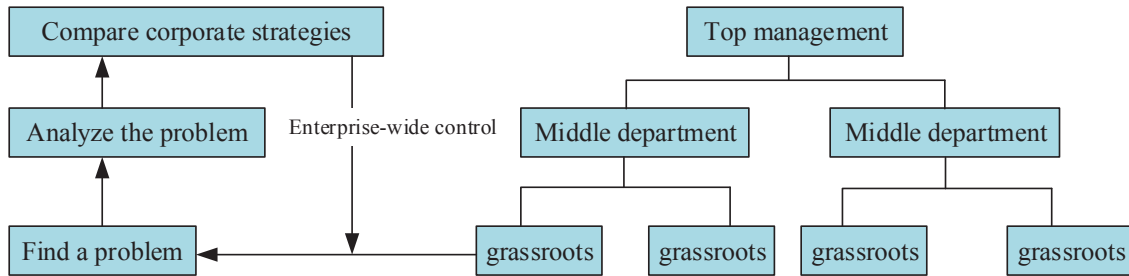
### **4. IMPLEMENTATION MEASURES FOR OPTIMIZATION OF THE COMPANY'S ORGANIZATIONAL STRUCTURE**

#### **4.1. STRENGTHEN MANAGEMENT CONTROL PLATFORM PROGRAMMATIC MANAGEMENT**

At each stage of the organizational optimization and adjustment, the corresponding management system is developed and the procedure is strictly implemented. The flow chart of control in management is shown in Figure 1. The management system cannot be replaced at will, and the implementation process needs to prevent interference and abolish the system that cannot be applied. The management system is regularly updated to ensure its effectiveness. The management control platform needs to be implemented into the actual work to control specific projects to ensure the successful completion of the project and demonstrate good corporate control. The management control system flow chart is shown in Figure 2.



**Figure 1.** Controls in administration



**Figure 2.** Management control system

#### 4.2. ESTABLISHING A COMMON BELIEF SYSTEM

We integrate the concept of “people first” into our corporate culture, establish a common belief system, and strengthen communication between employees and managers. The criteria for corporate values include a unique corporate agenda, salary and benefits, beliefs and cultural heritage, and long-term development strategies. Establishing a belief system to transmit corporate values, mobilizing employees’ initiative, and giving them a sense of belonging will lay a good foundation for corporate development.

#### 4.3. RATIONALIZE TEAM STRUCTURE

A good team is the core competitiveness of a company and can develop a work plan according to the employees. The achievement of corporate goals cannot be achieved without the cooperation of a good team and requires effective cooperation among team members to better complete projects. Adjusting the team structure needs to pay attention to several points: complementary abilities, differences in abilities, and the pursuit of results. According to the project needs to form a team with complementary abilities, consider the differences in employee abilities, and pursue the team effect.

#### 4.4. EMPHASIS ON PERFORMANCE MANAGEMENT AND RESHAPING THE COMPENSATION STRUCTURE

Quantify the performance appraisal standards, make each performance standard scientific and precise, avoid disputes caused by the administrative department management evaluation, reduce employee satisfaction, and employees have the right to know the performance details. Sound performance system, clear performance goals for each employee, department and enterprise, and adjust according to the actual situation. Set up a communication and feedback mechanism to monitor employees’ performance completion in real time, give help, answer and change unreasonable places.

Performance is about pay, establish a reasonable performance management mechanism to motivate employees to work enthusiastically, reduce turnover rate and improve corporate performance. Enhance salary transparency, disclose salary structure and promotion positions, protect employees’ personal salary privacy, and ensure salary fairness.

## 5. CONCLUSION

By analyzing the external and internal factors influencing the change of corporate organizational structure, this paper proposes a design plan for optimizing the company's organizational structure and further proposes implementation measures. Among them, measures such as strengthening the procedural management of management control platform, establishing a common belief system, rationalizing the team structure, attaching importance to performance management and reshaping the compensation structure are expected to achieve better results in practice. Through the implementation of these measures, enterprises can better adapt to market competition and the development trend of information technology, and enhance their overall competitiveness and innovation capability. At the same time, this paper also provides some reference values for the subsequent research.

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# THE INTEGRATION OF LOW CARBON FITNESS CONCEPT IN COLLEGE PHYSICAL EDUCATION IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

This paper discusses the new idea of integrating low carbon fitness concept in college physical education in the context of deep learning, analyzes the demand of college physical education under the concept of low carbon fitness, explores the concept of “low carbon fitness” in college physical education, verifies the teaching behavior of low carbon fitness concept in physical education classroom, and tests the system with intra- and inter-rater methods. The reliability of the system was tested by intra- and inter-rater methods. There was a positive correlation between the data coded by the three observers,  $r = 0.91 - 0.95$ ,  $p \leq 0.01$ . The ANOVA results showed that there was no significant difference between the data coded by the three observers,  $F = 0.00$ ,  $p = 1.00$ . The physical education classroom behavior analysis system was used to provide a convenient curriculum model for the integration of low-carbon fitness concepts in college physical education.

## KEYWORDS

Deep learning; Low carbon fitness concept; College physical education; Classroom teaching behavior

## 1. INTRODUCTION

With the continuous improvement of people's living standard, low-carbon and healthy life has gradually become people's pursuit, thus, the concept of low-carbon fitness has emerged [1-2]. In order to meet the needs of the development of the times, colleges and universities began to innovate and reform physical education, and incorporate the low-carbon fitness concept into physical education to improve students' comprehensive physical fitness on the basis of reducing the waste and consumption of resources, thus improving the effect of teaching [3-4].

Taking the low-carbon fitness concept extended by ecological civilization as the entry point, we analyzed the theoretical demands of college physical education of low-carbon fitness concept and low-carbon teaching mode, and proposed the concept of light physical education [6]. It aims to guide that physical education in colleges and universities should reduce energy and resource consumption, lower carbon dioxide emissions, and make full use of the natural environment to achieve the purpose of physical education [7-8]. Physical education courses are all important parts of the teaching curriculum, and teachers can should call for low-carbon fitness and low-carbon sports for students in the process of teaching to reduce carbon emissions on the basis of ensuring the effect of sports, so as to achieve the purpose of protecting the environment [9-11]. This paper explores the physical education teaching in colleges and universities under the concept of low-carbon fitness and puts forward several

suggestions.

## **2. LOW CARBON FITNESS CONCEPT COLLEGE PHYSICAL EDUCATION IN THE CONTEXT OF DEEP LEARNING**

### **2.1. COLLEGE SPORTS UNDER THE CONCEPT OF LOW CARBON FITNESS**

#### **2.1.1. NEW MODEL OF “LOW-CARBON FITNESS” CONCEPT IN COLLEGE SPORTS**

“Low-carbon fitness” is a healthy fitness concept, the public in the process of fitness began to consider whether such fitness is low-carbon, environmental protection, whether ecological? And take the initiative to choose a more environmentally friendly way to exercise to reduce carbon dioxide emissions. Nowadays, “low-carbon fitness” has received attention and recognition from all walks of life, and many colleges and universities have taken the initiative to integrate the concept of “low-carbon fitness” into their physical education and tried to enhance their environmental awareness through innovative teaching methods, so that The concept of “protecting the environment and low-carbon development” is deeply rooted in people’s hearts.

#### **2.1.2. DEMAND FOR PHYSICAL FITNESS IN MODERN LIFESTYLES**

With the development of economy, social progress and the transformation of modern life style, rich material life is no longer a sign for people to enjoy life, but a rich and colorful spiritual life is more and more people pursue the goal, and people’s concern for their own health begins to gradually increase. Ecological sports and fitness is a modern fitness concept in terms of the relationship between people and the environment and nature, which requires people to carry out fitness exercises not only to achieve the purpose of physical exercise, but also to promote healthy psychology, improve the standard of living, improve the quality of life and other aspects of the purpose.

## **2.2. NEW IDEAS OF “LOW-CARBON FITNESS” CONCEPT IN UNIVERSITY SPORTS**

### **2.2.1. OPTIMIZE THE STRUCTURE OF COURSE SYSTEM**

The goal of higher education in the 21st century is “to know, to do, to co-exist and to survive”, which is to let students learn to learn, to master learning methods, to develop learning potential, to cultivate students’ ability to adapt to society, and to apply the learned knowledge to practical work and study. Therefore, in order to realize the transformation from “teacher as the main body” to “student as the main body” and optimize the structure of curriculum system, we must design the teaching curriculum from the perspective of stimulating students’ learning wisdom and ability, and arrange the teaching process from the law of students’ understanding of the content of physical education materials. The teaching process is arranged from the perspective of stimulating students’ learning intelligence and ability.

### **2.2.2. STIMULATING STUDENTS’ INTEREST IN SPORTS**

Interest is the initial motivation for learning and the guarantee of effective learning. Sports habits and interests are the prerequisites for promoting students’ independent learning and lifelong adherence to exercise. Interest plays a very important role in whether students can form sports hobbies and exercise habits through the learning of physical education courses. Only by stimulating and maintaining students’ interest in sports can students actively, consciously and positively learn and exercise in physical education courses, and further develop students’ “low-carbon fitness” habits. Therefore, in the physical education curriculum, from the selection of teaching materials, teaching methods, teaching process arrangements should be fully considered students’ interest in sports, and effectively promote the development of students’ “low-carbon fitness” habits.



### 3. AN EMPIRICAL TEST OF A BEHAVIORAL ANALYSIS SYSTEM FOR PHYSICAL EDUCATION CLASSROOM TEACHING

#### 3.1. RELIABILITY ANALYSIS OF PHYSICAL EDUCATION CLASSROOM TEACHING BEHAVIOR ANALYSIS SYSTEM

To verify the reliability of the behavioral analysis system for teaching low-carbon fitness concept physical education classroom in the context of deep learning, 10 videos of quality physical education classroom teaching under the Chinese health physical education curriculum model were observed separately, and intra-rater and inter-rater methods were used to test the reliability of the system. Pearson  $r$  correlation, ANOVA and two-way random group intra-rater correlation were conducted on the observed and recorded coded data to analyze the system reliability parameters as shown in Table 1.

**Table 1.** Analyzing the results of the system reliability parameters

Observers A/B/C	Pearson $r$	$F / P$	Inter-rater ICC	Intra-rater ICC
A×B	0.95**	0.00/1.00	0.95	
A×C	0.92**		0.92	
B×C	0.91**		0.91	
C				0.92

\*\*Significantly correlated at the 0.01 level.

There was a positive correlation between the data coded by the 3 observers,  $r = 0.91-0.95$ ,  $p \leq 0.01$ . ANOVA results showed no significant differences between the data coded by the 3 observers,  $F = 0.00$ ,  $p = 1.00$ . Reliability analysis results indicated that both inter-rater and intra-rater reflected good reliability, 0.91-0.95 for inter-rater and 0.92 for intra-rater.

#### 3.2. RELIABILITY OF A SYSTEM FOR ANALYZING TEACHING BEHAVIOR IN PHYSICAL EDUCATION CLASSROOMS

There was a need for standardized training for coders in this study to provide them with a better understanding of the operational definitions of physical education teacher behaviors, interactive behaviors, and student behaviors in the context of the low-carbon fitness concept and to enable them to make the right choices when observing and recording specific behaviors. As a result of a comprehensive and standardized training protocol, there was a positive correlation between the coded data recorded by the three observers for physical education teacher behaviors, interactive behaviors, and student behaviors  $r = 0.91-0.95$ ,  $p \leq 0.01$ , reflecting good inter-rater and intra-rater reliability of 0.91-0.95 for inter-rater and 0.92 for intra-rater. This indicates that the observers were effective in interpreting and evaluating physical education in the context of the low-carbon fitness philosophy curriculum model in the context of deep learning consistency across indicators of classroom teaching behaviors. Overall, these results provide empirical support for the reliability of the system for analyzing physical education classroom teaching behaviors in a low-carbon fitness philosophy curriculum model.

### 4. CONCLUSION

Based on the theoretical basis of sustainable development of ecological civilization construction, physical fitness under modern lifestyle and reform of traditional sports teaching mode in colleges and universities, we actively explore the reform of college sports under the concept of "low-carbon fitness". We will optimize the structure of college sports curriculum, cultivate the habit of "low-carbon fitness" among college students, and advocate the light sports

style.

Schools should take the initiative to comply with the requirements of the development of the times and incorporate “low-carbon fitness” into physical education, helping students to develop good “low-carbon fitness” habits by optimizing the curriculum structure, improving their interest in participation and enhancing their environmental protection concepts. At the same time, physical education teachers should incorporate light sports into classroom teaching, so as to realize the low carbonization of physical education and fitness in colleges and universities, and contribute to the overall coordinated and sustainable development, and strive to realize the low carbonization of physical education and fitness in colleges and universities, so that physical education in colleges and universities can not only develop comprehensively, but also develop in a healthy and sustainable way.

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# RESEARCH ON HOME MEDICAL CARE PATHWAYS AND SCHEDULING BASED ON ARTIFICIAL INTELLIGENCE ALGORITHMS

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## ABSTRACT

This paper studies the research of home medical care path and scheduling based on artificial intelligence algorithm, explores the current existing intelligent model of home medical care path and scheduling, establishes the distance and scheduling modal algorithm, and conducts sensitivity analysis of artificial intelligence algorithm parameters. The study shows that there are great advantages of using artificial intelligence algorithms in home medical care, which can effectively alleviate the current nursing staff scheduling problems, establish a model to optimize the service time and travel time of medical staff, help solve the problems in scheduling paths and services, and better serve the majority of medical staff to improve efficiency.

## KEYWORDS

Home health care; Artificial intelligence algorithms; Intelligent models; Sensitivity; Work efficiency; Pathways and scheduling

## 1. INTRODUCTION

At the present stage, the crisis of population aging and the shortage of resources for medical services have become inevitable social problems [1]. Home medical care is based on clients, caregivers and care institutions, and according to the needs of clients, care companies arrange caregivers to provide services such as medicine, drug injections and physical therapy at home [2-3]. It is a variation of traditional medical services and can effectively alleviate the shortage of medical resources and reduce the cost of services [4-5].

The needs of elderly people are complex, and they often need a variety of health care services in addition to daily care and spiritual comfort [6-7]. The home health care model is an effective way to address the needs of elderly people in old age and disease management by combining the functions of living care and medical services [8-10].

This paper investigates the home health care worker routing and scheduling problem based on artificial intelligence algorithms. An opportunity constrained planning model for the home health care worker path and scheduling problem with the objective of minimizing the total work time of health care workers is developed considering the stochastic nature of health care workers' service time and travel time, and the need for work load balancing among health care workers [11-13].

## 2. HOME HEALTH CARE WORKER PATHWAY AND SCHEDULING MODEL

### 2.1. CURRENT SCHEDULING PROBLEMS

Clients distributed in different locations make appointments for care services in advance according to their needs, and the care enterprise arranges the visit routes and service

recipients for the care personnel according to the appointments made by the clients. The care personnel depart from the care enterprise, need to provide and complete the services within the service window of the clients, and finally return to the care enterprise. Each client can only be served by one caregiver, and each caregiver can only serve one client at a time. The care enterprise reasonably arranges the order of caregivers' services so that the road travel cost, fixed cost and service cost are minimized.

## 2.2. ROUTING AND SCHEDULING INTELLIGENCE MODEL

The subjective perceptions of the actors are combined with interference management methods to carry out the following five areas of research:

(1) Assume that the time spent by clients receiving services obeys uniformly distributed interference management:

$$\sum_{k=1}^m x_{ik} = 1, \quad i = 1, 2, \dots, n \quad (1)$$

(2) Travel time of the paramedic from the previous client to the next client:

$$\sum_{i=0}^{N+1} \sum_{k=1}^m y_{ijk} = 1, \quad j = 1, 2, \dots, n \quad (2)$$

(3) Time factor for health care workers to serve clients:

$$\sum_{i=0}^{n+1} y_{0ik} = 1, \quad k = 1, 2, \dots, m \quad (3)$$

(4) Confidence level that medical staff workload is less than the upper limit of medical staff workload:

$$\sum_{i=0}^{n+1} y_{i(n+1)k} = 1, \quad k = 1, 2, \dots, m \quad (4)$$

(5) The range of values of decision variables:

$$\sum_{i=0}^{n+1} y_{ijk} - \sum_{i=0}^{n+1} y_{jik} = 0, \quad j = 1, 2, \dots, n; k = 1, 2, \dots, m \quad (5)$$

## 3. EXPERIMENTAL ANALYSIS OF HOME MEDICAL CARE PATHWAY AND SCHEDULING MODEL

### 3.1. ROUTING AND SCHEDULING MODAL ALGORITHM ESTABLISHMENT

The home health care worker path and scheduling problem has stochastic characteristics and complex constraints, and evolutionary methods are prone to too slow convergence. The modal algorithm memetic algorithm (MA) is an efficient algorithm that combines global search with local search. The algorithm was proposed by Moscato and simulates the principle of cultural evolution, i.e., the offspring individuals have a higher probability of being better than their parents. The modal algorithm consists of four phases: generation of initial population phase, population evolution phase, local search phase, and algorithm termination phase. In this paper, MA is designed based on the problem characteristics. The algorithm uses genetic algorithm (GA) for global search and local search based on full neighborhood search operator to improve the rate of algorithm convergence.

### 3.2. SIMULATION CONDITIONS AND ANALYSIS

In this paper, the results of the simulation experiments of 12 arithmetic cases were tested by paired samples rank sum test using SPSS data analysis software. The magnitude of  $P$  values is observed, and if  $P \leq 0.05$ , it indicates that there is a significant difference between MA and GA on the computational performance of the model, and the test results of each arithmetic case are shown in Table 1.

Under the same experimental parameters, the mean value of the MA calculation results among the 12 cases is smaller than that of the GA. by comparing the standard deviations of the calculation results, it can be obtained that the MA has better calculation ability in most cases. The results of the paired-sample rank-sum test can fully illustrate that the computational power of MA is significantly better than that of GA.

**Table 1.** Paired sample rank sum test results for the results of two algorithms

Example of an algorithm	GA		MA	
	Average value	Standard deviation	Average value	Standard deviation
C11101	226.52	6.23	221.02	28.52
C11102	267.28	8.314	131.23	19.08
C11103	184.23	34.32	171.23	10.63
C11104	276.95	8.351	109.09	10.59
R12201	778.34	28.75	359.60	13.24
R12202	912.81	24.97	346.43	14.52
R12203	625.54	24.44	464.68	57.98
R12204	546.82	24.81	469.68	19.59
RC12201	1348.42	248.16	569.54	27.34
RC12202	5201.48	240.45	639.24	34.92
RC12203	2852.42	146.85	527.68	35.59
RC12204	1281.40	281.64	348.72	75.23

### 3.3. SENSITIVITY ANALYSIS

In order to determine the number of caregivers and the maximum number of tasks for the model and to illustrate the effect of their different values on the optimal solution, several operations were performed using matlab in order to determine the approximate range of these two values. In order to enable all clients to be cared for, the maximum number of tasks cannot be too small, and the values are taken from 6 to 12, and the number of caregivers is chosen from 8 to 18. Since the number of caregivers is 1 less than the number of caregivers for low skill S1 corresponding to the number of caregivers for 15, 16, and 17, respectively, the optimal solutions obtained from the operations of the last three cases often contain the first three, so the operations on the first three cases are removed. The number of caregivers selected and the number of caregivers for each skill are shown in Table 2.

**Table.2** Number of nursing people and the number of nursing people in each skill

Number of nursing staff	The number of nursing staff corresponding to each skill		
	S1	S2	S3
9	3	3	4
10	2	5	3
11	3	5	6
14	4	6	7
16	3	6	7
18	2	4	4

#### 4. CONCLUSION

The home health care service model is an effective way to solve the problem of aging population and an important part of the integrated health care service system. At present, home health care services are late in starting and the overall supply of resources is insufficient. Therefore, a reasonable allocation and dispatch of home healthcare resources can promote the full utilization of existing resources, improve the operational efficiency of home healthcare management, and enhance patient and caregiver satisfaction.

Therefore, this paper conducts a study of the problem of scheduling home health care workers across regions. A comparative analysis of genetic algorithms and non-dominated sorting genetic algorithms was performed, and a sensitivity analysis of two parameters, the number of caregivers and the maximum number of tasks, was conducted. The influence of the two parameters of the model, the number of caregivers and the maximum number of tasks, on the results is analyzed and their reference ranges are determined, which can help to promote modern information and refinement management of home medical care.

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# RESEARCH ON THE INDEPENDENT DESIGN OF TOURISM PRODUCTS IN STUDY TOUR ACTIVITIES BASED ON INTELLIGENT DATA ANALYSIS

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## ABSTRACT

This paper discusses how to improve the quality and satisfaction of study tour products through strategies such as rational development and utilization of resources, enriching the types of tourism products, focusing on the balance of quality study tours, comprehensive protection of tourism safety, and evaluation and optimization of tourism products using intelligent data analysis methods. The feasibility and effectiveness of the proposed strategies are also further verified by analyzing the study tour products in Hailuogou Scenic Area, showing how to optimize the design of tourism products using intelligent data analysis methods, and by optimizing the design of study tour products in the high school section. Among them, the satisfaction rates of study master plan and study harvest were higher, 4.23 and 4.14, respectively.

## KEY WORDS

Study tour; Tourism product; Intelligent data analysis; Hailuogou Scenic Area; Tourism safety

## 1. INTRODUCTION

As an emerging educational approach, study tours have gradually received attention and focus. In study tour activities, the design and development of tourism products is a crucial aspect [1]. However, in the current market, most study tour products are still stuck in the traditional mode, lacking innovation and personalization [2-3]. Meanwhile, due to the fierce competition in the tourism market, many enterprises tend to focus only on commercial interests and ignore the real needs of tourists in the process of product design and operation [4]. Therefore, how to evaluate and optimize study tour products through intelligent data analysis methods and focus on tourists' needs and experiences in independent design has become a current problem to be solved [5-6].

The literature [7] proposes the application of the human activity approach in the study of tourism behavior and describes the importance of the approach for understanding tourist decision making and behavior. The literature [8] explores the aspects of risk perception, information search, information processing, choice and subsequent behavior in tourism decision making from both the tourist and destination perspectives, respectively. On the tourist



side, the authors emphasized the influence of individual differences and socio-cultural background on risk perception and decision making

In order to better meet the needs of different tourists, tourism product development needs to consider resource utilization, product type enrichment, quality and safety assurance. At the same time, the use of intelligent data analysis methods to evaluate and optimize tourism products is also an important means to improve product competitiveness. Taking Hailuoguo Scenic Area as an example, this paper proposes an optimized design plan for the study tour product for the high school section through analysis and satisfaction survey of its study tour product.

## **2. PRODUCT DEVELOPMENT STRATEGY OF STUDY TOUR BASED ON INTELLIGENT DATA ANALYSIS**

### **2.1. RATIONAL EXPLOITATION OF RESOURCES**

Active use of local tourism resources, and school teaching objectives close to the design and development of educationally meaningful study tour products is the main issue at hand. Study tours are not simply the understanding of spring and autumn tours, science tours, red tours or even a second classroom, the need for in-depth local visits, so that young people to broaden their horizons, understanding of the countryside, local residents, including farmers, workers, scholars and other understanding of local culture, employing them as study instructors to achieve the study tour function is more beneficial.

### **2.2. ENRICH THE TYPE OF TOURISM PRODUCTS**

The current study tours are still mainly collective activities organized by schools, designed by teachers and participated by students. If we want to fully spread this activity, improve product quality and enrich product connotation, we should be more flexible in the specific operation. Correct understanding of the concept of study tours and their characteristics, according to different purposes, different needs, students of different ages and conditions of enterprises and institutions to design and organize, forming a rich product system and design differentiated tourism products.

### **2.3. FOCUS ON THE QUALITY OF LEARNING AND TRAVEL AT THE SAME TIME**

Study tour products should be developed to enrich students' cultural knowledge and improve the overall quality as the starting point and anchor point. Youth study tours are not purely sightseeing and leisure, and not purely scientific research, but according to the psychological needs of young people, education and fun, around the quality of body education, patriotic education and cultural learning, arranged with educational characteristics of the content, so that young people in the acquisition of self-improvement, youth study tours are definitely not the same as conventional tourism or a taste of suffering education.

### **2.4. COMPREHENSIVE PROTECTION OF TOURISM SECURITY**

First, should strengthen the safety education for students, increase the efforts of tourism safety education for students, regulate behavior, overcome the mentality of fluke, put travel safety in the first place; Second, schools should strengthen tourism safety management measures, improve the quality of supervisory service personnel, strengthen security and protection, and actively purchase accident insurance for students, equipped with health care doctors to prevent accidents; Finally, the use of scenic tourism safety emergency rescue mechanism, strengthen tourism safety information communication, for the accident that has occurred can not be avoided should take positive measures to deal with, as far as possible to minimize the loss.

## 2.5. EVALUATION AND OPTIMIZATION OF TOURISM PRODUCTS USING INTELLIGENT DATA ANALYSIS METHODS

Smart data analysis methods can be divided into external data, internal data and market data depending on the source of data. Among them, external data includes social network data, online reviews, forums, blogs, etc. Internal data includes customer satisfaction surveys, booking data, logs, etc. Market data, on the other hand, includes industry reports, market research reports, etc. Combining these data, the analysis and forecast of tourism products can be carried out, thus helping tourism companies to discover customer needs, grasp market trends, and develop more targeted marketing strategies and product designs.

In practice, the commonly used intelligent data analysis techniques are predictive modeling, multiple regression and cluster analysis. Predictive modeling is the use of existing data to predict future trends and outcomes. Predictions are made through algorithms and model building and are used to identify bottlenecks and directions for product improvement. Multiple regression is to analyze the relationship between multiple variables to help companies determine the strengths and weaknesses of each aspect and provide support for product formulation. Cluster analysis is to divide similar objects or things into categories and find similarities within categories and differences between categories, and is used to determine the needs of different types of customers.

### 3. HAILUOGOU SCENIC AREA STUDY TOUR PRODUCT ANALYSIS

#### 3.1. HAILUOGOU SCENIC AREA STUDY TOUR PRODUCTS

At present, Hailuogou Scenic Area actively develops study tours, relying on its own rich study tour resources, for student groups, and cooperates with schools and travel agencies to develop and launch the following kinds of study tour products as shown in Table 1. The “Ruo Ding Mountain Metamorphosis” is a 3-5 day study tour product for primary and secondary schools developed by Hailuogou Scenic Area in cooperation with travel agencies, which includes a number of courses on red culture knowledge, nature exploration, traditional farming culture, etc. Hailuogou scenic area launched a number of study tour products, but the existing product content fragmented, lack of a complete system, need to be further optimized.

**Table 1.** Research travel products of Hailuogou Scenic spot

Product name	Target population	Study the types of travel products
The Metamorphosis of Mount Ruoding	Primary and middle school students	Experiential investigation type
“Red” + “Green”	College student	Inspirational expansion type + experience type
“Red Road, Three agricultural conditions, Chinese Dream”	Chengdu Golden Apple Jincheng No.1 Middle School	Inspirational expansion type + experience type

#### 3.2. HAILUOGOU SCENIC AREA RESEARCH AND STUDY TRAVEL PRODUCT SATISFACTION ANALYSIS

The survey results found that the respondents were satisfied with the study tour products in Hailuogou Scenic Area as shown in Table 2. The satisfaction of study tour products is not very high in general, and the products have a lot of room for optimization. Among them, the satisfaction of study master plan, study harvest and study instructor is high, with scores above 4, 4.23, 4.14 and 4.02, respectively, and the highest score is study master plan. The rest of the options have similar scores, with the lowest score of 3.20 for the study course content and relatively low scores of 3.66 and 3.58 for the study travel resources and study bases, respectively, which can be found that respondents are satisfied with the overall degree of Hailuogou study travel products, especially with the study master plan, study harvest and study

instructors, as well as with its Hardware conditions, such as the construction of study bases and the degree of development of study resources, are not very satisfying, and the optimization of study tour products can be prioritized from relatively low satisfaction items in order to improve the satisfaction of study tour products.

**Table 2.** Satisfaction of research travel products in Hailuogou scenic area

Satisfaction factor	Very satisfied	Be satisfied	In general	Not satisfied	Very dissatisfied	score
Research travel resources	23.13	36.23	25.48	10.68	4.48	3.66
Research supervisor	39.98	37.75	14.53	4.72	3.02	4.02
Master plan for research	39.31	42.49	13.78	3.17	1.25	4.23
Research objective	29.16	37.73	21.58	6.95	4.58	3.67
Research course content	29.92	37.72	23.00	6.20	3.16	3.20
Arrangement of research activities	27.83	36.87	23.59	7.71	4.00	3.84
Ability cultivation	30.67	34.53	22.22	7.83	4.75	3.80
Research harvest	41.72	33.76	19.32	3.39	1.81	4.14
Research base	19.26	36.86	26.34	12.24	5.30	3.58
security	38.55	33.10	19.27	5.27	3.81	4.02

### 3.3. OPTIMIZED DESIGN OF STUDY TOUR PRODUCTS FOR HIGH SCHOOL SECTION

The type of study product design should be mainly experiential expedition type and inspirational expansion type, and the provincial and national conditions as the main study content. Study theme: experience the most beautiful glaciers and examine the primitive forests. Feel the humanistic history and inspire patriotic feelings. The study itinerary is shown in Table 3.

**Table 3.** Research schedule

schedule	Itinerary arrangement	
The first day	morning	Go to Hailuogou Scenic Spot by bus from school
	afternoon	Visit Moxi Red Army Long March Memorial Hall, Moxi conference site and other red research bases
The next day	morning	Explore Camp 3 and 4 in Hailuogou
	afternoon	Decrypt the virgin forest of Hailuogou scenic area
The third day	morning	Experience folk customs and religious culture
	afternoon	Experience farming culture
The fourth day	morning	Retrace the ancient Tea Horse Road
	afternoon	Go back to school by bus from Hailuogou Scenic spot

## 4. CONCLUSION

Through the research in this paper, it is also essential to use intelligent data analysis methods to evaluate and optimize tourism products in the design of study tour products. This approach can help us better understand tourists' needs and feedback, so that we can target product design and improvement. Finally, taking Hailuogou Scenic Area as an example, we analyzed the satisfaction of the study tour products in this area. Among them, the satisfaction scores of study master plan, study harvest and study instructor are higher, with scores above 4, 4.23, 4.14 and 4.02, respectively, and the highest score is the study master plan. In summary, the research results of this paper are expected to provide some useful references and guidance for the independent design of tourism products in study tour activities.

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# INNOVATION OF COLLEGE COUNSELORS' CAREER GUIDANCE MODE FOR COLLEGE STUDENTS IN THE BACKGROUND OF BIG DATA

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## ABSTRACT

In the paper, based on the current challenges of university employment work, we proposed to build an employment information platform by applying the model of MVC under J2EE platform, developed a university graduate employment management information system based on J2EE technology, and tested the system performance and graduate login security. When the number of concurrent users is 400, the transaction success rate is 100%, the average transaction response time is 1.957, the maximum transaction response time is 3.519, and the average traffic volume is 5003 bytes/second. The graduate employment information platform developed based on J2EE technology has the advantages of improving the efficiency of college counselors and promoting the grassroots employment of graduates.

## KEYWORDS

College employment; J2EE platform; MVC model; Employment information platform; Employment management; College counselor

## 1. INTRODUCTION

The employment of college students has always been a topic of great concern, and with the expansion of colleges and universities, more and more graduates enter the society, the employment pressure continues to increase and the employment situation becomes increasingly severe [1]. Promoting college students' employment is conducive to solving the problems of lack of grassroots talents and difficult employment of college graduates [2-3]. Counselors can play an important role in the employment guidance work at the grassroots level, taking career guidance class as a carrier and playing its role as a link in the employment guidance of college students through the daily work penetration of counselors [4-6]. Cultivate students' noble ideals and basic grassroots employment quality, while improving counselors' influence and competency in college students' employment guidance. As college educators, they should adapt to the development requirements of the times and improve the quality of employment work [7].

The system can greatly improve the work efficiency of college counselors, reduce their workload, and provide good employment guidance and information for graduates' employment.

## **2. SPECIFIC INITIATIVES OF THE MECHANISM OF THE COLLEGE STUDENT CAREER GUIDANCE SYSTEM**

### **2.1. CHALLENGES OF THE CURRENT EMPLOYMENT WORK IN UNIVERSITIES**

#### **2.1.1. SOCIAL PRACTICE FOR GRADUATES**

High school graduates have shallow social experience and lack of social practice, and their understanding of employment mainly comes from family and school education, and their understanding of grassroots employment is not sufficient and comprehensive. The publicity of grassroots employment for graduates in colleges and universities lacks attraction for students. The lack of encouragement and incentive policies for grass-roots employment is the fundamental reason for the lack of attractiveness of publicity.

#### **2.1.2. EMPLOYMENT INFORMATION PLATFORM**

At present, graduates get employment information mainly from employment recruitment software on the market, but many of them can't choose suitable careers for themselves because of the confusion they face in employment. The purpose of developing Graduate Employment Management Information System is to provide a good service platform for graduates' smooth employment, so that teachers in charge of employment work in schools can make full use of the system to timely release recruitment information, provide graduates with some necessary employment guidance and related policies of the state and schools about graduates, etc., and help students get more employment information and sort out good employment concepts.

## **2.2. SYSTEM KEY TECHNOLOGIES**

### **2.2.1. DYNAMIC COLLABORATION BETWEEN MODELS AND VIEWS**

The collaborative relationship between the model and the view is typical of the observer design pattern. The Observer pattern is a behavioral design pattern. The observer pattern defines a one-to-many dependency between objects, where when the state of an object changes, all objects that depend on it are notified and automatically updated.

The key objects defined in the Observer pattern are the observer and the target, and a target can have any number of observers that depend on it. Once the state of the target changes, all observers are notified. In response to this notification, each observer will query the target to synchronize its state with that of the target.

### **2.2.2. APPLY THE MVC MODEL UNDER J2EE PLATFORM**

Under the component-based J2EE platform, how to organize the application for simple and efficient application upgrade and maintenance, and how to let people who do not know the program code to avoid the program data, become the first problem to solve. And this is why the MVC design pattern is used.

Clear division of labor among development staff. MVC clearly separates computation from display, with no processing appearing on the JSP page and no data formatting in the Servlet or business logic. Java programmers focus on Servlet code and business processing code, and frontend personnel focus on JSP and display effects. The division of labor is refined so that all kinds of personnel focus on dealing with their familiar areas, which improves the development efficiency of the project.

## **3. CLASSIFICATION OF SYSTEM TESTING AND ANALYSIS OF RESULTS**

### **3.1. SYSTEM PERFORMANCE TESTING**

Because the number of graduates is generally large, so the performance of the system

should meet certain requirements, so the system performance simulation test was conducted to develop the employment guidance system under J2EE platform, and the system performance simulation test results are shown in Table 1. When the number of concurrent users is 200, the transaction success rate is 100%, the average transaction response time is 1.238, the maximum transaction response time is 1.982, and the average traffic is 5318 bytes/sec. When the number of concurrent users is 400, the transaction success rate is 100%, the average transaction response time is 1.957, the maximum transaction response time is 3.519, and the average traffic is 5003 bytes/sec.

The system performance meets the requirements, and the running speed does not exceed 4 seconds, and the transaction success rate is 100%, which can meet the current needs of employment guidance for graduates and help college counselors to innovate the employment guidance mode for college students.

**Table 1.** System performance simulation test results

Number of concurrent users	Average Transaction Response Time	Maximum Transaction Response Time	Average number of transactions per second	Transaction Success Rate	Hits per second	Average Traffic
200	1.238	1.982	7	100%	119	5318
400	1.957	3.519	9	100%	204	5003

### 3.2. GRADUATE LOGIN TEST CASE DESIGN

In the whole college employment management system, including login module, graduate user login sub-module and administrator login sub-module, there are always big or small problems in the testing process, so the graduate login module is tested and the results of student login test are shown in Table 2.

Based on the fact that it is not possible to log into the system normally under abnormal circumstances, the graduate user login sub-module meets the system security requirements.

**Table 2.** Student Login Test

Input Conditions	Test content	Test cases	Test results
001	Graduate Name	Correct input	Information is displayed correctly
002	Graduate's school number	Incorrect input	Wrong information is displayed
003	Graduate's ID card	Correct input	Information is displayed correctly
004	Graduate Information	Incorrect input	Wrong information is displayed

## 4. CONCLUSION

Promoting the grassroots employment of college students can alleviate the lack of grassroots talents and the employment pressure of college graduates, while the guidance of colleges and universities is the guarantee of the grassroots employment of college students, and colleges and universities should do a good job of talent training orientation, which is in line with the economic and social development and social human resource structure. Counselors can play an important role in the guidance of grassroots employment, take career guidance class as a carrier, play its role as a link in the guidance of grassroots employment of college students through the daily work penetration of counselors, cultivate students' noble ideals and basic grassroots employment quality, improve the influence and competence of counselors in the guidance of grassroots employment, make good use of the platform built by the state and school for college students, and guide more ideal and ambitious young students to join the grassroots. We will guide more young students with aspirations and ambitions to join the grassroots, dedicate their youth and achieve their dreams in life.

Most of the current J2EE-based college student employment information platforms can support multi-platform access and control, and adopt distributed data management. Through the system to call the interface of sending short messages to cell phones, which is conducive to the employment information timely for students to understand.

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# THE CONSTRUCTION OF ONLINE TEACHING INTERACTIVE PLATFORM FOR IDEOLOGICAL AND POLITICAL COURSES IN UNIVERSITIES UNDER THE BACKGROUND OF ARTIFICIAL INTELLIGENCE

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## **ABSTRACT**

This paper is based on exploring the deep integration of artificial intelligence and college Civics class to build an online teaching interactive platform for college Civics class, based on the characteristics of BP neural network, looking for the organic combination of technology as a tool and educating people, analyzing the skill weights and ideological security by combining the training objectives of college Civics class, and analyzing the factors affecting the application of online teaching interactive platform for Civics class. The construction of online teaching interactive platform is the dominant factor influencing the operation status with a weight of 0.812, university support is the secondary factor with an influence weight of 0.764, and the influence weight of teachers' team is 0.839. Qualitative analysis is conducted on the teacher-student interaction mode of online teaching platform, and interaction design strategies to stimulate teachers and students to participate in interaction are derived.

## **KEYWORDS**

Artificial intelligence; College Civics course; Deep integration; Online teaching interactive platform; BP neural network; Skill weights

## **1. INTRODUCTION**

With the advent of the network era, information technology has penetrated into many fields such as politics, economy, and culture, and major changes have occurred in human production, lifestyle, and learning [1-2]. The traditional education model has been difficult to meet the diverse needs of students, and education reform and development are facing unprecedented challenges, while the modernization of education driven by education informatization is the breakthrough point of education reform [3-4]. The wide application of artificial intelligence technology promotes the reform and innovation of university teaching of ideology and politics, realizes the personalization, differentiation and precision of teaching of ideology and politics courses in colleges and universities, as well as the precise grasp of the educational situation of teaching of ideology and politics for college students, and promotes the formation of new teacher-student relationship of equal, dialogical and participatory type [5-7]. In order to give full play to the effectiveness of ideological and political education and promote the deep integration of AI and college Civics education, the new requirements of AI on teachers' literacy

should be focused on [8-10]. The construction of an interactive platform for online teaching of college Civics class should be based on the pivot points of enhancing teachers' level, respecting students' reality, reforming classroom teaching and casting the soul to educate people, and realizing the innovation of teaching mode of Civics class at four levels: ideology, system, technology and action [11-12].

## **2. DEEP INTEGRATION OF ARTIFICIAL INTELLIGENCE AND COLLEGE CIVICS COURSE**

### **2.1. VALUE RATIONALE FOR DEEP INTEGRATION**

#### **2.1.1. THE ORGANIC COMBINATION OF TECHNOLOGY AS A TOOL AND HUMAN EDUCATION**

Artificial intelligence is a new technology based on the latest technological achievements of information technology, which is formed by the collection of big data, algorithms and other technologies. With the help of big data, algorithms and other technologies, artificial intelligence can statistically analyze and predict the dynamics of individuals' thoughts as well as behavioral development changes, which can strongly promote the innovation of teaching mode of college Civics class. Artificial intelligence belongs to a new type of tool, and its use in the process of Civics class must be highly vigilant to ensure that the subject position of human beings is not alienated, and that Civics class is empowered by artificial intelligence to truly achieve the goal of educating people and improving the classroom effect of Civics class.

#### **2.1.2. SKILL WEIGHTS AND IDEOLOGICAL SECURITY**

Since human society entered the 21st century, the pace of development of science and technology has become faster, especially the iterative cycle of information technology has become shorter and shorter, and the development results of modern information technology have appeared one after another. Through the use of artificial intelligence technology in the college Civics course, in addition to the instrumental and functional nature of artificial intelligence technology, it can further distinguish the educational subject and object.

It is necessary to pay high attention to this, should be combined with the training objectives of the college Civics course, continue to enhance the technical discourse identity, the development and development of strategic goals consistent with the development of strategic planning for the development of artificial intelligence, through artificial intelligence technology to empower the college Civics course, improve the effectiveness of Civics course, has an important significance to build a firm university ideological main position.

## **2.2. BP NEURAL NETWORK**

### **2.2.1. SELF-LEARNING AND SELF-ADAPTIVE CAPABILITIES**

The connection weights between the nodes of each layer of the BP neural network are adjustable, and the BP neural network learns the "reasonable rules" between the input and output data during the training process, and adaptively stores the learning contents in the weights of the network, i.e., the BP neural network has a high degree of self-learning and self-adaptability.

### **2.2.2. NONLINEAR MAPPING CAPABILITY**

BP neural networks essentially implement a mapping function from input to output, and mathematical theory demonstrates that a three-layer neural network can approximate any nonlinear continuous function with arbitrary accuracy. This nonlinear mapping capability of BP neural networks makes them very suitable for solving problems with complex internal mechanisms.

### 2.2.3. COMPUTATIONAL PARALLELISM AND STORAGE DISTRIBUTIVITY

BP neural networks use connection weights between nodes to store information. The distributed information storage approach of BP neural networks is reflected in the fact that information is distributed throughout the network by content, rather than being stored in only one place. A node on the network stores parts of multiple pieces of information, i.e., the information is processed as necessary during the network training process, and then the information is stored decentralized throughout the network.

## 3. ANALYSIS OF FACTORS INFLUENCING THE APPLICATION OF ONLINE TEACHING INTERACTIVE PLATFORM FOR CIVICS CLASS

### 3.1. DETERMINATION OF THE WEIGHTS OF FIRST-LEVEL INDICATORS

The direction of the role of the setting of the weight of the first-level indicators is positive, and the direction of the role of the second-level indicators of each first-level indicator is positive, which determines the degree of influence of the 4 factors of the first-level indicators is positive, that is, the larger the value, the greater the influence value.

The calculation of the influence degree of the 4 leading factors of the first-level indicators is as follows:

$$Y_g = W_g * \left( \frac{1}{2} * X_{ga} + \frac{1}{2} * X_{gb} \right) \quad (1)$$

$$Y_p = W_p * \left( \frac{1}{4} * X_{pa} + \frac{1}{4} * X_{pb} + \frac{1}{4} * X_{pc} + \frac{1}{4} * X_{pd} \right) \quad (2)$$

$$Y_j = W_j * \left( \frac{1}{3} * X_{ja} + \frac{1}{3} * X_{jb} + \frac{1}{3} * X_{jc} \right) \quad (3)$$

$$Y_x = W_x * \left( \frac{1}{3} * X_{xa} + \frac{1}{3} * X_{xb} + \frac{1}{3} * X_{xc} \right) \quad (4)$$

Through the relevant scores of the expert rating method, combined with the above calculation formula, the weights of the 4 dominant factors are derived, and it can be seen that the scores of the 4 dominant factors are more evenly scored by the expert rating method, basically maintaining around 0.75, but there are differences. The online teaching interactive platform of Civics class is shown in Table 1. The construction of online teaching interactive platform is the dominant factor affecting the operation status, with a weight of 0.812, and the lagging construction of online teaching interactive platform is the main problem. The support of universities is the secondary factor, with an influence weight of 0.764, and the influence weight of teachers' team is 0.839. Teachers have a significant influence on the effective use and functional development of the online teaching interactive platform of Civics and Political Science class, and they have a guiding role in the use of the teaching platform, and have the responsibility to promote and encourage students to use the online teaching interactive platform of Civics and Political Science class, and at the same time, they should improve and adjust the teaching content and enrich the teaching form in a timely manner, etc. It is also necessary to improve and adjust teaching contents and enrich teaching forms. Students' awareness, demand and commitment to the online teaching and interactive platform of Civics and Political Science class directly affect the use of the platform.

**Table 1.** Weighting of first-level indicators

Target layer	Tier 1 Indicators	Weighting
Factors influencing the online teaching interactive platform of Civics class	Support from colleges and universities	0.764
	Online Teaching Platform	0.812
	Teachers' team	0.839
	Students	0.737

### 3.2. IMPACT DEGREE OF SECONDARY INDICATORS

The determination of the degree of influence of the secondary indicators is based on the preference of students for each indicator selected, after the assignment of the preference degree and the results measured by combining the above formula, the analysis of the degree of influence of the secondary indicators is shown in Table 2. The results focus on the students' willingness for the secondary indicators and can also be considered as the students' ratings for each secondary indicator. From the calculation results, it can be seen that the indicators with higher scores are mainly distributed in the construction of online teaching interactive platform, among which the convenience, module integrity and management and maintenance of online teaching interactive platform of Civics and Political Science class are the three indicators with the highest scores, which are 2.825, 2.715 and 2.696 respectively. This indicates that students' knowledge of participating in the online teaching and learning platform for Civics and Political Science is relatively lacking.

**Table 2.** Impact degree of secondary indicators

Target layer	Tier 1 Indicators	Tier 2 Indicators	Impact degree
Factors influencing the online teaching interactive platform of Civics class	High School Support	Network Infrastructure	2.481
		Related Training	2.285
	Online Teaching Platform	Convenience	2.815
		Resourcefulness	2.227
		Module Integrity	2.624
		Management and Maintenance	2.538
	Faculty	Level of emphasis	2.753
		Faculty Outreach	2.228
		Self-application	2.382
	Students	Student Awareness	2.237
		Student Input	2.141
		Student demand	2.266

## 4. CONCLUSION

In the context of the growing number of online teaching platforms and more diversified teaching methods, this paper focuses on the interaction mode of teacher-student participation from the perspective of interaction design and explores the design strategies to stimulate teacher-student interactivity in the current online teaching interactive platform. A set of applicable and scientific online teaching interactive platform quality evaluation index system and model is constructed, which can provide some reference value for the evaluation and improvement of online teaching interactive platform and help improve the quality of online teaching.

This paper constructs an online teaching interactive platform quality evaluation index

system and model based on BP neural network theory, and conducts an empirical study to provide suggestions for teachers' teaching improvement and online teaching interactive platform perfection based on the empirical results.

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# EXPLORING THE PATH OF SHORT VIDEO COPYRIGHT PROTECTION UNDER AUTOMATED DECISION-MAKING

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## ABSTRACT

Improving the protection path of short video copyright is a necessary prerequisite for the flourishing of short video. Based on the exploration of the characteristics of automated decision-making, this paper proposes the analysis obligations of data processors in automated decision-making based on the concept of meta-regulation. The copyright protection path is constructed by combining the development history of short videos with the analysis of infringement cases. The overall trend of short video copyright infringement cases occurred from 2012 to 2022 is on the rise. It soared from the initial 10 cases a year to 466 cases a year. The number of infringement has doubled dozens of times compared with the time when short videos first emerged.

## KEYWORDS

automated decision making; short video; copyright protection; meta-regulation; infringement cases

## 1. INTRODUCTION

In recent years, short videos have become a new choice for Chinese Internet users for leisure and social sharing. Short videos harbor a huge market value, attracting a large amount of capital and traffic into the short video industry [1-3]. Although the development of the short video industry is strong, the problems of it are also gradually highlighted [4-5]. Driven by economic interests, the unhealthy competition in the industry has become more and more serious, leading to the intensification of copyright infringement in short videos.<sup>6</sup> Since 2018, major departments have jointly launched special copyright rectification actions for online infringement and piracy in key areas such as short videos, and short video rights holders have started to defend their copyright interests through legal means. After the official establishment of the Beijing Internet Court, the first case accepted was a short video copyright infringement dispute.

The primary condition for short videos to be protected by copyright is to have originality. The literature [7] proposes a new approach to digital video watermarking copyright protection using two different algorithms that employ continuous estimation of

statistical metrics to detect scene boundaries. The literature [8] analyzes the unexpected shutdown of the main platforms for unauthorized video streaming in the German market and helps to understand the reasons for the high rate of online piracy. The literature [9] considers copyright as an institution and examines the decline of online video piracy in China embedded in the institutional changes of three copyright-related institutions.

## **2. REASONABLE ANALYTICAL OBLIGATIONS OF DATA PROCESSORS UNDER AUTOMATED DECISION MAKING**

### **2.1 THE IMPACT OF AUTOMATED DECISION MAKING ON SOCIAL LIFE**

#### **2.1.1 AUTOMATED DECISION MAKING**

Automated decision making is an activity that uses computer programs to automatically analyze and evaluate the behavior, interests, or financial, physical, and economic status of the individual subject of the information and make decisions. Banks can use the algorithms in automated decision making to screen and evaluate the economic strength of information subjects in order to classify loans based on the evaluation results, and governments can use the same process to improve social welfare measures such as poverty alleviation. Automated decision making is changing people's lives, and the algorithmic society is coming.

#### **2.1.2 CHARACTERISTICS OF AUTOMATED DECISION MAKING**

The characteristics of automated decision making include the following:

- (1) The subject of automated decision making is a personal information processor.
- (2) The object of automated decision-making is a database formed by a large amount of collected personal information.
- (3) The way of automated decision making is non-manual in nature by using computer programs.

Since the information subject is in an information-poor position compared to the information processor and the algorithm of the computer program is obscure, these characteristics lead to the information subject's right to know and consent to personal information being easily violated, and therefore, certain rules must be observed.

### **2.2 THE DUTY OF REASONABLE ANALYSIS UNDER THE CONCEPT OF META-REGULATION**

#### **2.2.1 A META-REGULATORY APPROACH TO AUTOMATED DECISION RISK**

There are at least three risks associated with automated decision making. First, data processors must collect large amounts of data, and there is a tension between privacy protection and data collection and circulation. People who value privacy are less likely to share personal information, which makes them less visible in the era of big data and thus less likely to be affected by automated decision-making. Second, it impairs human autonomy. Automated decision making creates a digital portrait of an individual based on their interests, hobbies, abilities, credit, health, etc., and provides various services

and information to the person that match the portrait. Again, creating algorithmic discrimination. For example, merchants use user portraits for big data killing and creating price discrimination.

### **2.2.2 NORMATIVE BASIS FOR THE OBLIGATION TO REASONABLY ANALYZE**

According to the governance stance of the meta-regulatory approach, the legislation should impose some targeted duties of care and legal responsibilities on personal information processors who have gained information dominance through "technological empowerment". There are at least three factual bases for imposing such legal obligations on personal information processors:

(1) The personal information processor has the technology and talents to carry out systematic risk control, is familiar with the technical and market information related to personal information processing, and has the ability to undertake reasonable analysis obligations.

(2) The personal information processor enjoys "algorithmic power" and can benefit from information processing activities, while the security of personal information is in a state of uncertainty and danger, so the information processor should assume the same power.

(3) The information processor is the designer or controller of the algorithmic decision, and determines the purpose and manner of information processing activities, so it is direct and convenient for him/her to assume the obligation of reasonable analysis.

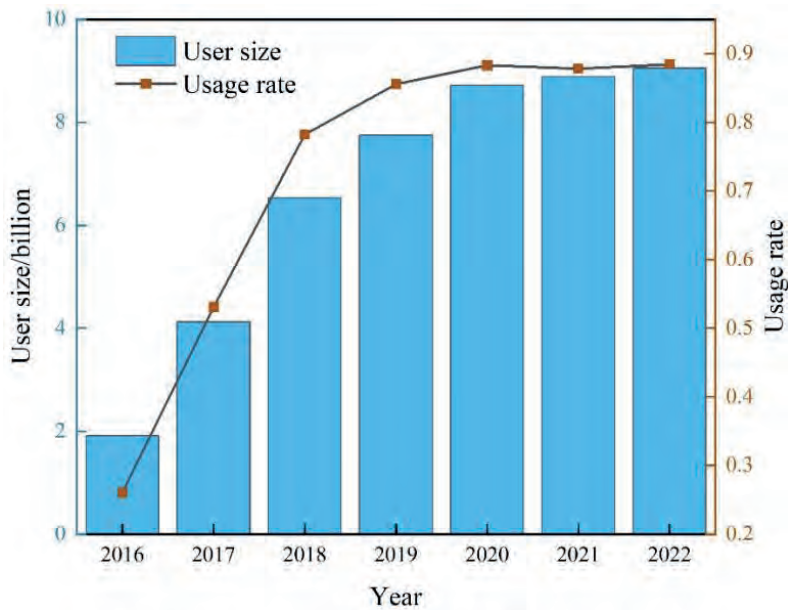
## **3. EXPLORING THE PATH OF COPYRIGHT PROTECTION FOR SHORT VIDEOS**

### **3.1 ANALYSIS OF THE OPERATION STATUS OF SHORT VIDEO**

#### **3.1.1 THE DEVELOPMENT HISTORY OF SHORT VIDEO**

The development of short video has experienced the budding development stage from none to many, the growth explosion stage from many to many, and the maturity and stability stage from many to excellent, and the current development is in the third stage. the scale and usage rate of short video users from 2016 to 2022 are shown in Figure 1. The scale of short video users grew from 191 million in 2016 to 905 million in 2022, and the usage rate of short video also grew from 26.05% to 87.95%. after 2016 China ushered in the Internet+ era, Baidu, Tencent and other Internet giant companies actively responded to the development of the Internet era, carried out to explore new development models, and unified their efforts to the short video industry. Typical such as Tencent's Weishi, Baidu's Good Video, etc. Influenced by the short video platform, so that the short video into the national trend, followed by a number of short video platforms such as Jieyin also appeared one after another. The number of short video platform users as well as network users watching short video time increased in a wide range, short video is explosive growth.

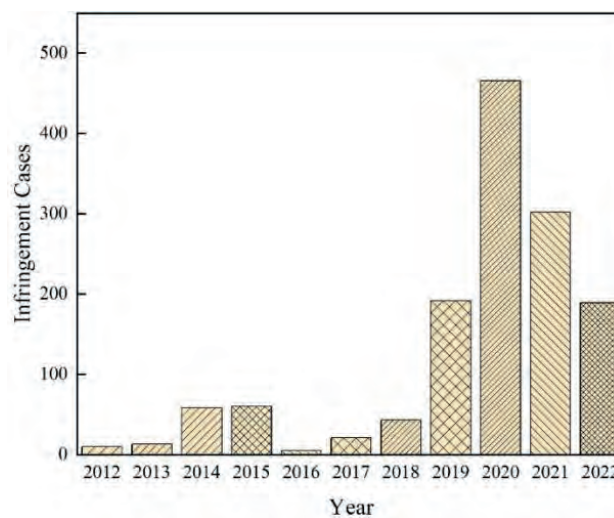




**Figure 1** Short video user size and usage rate from 2016 to 2022

### 3.1.2 INFRINGEMENT OF SHORT VIDEOS

While seeing the prosperous development of the short video industry, it is also necessary to pay attention to the new problems and challenges brought by the new object of short video. In the era where everyone is a creator, everyone also faces the risk of infringement and being infringed, and a large number of infringement disputes have been concentrated, and the issue of copyright protection has become increasingly prominent. In order to objectively analyze the infringement problems occurring in the short video field. The number of short video copyright infringement cases is shown in Figure 2. the overall trend of short video copyright infringement cases occurring from 2012 to 2022 is on the rise. It soared from the initial 10 cases a year to 466 cases a year. Although the number declined in 2021 benefiting from the national remediation action, it still clearly reflects that the current number of infringement has doubled dozens of times compared with the time when short video first emerged.



**Figure 2** Number of Short Video Copyright Infringement Cases

### **3.2 THE PATH OF COPYRIGHT PROTECTION UNDER AUTOMATED DECISION-MAKING**

At present, the existing laws and regulations mainly on the network platform has a small amount of regulation, but in the face of the general environment of multiple subjects, only one party to make the requirements that want to cure the short video industry development of the persistent problems, is a drop in the bucket. Only through the linkage of multiple subjects to form a synergy, to crack down on short video infringement, in order to take into account the interests of all parties, to achieve the goal of stable and rapid development of the industry. Throughout the development of short video so far, the market the "invisible hand" in the allocation of resources to play a decisive role, but in the hundreds of billions of traffic, the government the "visible hand" should play a good guiding, compensatory, regulatory role. In response to the controversy of infringement liability of short video platform, it should be determined whether the platform constitutes infringement based on the standard of dichotomy of behavior, and then the platform's duty of reasonable care should be analyzed rationally. At the same time, the specific application of the "notification-deletion" rule should be clarified to meet the challenges brought by the development of high-tech.

### **4. CONCLUSION**

This paper explores the analysis obligations of data processors under automated decision-making, and puts forward the protection path of short video copyright through the data analysis of short video development and infringement cases. In response to the problem of insufficient regulation of the development of short video industry, the government and its relevant departments should play a good guiding role, timely introduce necessary policy measures, establish a practical and relaxed punishment mechanism, and promote the benign and ecological development of short video industry. With regard to the controversy over the liability of infringement of short video platforms, the specific application of the "notification-deletion" rule should be clarified, the duty of care of short video platforms should be appropriately increased, and it is suggested that platforms should set different processing time for different situations after receiving the notification. With regard to the determination of copyright infringement of short videos, consideration should be given to introducing the theory of transformative use into the fair use system by means of judicial interpretation.

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# INNOVATIVE RESEARCH ON THE TEACHING MODE OF LEISURE SPORTS MAJORS BASED ON DIVERSIFIED TEACHING METHOD

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## ABSTRACT

This article is based on the diversity teaching method by introducing various forms of activities and teaching methods in order to increase students' interest and participation in physical education. The article firstly explores the promoting effects of diversity on physical education in colleges and universities, including the promotion of students' physical literacy, competitive awareness and interest in learning. Then the comparison of soccer skill scores between the experimental and control groups was used to verify whether the teaching model could effectively improve students' comprehensive quality and competitive consciousness. The results showed that the overall skill performance of the experimental group was 18.58 seconds faster than that of the control group by 1.9 seconds.

## KEY WORDS

Diversified pedagogy; Physical education; Physical literacy; Competitive awareness; Interest in learning; Soccer

## 1. INTRODUCTION

The diversified teaching method is a student-centered teaching mode characterized by diverse teaching methods and approaches [1-2]. This model focuses on cultivating students' independent thinking and innovation ability, and emphasizes the combination of practical operation and theoretical knowledge [3-4]. The application of the diversity teaching method in leisure sports can promote students' in-depth understanding of the leisure sports industry and improve their practical skills [5-6]. Silva, A et al. theoretically discussed the concept and meaning of the diversity teaching method and proposed how to design and implement the training program of the diversity teaching method in practice [7]. Quennerstedt, M argued that traditional methods of teaching physical education overemphasize skills and performance at the expense of students' individual needs and development. On the contrary, the use of a transformative learning approach can help students to understand and apply what they have learned in greater depth and facilitate their growth and development [8]. In the literature [9], a physical education and physical education pedagogy called the "constraint-led approach" was studied. The authors discuss the theoretical basis and practical application of this approach,

which aims to help coaches and teachers better guide students to develop skills and improve performance. The literature [10] explores how the thinking model can be used to develop students' creative thinking and problem-solving skills, and to improve their literacy and competence in the field of physical education. The literature [11] emphasizes the important role of physical education in promoting students' physical and mental health, improving general quality and developing social responsibility.

This paper focuses on an innovative study of a teaching model based on a diversified teaching method for leisure sports majors. Through the introduction of various forms of activities and teaching methods, including group cooperation, game competition, case study and other forms, in order to improve students' interest and participation in physical education. Also, this paper will verify whether the teaching model can effectively improve students' overall quality and competitive consciousness by comparing the soccer technical performance between the experimental and control groups. The purpose of this paper is to provide a new way of thinking and method for teachers of recreational sports and to provide a reference for the reform of physical education in colleges and universities.

## **2. THE PROMOTING EFFECT OF DIVERSITY ON COLLEGE PHYSICAL EDUCATION**

### **2.1. PROMOTING STUDENTS' PHYSICAL LITERACY**

Physical literacy reflects the student's ability to integrate physical education knowledge with other cultural knowledge, and the student has to integrate physical education knowledge with other knowledge to make the most of physical education in learning and life. Most of the physical literacy is cultivated later in life. Students develop their interest in sports through some necessary physical exercises in college physical education classes, including the learning of theoretical knowledge of sports, the cultivation of sports awareness and the continuous improvement of sports skills and sports quality, which play a great role in college physical education. The diversified way of physical education focuses on the overall development of students in physical education classroom, cultivates students' sports personality, and puts the cultivation of physical education theoretical knowledge and sports consciousness on the same status as practical activities, which makes the diversified teaching play a role in promoting the improvement of students' sports literacy.

### **2.2. PROMOTE THE DEVELOPMENT OF STUDENTS' SENSE OF COMPETITION**

Competition consciousness refers to a psychological state that students want to surpass others in study or life. A proper competition consciousness can make students maintain a certain sense of crisis and promote their continuous progress, and the cultivation of healthy competition consciousness should also be paid attention to in college physical education so that students can make continuous progress in the process of competition. In the process of diversified physical education, teachers often organize students to watch large sports events such as Olympic Games and World Championships, through watching these events, students can experience the healthy competition consciousness among excellent athletes, realize that they are in the big environment of constant competition, learn the excellent quality of being positive and striving in athletes, so as to improve themselves continuously. Not only can students learn more about sports and the rules of the game, but appropriate competition can provide motivation for students to focus more on their studies.

### **2.3. PROMOTE STUDENTS' INTEREST IN LEARNING**

In the design process of diversified physical education courses, teachers will develop different teaching methods according to students' interests and enrich the teaching contents appropriately. The diversified teaching methods can enhance teachers' understanding of

students and promote communication between teachers and students, and students can have a deeper understanding of the rules and benefits of sports, and only when they fully understand sports will students be willing to participate in diversified teaching physical education classes.

#### 2.4. PROMOTE THE CREATION OF A VIBRANT CLASSROOM ATMOSPHERE

Classroom atmosphere is a very important part of the teaching process, too relaxed classroom atmosphere will cause students to be too relaxed in the classroom, not fully focus on learning. A classroom atmosphere that is too stressful will make students feel too much pressure and is not conducive to their understanding of knowledge, so teachers should grasp the process of creating classroom atmosphere so that the physical education classroom has both a relaxed learning atmosphere and a stressful learning rhythm. After the implementation of diversified teaching methods, the classroom atmosphere can be appropriately active, so that students can really understand the meaning of learning, rather than treating learning as a kind of pressure. Such diversified teaching methods are conducive to the creation of classroom atmosphere, reduce students' learning pressure, and also increase the communication opportunities between students and teachers, which makes the whole process of physical education more scientific and promotes the continuous development of physical education.

### 3. COMPARISON OF SOCCER TECHNICAL PERFORMANCE BETWEEN THE EXPERIMENTAL AND CONTROL GROUPS

#### 3.1. COMPARISON OF SOCCER TECHNICAL PERFORMANCE OF THE EXPERIMENTAL GROUP BEFORE AND AFTER THE SEMESTER

Paired samples t-test was performed on the soccer skill scores of the experimental group before and after the semester, and the mean score of ball sense post-test was 12.5 seconds higher than that of the semester before by 2.65 seconds.  $p < 0.01$  There was a highly significant difference between the two. The mean score on the back and forth dribbling post-test was 2.58 seconds higher than the pre-semester score.  $p < 0.01$ . There was a highly significant difference between the two. The average score of 5 on the inside kick post-test was 0.96 points higher than before the semester, with a significant difference between the two. The average score of 17.51 seconds in the post-test of comprehensive skills was 1.93 seconds higher than that of the semester before, with a significant difference between them at  $P < 0.05$ . The results of the t-test for the basic soccer skill level of the experimental group are shown in Table 1. Compared with the pre-semester, all the post-semester tests showed significant improvement, and the soccer skills of the students in the diversified teaching group showed significant improvement.

**Table 1.** t test of basic football skill level of experimental group

Test index	pretest (M±SD)	post-test (M±SD)	T	P
Ball sensation (seconds)	15.15±4.68	12.50±4.51	4.51	<0.01
Round trip Dribble (seconds)	11.02±3.92	8.44±3.38	3.38	<0.01
Inside kick (points)	4.04±2.64	5.00±1.63	1.63	<0.01
Combined Skills (seconds)	20.51±6.78	18.58±6.79	6.79	<0.05

#### 3.2. COMPARISON OF SOCCER TECHNICAL PERFORMANCE OF THE CONTROL GROUP BEFORE AND AFTER THE SEMESTER

Paired samples t-test was performed on the soccer skill scores of the control group before and after the semester. The mean score of 14.53 seconds on the post-test of ball sense was 0.58 seconds higher than that before the semester, and there was a significant difference between them at  $P < 0.05$ . The score of 4.11 points on the inside kick post-test was 0.85 points higher than the score before the semester, with a significant difference of  $P < 0.05$ . The post-

test score of 8.61 seconds for back and forth dribbling was 0.06 seconds higher than that of the semester before, with no significant difference between the two. The post-test score of integrated skills was 20.45 seconds higher than that of the semester before by 0.02 seconds, with no significant difference between the two at  $P>0.05$ . The results of the t-test for the basic soccer skill level of the control group are shown in Table 2. The study showed that the traditional teaching method had a certain effect on improving students' soccer skills, but it did not have a significant effect on improving the performance of comprehensive skills.

**Table 2.** t test of basic skill level of football in control group

Test index	pretest (M±SD)	post-test (M±SD)	T	P
Ball sensation (seconds)	14.61±2.86	14.03±4.58	-2.27	<0.05
Round trip Dribble (seconds)	8.67±2.50	8.61±3.36	-2.03	>0.05
Inside kick (points)	4.96±1.46	4.11±1.55	2.80	<0.05
Combined Skills (seconds)	20.50±4.95	20.48±6.89	-2.00	>0.05

### 3.3. COMPARISON OF SOCCER TECHNICAL PERFORMANCE BETWEEN THE EXPERIMENTAL AND CONTROL GROUPS AFTER THE SEMESTER

Independent sample t-test was conducted on the technical performance of soccer in the experimental and control groups, and the average performance of ball sense in the experimental group was 12.5 seconds faster than that in the control group, 1.53 seconds,  $P<0.01$ . There was a significant difference between them. The mean score of round-trip dribbling in the experimental group was 8.44 seconds, 0.17 seconds faster than that of the control group,  $P<0.05$ . There was a significant difference between the two groups. The average score of kick accuracy in the experimental group was 5 points higher than that of the control group, 0.89 points higher than that of the control group,  $P<0.01$ . There was a significant difference between the two groups. The overall skill score of the experimental group was 18.58 seconds faster than that of the control group, 1.9 seconds faster than that of the control group,  $P<0.01$ . There was a significant difference between the two groups. The results of the t-test for the soccer skill level of the students in the experimental and control groups after the semester are shown in Table 3. The study showed that the teaching effect of the diversified teaching method was significantly better than the traditional teaching method in improving the soccer skills of elementary school students.

**Table 3.** t test of football skill level of experimental group and control group

Test index	Experimental group (M±SD)	Control group (M±SD)	T	P
Ball sensation (seconds)	12.50±4.51	14.03±4.58	-2.190	<0.01
Round trip Dribble (seconds)	8.44±3.38	8.61±3.36	-2.137	<0.05
Inside kick (points)	5.00±1.63	4.11±1.55	2.830	<0.01
Combined Skills (seconds)	18.58±6.79	20.48±6.89	-2.211	<0.01

## 4. CONCLUSION

In this paper, we compare the soccer technique performance of the experimental group and the control group based on the innovation research of teaching mode of recreational sports profession based on diversified teaching method. The average performance of ball sense of the experimental group was 12.5 seconds faster than that of the control group by 1.53 seconds. The average score of round-trip dribbling in the experimental group was 8.44 seconds faster than that of the control group by 0.17 seconds. The average score of kick accuracy in the experimental group was 5 points higher than that of the control group by 0.89 points. The

overall skill score of the experimental group was 18.58 seconds faster than that of the control group by 1.9 seconds. Therefore, the teaching mode of leisure physical education profession based on diversified teaching method is an effective method worth promoting and applying. Meanwhile, this paper also provides some reference value for the reform of physical education in colleges and universities.

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# BIG DATA ANALYSIS OF ARTWORK PREFERENCE STUDY UNDER NEUROMARKETING APPROACH

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## ABSTRACT

This paper first discusses the value and future trends of neuromarketing research, including the development from “neuroscience” to “neuromarketing”. Then, we discuss the application of neuromarketing and big data in artwork preference research, including the application of neuromarketing in artwork preference research and the application of big data in artwork preference research. Finally, we analyze the music style preferences of college students as a whole, as well as the music style preferences of different school types and major types. “Pop” is the most popular music style among college students, accounting for 42.03%. The next one is “folk”, accounting for 18.01%.

## KEYWORDS

Neuromarketing; Big data; Artwork preference; Neuroscience; Musical style

## 1. INTRODUCTION

Neuromarketing is a marketing approach based on neuroscience that optimizes marketing strategies by studying the human brain’s response to stimuli such as advertising and branding [1]. And in the field of art, neuromarketing can be used to study people’s preferences and reactions to different types, styles, themes, and other artworks [2-3]. Through big data analysis, we can collect and analyze a large amount of user evaluation and feedback data on different types, styles, themes, and other artworks [4]. These data can include user browsing records, purchase records, comment contents, etc. Through these data analysis, we can get more objective and comprehensive preferences and trends of people’s artworks, provide more targeted creative suggestions for artists, and provide more accurate exhibition planning for art museums and galleries [5-6]. The literature [7] focuses on consumer behavior and analyzes consumer preferences and responses through a neuromarketing approach. The prospects of the application of neuromarketing methods in marketing are explored, and some suggestions and future research directions are proposed. The literature [8] focuses on the relationship between music preferences and personality traits. These findings can be used in personalized recommendation systems, ad targeting, and other marketing strategies to better meet consumer needs and improve market competitiveness. In this paper, we combine two approaches, neuromarketing approach and big data, to conduct an in-depth study of college students’ music style preferences and to explore the influence of different school types and major types.

## **2. NEUROMARKETING**

### **2.1. RESEARCH VALUE OF NEUROMARKETING ERP**

Neuromarketing ERP research is not only important for advancing existing marketing management theories, but also for promoting marketing practices. In terms of theoretical value, neuromarketing ERP research helps argue, improve and deepen existing marketing management theories, which are reflected in the problem identification, information collection, solution evaluation and post-purchase behavior stages of art lovers' purchase decision process. ERP technology can objectively reflect the neural mechanisms in art lovers' behavior process by directly detecting changes in their brains, and to a certain extent, it can avoid art lovers' bias brought by questionnaire survey methods. The time sensitivity of ERP can help marketing researchers more effectively isolate the dynamic and continuous cognitive processes behind art lovers' behaviors. ERP research can help detect emotions, unconscious behaviors, and other partially unknown areas.

### **2.2. SEVERAL FUTURE TRENDS IN NEUROMARKETING ERP**

#### **2.2.1. FROM “NEUROSCIENCE” TO “NEUROMARKETING”**

Despite the progress made in neuromarketing research, the development of neuromarketing has been hampered by fundamental differences in the research focus of neuroscience and marketing. Neuroscience research is more concerned with the “when” and “where” questions. Neuroscience is concerned with the question of when an individual's consciousness and behavior cause which brain regions to be active. Marketing research, however, is more concerned with the question of “what”. For most marketing researchers, these questions of “when” and “where” are secondary to understanding the processes that occur in the brains of art lovers, but more important are the interconnections between different areas of the cerebral cortex behind consumer decisions and how these connections contribute to marketing theory. Increasingly, researchers are also finding that behavioral phenomena are not linked to one specific brain region alone, but rather arise from the synergistic work of multiple brain regions.

#### **2.2.2. DEVELOPMENT FROM “SINGLE RESEARCH INSTRUMENT” TO “MULTIPLE RESEARCH INSTRUMENTS**

Most of the articles in the field of neuromarketing use only a single experimental research method, but different neuroscience techniques have different advantages. For example, ERP tools have high-frequency resolution but relatively low spatial resolution, making it difficult to precisely brain source distribution, so they do not discriminate well the active regions of marketing stimuli in the cerebral cortex of art enthusiasts. In contrast, functional magnetic resonance imaging techniques have high spatial resolution and can accurately associate marketing stimuli with active regions of the brain, but have lower temporal resolution. In addition, eye-tracking techniques infer the intrinsic cognitive processes of art lovers through eye-related metrics such as gaze, eye jumps and tracking movements. Future studies should combine different research methods while using multiple research instruments to more rigorously investigate the psychological mechanisms of art lovers.

### **3. APPLICATION OF NEUROMARKETING APPROACHES AND BIG DATA IN THE STUDY OF ARTWORK PREFERENCES**

#### **3.1. APPLICATION OF NEUROMARKETING APPROACH IN THE STUDY OF ARTWORK PREFERENCES**

The neuromarketing approach is a marketing method based on the principles of neuroscience and psychology that measures signals from the human brain to reveal how consumers actually respond to a product or service. In artwork preference studies, the neuromarketing approach can help researchers understand aspects of subjects' preferences, emotional responses and cognitive processes to different artworks. The main neuromarketing approaches include: selecting subjects and installing devices such as EEG or fMRI. The subjects are asked to watch or enjoy different types, styles, and subjects of art works, and physiological indicators such as brain waves or blood oxygen levels are recorded. Analyze the data and extract relevant features, such as emotional value, cognitive load, arousal, etc. Assess the popularity and influencing factors of different artworks based on the analysis results and make relevant suggestions.

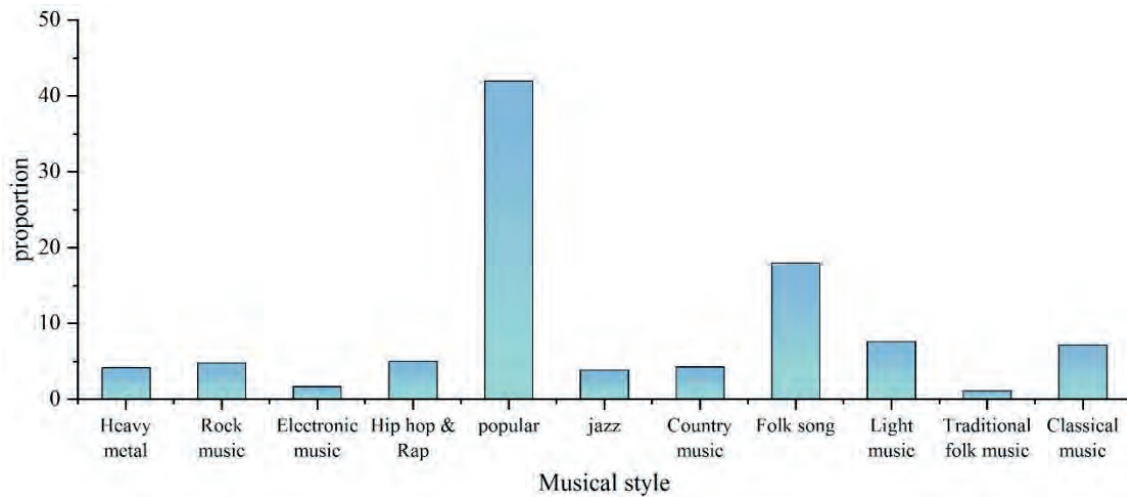
#### **3.2. APPLICATION OF BIG DATA IN THE STUDY OF ARTWORK PREFERENCES**

Big data is a collection of data of huge size, diverse types, and rapidly growing speed that can be stored, managed, and analyzed through computer technology. In artwork preference research, big data can help researchers understand aspects such as audience preferences, trends and changes in different artworks. The main applications of big data in artwork preference research are: data mining, which analyzes large amounts of data such as web search, social media, and online reviews to discover the popularity, trends and key factors of artworks, etc. Image recognition, which uses computer vision technology to identify and classify the type, style, theme and other characteristics of artworks for more accurate analysis and comparison. Personalized recommendation, based on information such as users' historical behavior and interest preferences, to recommend artworks that match their tastes and improve user experience and satisfaction.

### **4. ANALYSIS OF COLLEGE STUDENTS' MUSIC STYLE PREFERENCES**

#### **4.1. OVERALL ANALYSIS**

This paper investigates which style of music college students like most, and the results are shown in Figure 1. Among them, "pop" is the most popular music style among college students, accounting for 42.03% of the total number of respondents. The next one is "folk music", accounting for 18.01% of the total number of respondents. The next most popular genre was "light music", accounting for 7.61% of all respondents. "Classical music" accounted for 7.18% of the total respondents. Hip-hop & rap" accounted for 5.05%, "rock" for 4.81%, "heavy metal" for 4.25%, and "country" for 4.25%. Country music" accounted for 4.28% and was in the middle of the pack. The last three music styles are "jazz," "traditional folk music," and "electronic music," accounting for 3.9%, 1.17%, and 1.72% of the total number of respondents, respectively, 1.72%.



**Figure 1.** Overall status quo of college students' music style preferences

#### 4.2. MUSIC STYLE PREFERENCES OF DIFFERENT SCHOOL TYPES AND MAJOR TYPES

The music style preferences of college students in different school types are shown in Table 1, and the music style preferences of college students in different major types are shown in Table 2. The proportion of college students who like pop music and folk music is the highest in general colleges and universities, accounting for 42.05% and 20.12% respectively, while the proportion of college students who like country music is significantly higher in 211 and 985 colleges and universities than in general colleges and universities. For the recent popular “electronic music” style, the percentage of students from “211 universities” is the lowest, accounting for only 1.7%. The proportion of students who like “rock music” and “heavy metal” is much higher in “211 universities” than in ordinary universities and “211 and 985 colleges and universities”. Among the students of different majors, the proportion of those who like folk music is relatively small among those who major in “natural science” compared to “humanities” and “social science”. The proportion of those who like “rock music” and “heavy metal” is significantly higher.

**Table 1.** Music style preferences of college students of different school types

Type of school	Classical	Kunle	Light music	Folk song	Country	jazz	popular	Hip hop & Rap	Electronic music	Rock	Heavy metal	Missing value
Ordinary university	9.12%	2.16%	8.53%	20.12%	1.56%	2.18%	42.05%	6.32%	2.17%	3.05%	1.99%	0.75%
211 universities	6.72%	3.27%	6.78%	8.48%	4.25%	5.89%	24.90%	9.06%	1.70%	14.04%	14.12%	0.79%
985 Colleges and universities	6.54%	5.88%	10.41%	14.45%	4.54%	3.60%	33.06%	2.39%	2.35%	9.76%	7.02%	0.00%

**Table 2.** Music style preferences of college students of different major types

Major type	Classical	Kunle	Light music	Folk song	Country	jazz	popular	Hip hop & Rap	Electronic music	Rock	Heavy metal	Missing value
humanities	8.15%	2.09%	9.86%	20.63%	1.24%	3.41%	37.49%	7.16%	2.16%	3.57%	3.56%	0.68%
Natural science	7.13%	2.36%	6.63%	15.04%	2.90%	3.31%	33.19%	6.34%	2.67%	10.09%	9.16%	1.18%
Social sciences	5.84%	2.93%	8.32%	18.96%	2.30%	1.82%	45.54%	5.25%	2.31%	4.33%	1.99%	0.41%

## 5. CONCLUSION

Through the research in this paper, we can find important applications of neuromarketing approaches and big data in the study of artwork preferences. In the analysis of college students' music style preferences. "Pop" is the most popular music style among college students, accounting for 42.03%. The next most popular genre was "folk", accounting for 18.01%. The proportion of college students who like pop music and folk music is the highest in general universities, accounting for 42.05% and 20.12% respectively, while the proportion of college students who like country music is significantly higher in 211 and 985 universities than in general universities. In summary, the neuromarketing approach and big data provide a more comprehensive and in-depth research tool in the study of artwork preference.

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# EXPLORING THE CONSTRUCTION OF DIGITAL TEACHING MATERIALS FOR VOCATIONAL EDUCATION IN THE CONTEXT OF “INTERNET+”

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## ABSTRACT

This paper explores the interaction between digital technology and vocational education by analyzing the scope of application of “Internet+”. This paper explores the interaction between digital technology and vocational education by analyzing the scope of application of “Internet+”. The use of various digital technologies and applications changes the existing paper-based teaching materials, promotes the digitalization and modernization of teaching materials, and breaks the time and space limitation of teaching materials. By analyzing the direction of vocational education textbooks, strategies related to the construction of vocational education digital textbooks are proposed. The construction of digital teaching materials is regulated by establishing evaluation indexes. The ratio of the best digital teaching materials with the best characteristic knowledge should be 30%. The experience of a good digital textbook students is 60% in good, 37% in average and 3% in poor.

## KEYWORDS

Vocational education; Digital teaching materials; Digital technology; “Internet+”; Evaluation index

## 1. INTRODUCTION

Digital transformation is a key breakthrough for high-quality development of vocational education in the new era, but in the process of transformation, vocational institutions are faced with imperfect resource mechanisms, digital literacy of teachers and students to be improved, and incomplete digital assessment and evaluation criteria [1-3]. Digitization provides the possibility for the integration of resources of the school, government, and industry, and the integration of the industrial chain education chain, talent chain, and innovation chain [4]. An intelligent and interactive vocational education smart education information platform, permanent smart classroom and big data smart education ecosystem are established to provide highly skilled and intelligent talents to support the development of the country's emerging economy [5]. Meanwhile, vocational education digital teaching materials are popularized as well as used by major vocational schools. Teachers have improved the flexibility of the classroom by using digital teaching materials for teaching [6-7].

This paper explores the direction of teaching materials in vocational education by using the technologies related to Internet+ and proposes the construction of digital teaching materials.

## **2. IMPACT ON VOCATIONAL EDUCATION MATERIALS IN THE CONTEXT OF “INTERNET+”**

### **2.1. THE IMPACT OF “INTERNET+” ON EDUCATION**

#### **2.1.1. APPLICATION SCOPE OF “INTERNET+”**

The official definition of the Internet in 2015 is: it can apply Internet technology in daily production, integrate and optimize all elements of production, and always apply the latest technological achievements in the Internet industry to all areas of society, continuously improve the innovation and productivity of the existing real economy, and provide the foundation and development potential for broader economic development through Internet technology. The “Internet+” represents a new economic model and form that can provide infrastructure and various quality tools for social and economic development.

#### **2.1.2. THE IMPACT OF “INTERNET+” ON TEACHING AND LEARNING**

“Internet+” education, also known as “online education”, mainly uses various Internet technologies and applications to change the existing education model, promote education informatization and modernization reforms, and enhance the communication space between teachers and students. Parents and society are paying more attention to teaching and learning, which has led to changes in teaching methods. As a result, in terms of hardware, multimedia classrooms have been popularized in almost all schools to better integrate students into the teaching and learning environment. Not only are developed cities equipped with computers, iPads, 3D printers, etc., but even in less developed towns, multimedia classrooms are equipped with appropriate computers and equipment to play media courseware. The use of Internet technology in teaching is becoming more and more widespread, and students can use the Internet to get better quality teaching courses without the limitation of classroom infrastructure and teachers, thus increasing students' enjoyment of learning, promoting students' active learning through interest education, changing the traditional teaching mode, increasing mutual communication between teachers and students, and allowing students to better experience the charm of vocational education.

### **2.2. THE CHANGING DIRECTION OF “INTERNET+” TEACHING MATERIALS**

#### **2.2.1. “INTERNET+” DIGITAL TEACHING MATERIALS**

Digital teaching materials, as considered in this paper, are the sum of a series of digital teaching resource materials based on certain teaching objectives, digital teaching materials as the content center, and information technology as the teaching support to achieve the deep integration of information technology and teaching. In this paper, the core elements of digital teaching materials proposed by Sun Zhong are integrated and designed, that is, the content of digital resources, learning tools and learning communities are integrated for the construction of digital teaching materials for vocational education centered on teaching activities, and the following are the definitions of these core concepts:

##### **(1) Resource library**

In the database or cloud service system of digital textbooks, we first establish a library of learning resources that are highly focused, personalized and pushed and dynamically updated appropriate to the subject and the school period. Students can browse the learning resources and select them independently for learning.

##### **(2) Activity library**

The activities of digital teaching materials should meet the characteristics of ubiquitous and intelligent learning. Teaching activities and teaching resources should be interrelated, but

teaching resources and teaching activities can be not one-to-one correspondence; one teaching resource can be used for multiple teaching activities, and similarly, one teaching activity can be used for multiple teaching resources.

### 2.2.2. DIGITAL TEACHING MATERIALS WITH DIGITAL TECHNOLOGY

The type of vocational education determines the special nature of its teaching materials. Some researchers believe that vocational education teaching materials have obvious special characteristics, which are closely related to social development, economic operation and technological updates. Combining the theories of vocational education and theories of teaching materials, researchers have found that the books used for daily teaching and practical training in secondary and higher vocational schools are vocational education teaching materials, and they also include auxiliary materials that are an integral part of them. In addition to the function of ideological and moral education that general textbooks have, vocational education textbooks also have the function of vocational guidance. In the screening and selection of the content of textbooks, they highlight practicality and practicability, and take vocational ability as the basis and application as the purpose, and in the content organization structure of textbooks, traditional college textbooks, primary and secondary school textbooks, etc. are strong. The logical system of teaching materials is constructed according to the logical reasoning order of the discipline, which cannot meet the needs of vocational education which is job-oriented and focuses on ability enhancement.

## 3. SUGGESTIONS FOR THE CONSTRUCTION OF DIGITAL TEACHING MATERIALS FOR VOCATIONAL EDUCATION

### 3.1. STRENGTHEN THE CONSTRUCTION OF SPECIAL DIGITAL TEACHING MATERIALS

From the publication status of vocational education digital media teaching materials, at present, digital media teaching materials have not yet blossomed in a hundred different ways. The types and quantity of vocational education digital teaching materials are shown in Table 1, and the types of digital teaching materials are mostly concentrated in the basic theoretical knowledge category as well as the professional knowledge category, and the quantity of vocational education digital teaching materials with characteristic knowledge category is small, only one, accounting for 10%. The ratio of the best digital teaching materials with characteristic knowledge should be 30%. In general, the number and types of featured digital teaching materials are relatively scarce, so the construction of featured teaching materials should be strengthened.

**Table 1.** Types of digital textbooks for vocational education

Types of digital textbooks for vocational education	Basic theoretical knowledge	Professional knowledge	Characteristic knowledge
Number of digital teaching materials	6	3	1
proportion	60%	30%	10%
Optimal proportion	40%	30%	30%

There are also many ways to improve the characteristics of digital teaching materials. Teachers can combine the characteristics of vocational education subjects and the current knowledge level of students to tailor individual lecture materials with the school's professional characteristics. This can solve the problem of difficult textbook choices, or textbooks that do not match the characteristics of the major. Teachers' personal digital media lecture materials not only enable students to learn professional knowledge and increase their enthusiasm for learning, but also improve their professional skills.



### 3.2. STRENGTHENING THE MANAGEMENT OF DIGITAL TEACHING MATERIALS

The management of teaching materials is to regulate them systematically and bring them into a scientific and formalized track, so it is important to strengthen the management of digital media teaching materials. The selection of digital media teaching materials should fully consider the characteristics of digital media majors in different schools and the development needs of students, and the digital media teaching materials selected by different types of schools should be different, and students of different levels should also adopt different categories of digital media teaching materials. The judging criteria of digital teaching materials are shown in Table 2. The main objects of digital teaching materials evaluation are whether the content of digital teaching materials is correct and comprehensive, whether teaching tips are provided in the teaching design, and whether the media design reflects the flexibility of teaching materials, and the minimum percentage of meeting the three is 90%, 85%, and 80%, while the experience of students of a good digital teaching material is 60% in good, 37% in average, and poor was 3%.

**Table 2.** Evaluation criteria for digital teaching materials

Main evaluation object	Textbook content	Textbook design	Media design
requirement	The teaching process is correct and comprehensive	Offer teaching hints	Reflect the flexibility of teaching materials
Minimum satisfied ratio	90%	85%	80%
Classification of student experience	good	In general	poor
Experience ratio	60%	37%	3%

### 4. CONCLUSION

This paper assembles digital-related technologies to study the smart teaching in vocational education, and kinds of analysis on the role of digital teaching materials in vocational education. In the construction of vocational education digital teaching materials should focus on the construction of digital teaching materials with professional characteristics. Most of the kinds of digital teaching materials focus on professional knowledge as well as basic knowledge of science and technology, lacking the characteristics of vocational education, and it is recommended to integrate the characteristics of vocational education into the construction of digital teaching materials. It is also necessary to strengthen the management of digital media teaching materials and set standard indicators for digital construction.

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## ABSTRACT

This paper takes constructivism theory and humanism theory as the theoretical basis of the 5E teaching mode, explores the current trend of basketball teaching mode innovation in colleges and universities, constructs a control experiment, and uses big data analysis technology to analyze the changes of students' interests in sports, so as to analyze the applicability of "5E" teaching mode in basketball teaching. The experiment was conducted to analyze the applicability of "5E" teaching mode in basketball teaching. The mean value of students' motivation was 16.62 before the experiment and 22.15 after the experiment, the mean value of negativity was 18.57 before the experiment and 21.28 after the experiment, and the mean value of skill learning was 17.81 before the experiment and 21.02 after the experiment, which showed that the 5E teaching mode as the main way to innovate the basketball teaching mode in colleges and universities met the development needs of students.

## KEYWORDS

5E teaching model; Constructivist theory; Humanistic theory; Innovation trends; College basketball teaching; Big data analysis; Basketball teaching applicability

## 1. INTRODUCTION

The world has now entered the era of big data, and with the emergence of various types of data mining hardware, the amount of data information available to people has increased dramatically [1-2]. In conjunction with cloud computing technologies, the processing and analysis capabilities of data have risen dramatically, and the application areas related to big data technologies are expanding [3-5]. Big data and cloud computing technology, in the process of processing and analyzing data using a comprehensive analysis of various types of data, combined with the work of athlete selection, the various categories of athlete selection indicators for comprehensive processing and analysis, through the support of abundant data [6-7]. The development potential of athletes can be predicted more accurately for the final selection of coaching teams, which has a high reference value [8].

In the development of college basketball teaching work, how to effectively innovate the teaching mode of basketball class and effectively find a more effective teaching way and method is a research focus of the current college basketball teaching activities [9-10]. By reasonably innovating the teaching mode, the whole college basketball teaching can be better supported and developed, and good practical application effects can be obtained. This paper mainly analyzes and discusses the issues related to the innovation of teaching mode in college basketball teaching, and analyzes whether the 5E teaching mode can promote the students' basketball learning performance through big data technology.

## 2. RESEARCH ON INNOVATION OF TEACHING MODE OF BASKETBALL CLASS IN HIGH SCHOOL

### 2.1. THEORETICAL BASIS OF 5E TEACHING MODEL

#### 2.1.1. CONSTRUCTIVIST THEORY

Constructivist theory considers the learning process as the active construction of one's own

understanding of knowledge and new things, or the process of reorganizing and sublimating one's own conceptual understanding of an old thing, which can also be expressed as mutual integration. Social solidarity means that knowledge is not produced out of thin air, it comes from society. Learning is carried out through some social activities, and if this activity is needed here, it is done with the help of the social group, so in this case, learning also has social mutuality. The teacher's main role in the classroom is to be the designer of the classroom content and the facilitator of the teaching process, and our learning should be carried out in a concrete and realistic context that is more profound.

### **2.1.2. HUMANISTIC THEORY**

The prerequisites for creating a good classroom atmosphere: treating each other with sincerity in teaching; paying attention to students and respecting their emotions and ideas; and having empathy. Among them, having empathy means that the teacher should often stand in the students' perspective in the classroom to see the problem, to figure out the students' ideological context. Teachers should not only master teaching techniques in the teaching process, but also have the ability to grasp how to ensure and improve physical and mental health aspects, and appropriately carry out some learning activities that can show students' individuality.

## **2.2. INNOVATION TREND OF BASKETBALL CLASS TEACHING MODE IN HIGH SCHOOL**

### **2.2.1. DEVELOPMENT NEEDS**

The development of basketball teaching activities in colleges and universities should pay attention to the improvement of students' basketball psychology, hobbies, interests and mental health on the basis of the previous practical teaching of basic skills, so that students can not only get basketball skills and knowledge improvement, but also form a good awareness of physical fitness in the process of participating in basketball classes, so that students themselves are willing to participate in basketball learning and maximize the value of basketball.

### **2.2.2. SOCIAL RHYTHM**

Students' own learning pressure is gradually increasing, and sports itself has an important role in releasing pressure, which can effectively relieve students' internal tension, anxiety and other negative psychological state. In the current basketball class, its own leisure and entertainment characteristics appear more obvious. In basketball class teaching, students can learn and master the part they are interested in, help students to better relieve some stress in their future work, study and life, improve the students' physical and mental health state, and let students better enjoy life in the process of sports.

## **3. ANALYSIS OF THE APPLICABILITY OF THE "5E" TEACHING MODEL IN BASKETBALL TEACHING**

### **3.1. ANALYSIS OF BASKETBALL SPECIAL SKILLS PERFORMANCE**

In order to analyze the applicability of the "5E" teaching model in basketball teaching, 40 students were grouped and the changes in skill scores before and after the experiment were observed in the control group and the experimental group, and the comparative analysis of basketball special skill scores in the control group was constructed as shown in Table 1. The data test of the basketball scores before and after the experimental group showed that the  $T$  value was 4.138 and the  $P$  value was 0.000, and it can be concluded that the basketball scores before and after the experiment were extremely significant, while the  $T$  value was 3.681 and the  $P$  value was 0.025 in the control group before and after the experiment, and the basketball scores before and after the experiment were not significantly different. The main reason is that in the process of passing and catching the ball, each investigation group chose their own members to help pass the ball to test, and they were more familiar with each other's passing and running characteristics, which reflected the characteristics of basketball project group, so the results were extremely significant. The difference in scores was extremely significant compared to the pre-experimental period.

**Table 1.** Comparative analysis of basketball specific skill scores

Indicators	Group	Before the experiment		After the experiment		<i>T</i>	<i>P</i>
		<i>N</i>	<i>M ± SD</i>	<i>N</i>	<i>M ± SD</i>		
V-line passing and catching layups Indicators	Experimental group	20	31.26±2.10	20	24.52±2.42	4.138	0.000
	Control group	20	30.48±1.68	20	29.85±1.73	3.681	0.025

### 3.2. COMPARATIVE ANALYSIS OF SPORTS INTERESTS

The comparative analysis of physical education interest of the experimental group before and after the experiment is shown in Table 2. The mean value of students' positivity was 16.62 before the experiment and 22.15 after the experiment, the mean value of negativity was 18.57 before the experiment and 21.28 after the experiment, the mean value of skill learning was 17.81 before the experiment and 21.02 after the experiment, and the P-value of the above five groups was less than 0.01, indicating that the application of "5E" teaching mode made the above five indexes <0.01 before and after the experiment. The P-value of the above five indicators before and after the experimental group was <0.01, which was a highly significant difference, indicating that the "5E" teaching mode had a highly significant effect on improving students' interest in physical education.

**Table 2.** Comparative analysis results of sports interests of experimental groups before and after the experiment

Indicators	Pre-experiment		After Experiment		<i>T</i>	<i>P</i>
	<i>N</i>	<i>M ± SD</i>	<i>N</i>	<i>M ± SD</i>		
Motivation	20	16.62±1.87	20	22.15±2.03	-5.617	0.000
Negativity	20	18.57±2.17	20	21.28±1.94	-9.39	0.000
Skill learning	20	17.81±2.47	20	21.02±2.62	-6.928	0.000
After-school activities	20	16.94±2.07	20	20.88±2.70	-5.429	0.000
Sports attention	20	17.07±2.31	20	21.48±2.84	-4.381	0.000

## 4. CONCLUSION

In basketball class teaching innovation, we must conduct in-depth thinking and analysis to really highlight the entry point of basketball class innovation teaching. In practice, it is important to make basketball class innovation reasonable and effective based on the current physical and mental characteristics and cognitive rules of young students. For basketball class innovation, it should meet the characteristics and needs of different basketball class teaching contents, so that the whole teaching quality can be better guaranteed and improved.

The 5E teaching model, as a new teaching model, still needs time and social testing in the field of education, especially physical education. The traditional teaching mode has already achieved public recognition, so it cannot be directly replaced, but the advantages of both should be combined with a dialectical perspective, complementing each other and taking advantage of each other's strengths and weaknesses, and working toward the best teaching effect.

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# THE SIGNIFICANCE OF RURAL LANDSCAPE DESIGN BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY IN LANDSCAPE GARDEN PLANNING

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## ABSTRACT

This paper demonstrates the applicability of three-dimensional realistic models in the design of rural landscapes through the analysis of artificial intelligence technology and the application of three-dimensional realistic models to the design of rural landscapes. The overlay method technique is used to layer the design elements in landscape garden planning to highlight the three-dimensionality of the design. By comparing rural landscape design with landscape garden planning, the significance of the fusion of the two is analyzed. The work of landscape gardening after the fusion of the two conveys a sense of belonging of 50%, a sense of integration of 30%, and a sense of identity of 20%.

## KEYWORDS

Artificial intelligence; 3D realistic model; Overlay method technology; Rural landscape design; Landscape garden planning

## 1. INTRODUCTION

With the improvement of people's living standard in recent years, people's demand for tourism has also increased, and rural tourism has become an important tourist place chosen by tourists nowadays, therefore, the development of rural landscape resources has gradually tended to be commercialized [1-3]. The loss of the naturalness and special culture of rural landscape due to the unreasonable development has caused the rural landscape to fail to develop to a high level [4]. In order to protect the special culture and environmental optimization of rural landscape and make the pattern of rural landscape more multifunctional, scientific rural landscape assessment methods need to be used in the development of rural tourism landscape resources, which can effectively plan rural landscape resources to avoid unreasonable over-exploitation of rural tourism landscape, so it is a very important thing to combine rural landscape design and landscape garden planning by using the relevant technology of artificial intelligence [5-7]. This paper promotes the further development of landscape planning by integrating rural landscape design with landscape garden design through 3D realistic model and overlay method.

## 2. RURAL LANDSCAPE DESIGN BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY

### 2.1. ARTIFICIAL INTELLIGENCE TECHNOLOGY

#### 2.1.1. THREE-DIMENSIONAL REAL-WORLD MODEL

As a new model that has emerged in recent years, the 3D realistic model has been applied to different degrees in various industries. First, in terms of environmental realism, 3D realistic

model has the real characteristics of highly restoring the environment of the site itself. Second, in terms of information coverage, the 3D reality model has many types of information about the site environment, and through the browsing and measuring of the 3D reality model, more scientific and accurate site information can be obtained. Thirdly, in terms of multi-source application, the 3D realistic model is also a data format, and the visualization and analysis of the target site with one data to interface with multiple platforms realizes the multiple applications of the 3D realistic model.

### **2.1.2. THE APPLICABILITY OF 3D REALISTIC MODEL IN RURAL LANDSCAPE DESIGN**

Through the study of the characteristics and key technologies of the 3D realistic model, it is found that the realistic characteristics of the 3D realistic model can complement the problem of insufficient information of site analysis in the traditional rural landscape design method. The rich and diverse landscape types, spatial levels and fragile ecological landscapes of the mountainous countryside make it more difficult for designers to accurately assess the current situation of the mountainous countryside. The 3D realistic model has the real characteristic of highly restoring the environment of the site itself, so the designers can browse and analyze the 3D realistic model to objectively complete the assessment of the current situation information of the mountainous countryside landscape, and at the same time, they can use the format of the 3D realistic model for multiple applications, and cooperate with the panoramic experience platform to collect the user groups to design. Therefore, the use of 3D reality model in rural landscape design greatly improves the rationality and efficiency of the design.

## **2.2. THE USE OF THE OVERLAY METHOD IN LANDSCAPE GARDEN PLANNING**

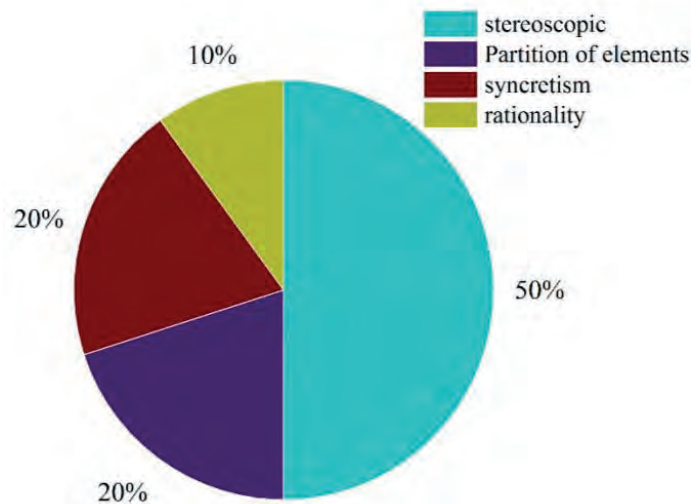
### **2.2.1. OVERLAY METHOD TECHNIQUE**

The overlay method mainly involves the layering of landscape elements and the superimposition of drawings, with the final superimposed drawing being a thematic drawing reflecting the degree of influence of environmental factors. Therefore, in landscape planning and design, the overlay method can be defined as a comprehensive technique of drawing by layering and overlaying thematic drawings containing changes or effects of a single landscape element to reflect the common effect of all elements. The above definition contains three main points, the first is layering, breaking down the overall landscape into single elements such as terrain, water bodies, vegetation, roads, etc., and studying the role of each element in depth. The second is superimposition, which re-integrates the thematic map of each element in a specific way. Lastly, co-action, which emphasizes that the purpose of overlay is to integrate the respective effects of different elements on the overall landscape.

### **2.2.2. ADVANTAGES OF THE OVERLAY METHOD IN LANDSCAPE GARDEN PLANNING**

The decomposition of complex landscape systems into topography, hydrology, vegetation and other elemental units is a fundamental mode of thinking in landscape planning and design practice. One of its vehicles is the stacked map method, characterized by the technique of element layering and superimposed reorganization, which originated at the end of the 19th century and has been continuously updated and iterated by several generations of landscape architects, and has now become a mature tool in the professional field. The advantages of the overlay method in landscape planning are shown in Figure 1, with the advantages of three-dimensionality, element division, strong integration and reasonable design. The percentage of three-dimensionality is 50%, element division is 20%, integration is 20% and rationalization is 10%.





**Figure 1.** Advantages of overlay method in landscape architecture planning

### 3. THE SIGNIFICANCE OF RURAL LANDSCAPE DESIGN IN LANDSCAPE GARDEN PLANNING

#### 3.1. THE INFLUENCE OF RURAL LANDSCAPE ON MODERN LANDSCAPE GARDENING

##### 3.1.1. ARTISTIC REPRODUCTION OF RURAL LANDSCAPE

It is a common phenomenon for modern landscape architects to draw design language from rural landscapes. In addition to directly reproducing a pastoral landscape in park design, as Olmsted did, many designers also use artistic techniques to abstractly process and reproduce rural landscapes in the city. In the urban park practice, he also wants to bring this rural idyll into the city, reproduce this kind of rural landscape, and express the idea that the city and nature can be combined with each other.

##### 3.1.2. DESIGN ELEMENTS REFLECTING REGIONAL CHARACTERISTICS

The formation of rural landscape is mostly formed after decades, centuries or even thousands of years of accumulation and precipitation, and is the final expression of the material form of the local people who are compatible with the regional climate and the natural and humanistic processes on the land. Landscape garden designers consciously extract these landscape elements with regional characteristics from the rural landscape and reflect them in the garden works. The advantages of the integration of rural landscape and garden planning are shown in Table 1, and the landscape garden planning before the integration of the two has the characteristics of single style, lack of innovation and low integration, accounting for 50%, 40% and 10% respectively. The works of landscape gardening after the integration of the two tend to also convey a sense of regional belonging, integration and identity.

**Table 1.** The advantages of the integration of rural and garden planning

Integrate the characteristics of the former landscape planning	Single style	Lack of innovation	Fusion stiffness
proportion	50%	40%	10%
After the fusion of the two	regionalism	High fusion	Strong sense of identity
proportion	50%	20%	30%

### 3.2. THE SIGNIFICANCE OF RURAL LANDSCAPE DESIGN IN LANDSCAPE GARDENING

#### (1) Reflecting cultural heritage and geographic and historical values

The combination of natural development and historical development of rural landscape, the use of rural landscape not only helps to spread its own cultural characteristics, but also enables people to feel the cohesion and crystallization of history. Improve human identification and understanding of history and inherit the excellent Chinese culture back. In the process of rural landscape construction, the differences of different regions need to be highlighted. Show the cognition of different regions in order to reflect the cultural history and value cognition of the region as much as possible in the process of rural landscape construction.

#### (2) Promoting the long-term coordinated development of landscape garden planning and the countryside

When constructing landscape gardens, the expandability of landscape gardens should be fully guaranteed, and certain landscape gardens with greater external effects but also more capital investment should be paid attention to, designed and constructed. In the creation of rural culture, we should take a historical and developmental perspective to avoid the formation of a social atmosphere and group consciousness that is quick to get things done and restless, and create a more stable and heavy rural heritage.

### 4. CONCLUSION

This paper uses three-dimensional realistic model and overlay technology to combine rural landscape design and landscape garden planning, and through the interaction of the two, it is concluded that rural landscape design integrated into the landscape garden can reflect certain cultural heritage and geographical value. The integration of the two can, to a certain extent, promote the long-term coordinated development of landscape garden planning and rural areas, thus creating a more stable and heavy rural heritage.

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# THE CURRENT SITUATION OF “HEAVY PENALTIES” IN CHINA’S CRIMINAL LAW IN THE CONTEXT OF INTERNET+

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## ABSTRACT

This paper analyzes the current situation of “heavy penalty” in the field of criminal law in China, analyzes the idea of heavy penalty in the field of criminal law, and architects a two-layer LSTM-Attention end-to-end key element extraction with four parts: word vector training, word annotation, semantic information acquisition, and key element extraction, by ablating Experiments are conducted to verify the effectiveness of LSTM+Attention experiments. The experiments on test datasets of different sizes show that this paper’s method is better than that without fused Attention and with only fused Attention in performing key element extraction, especially in terms of accuracy rate and F1 value. Based on the processing and construction of the corpus in the context of Internet+ and how to efficiently extract the key elements in the case descriptions become particularly important.

## KEYWORDS

Criminal law field; Felonious ideology; Word vector training; LSTM-Attention; Key element extraction

## 1. INTRODUCTION

Crime management has always been an important aspect of social governance in every country, especially when rapid economic development and rapid changes in the social environment, the deterioration of social security conditions will certainly make the state pay great attention to crime management [1]. Economic construction has made brilliant achievements and people’s living standards have been improving. Along with the rapid economic development, the social transformation is accelerating. An important social phenomenon that can accompany the economic and social transformation is the soaring crime rate [2-3].

The control of heavy penalties and the prudent use of the death penalty is not a stopgap measure under the complex situation we face at home and abroad; it is an important step in the field of criminal law to safeguard human rights and gradually adjust the current criminal policy thinking in China to meet the requirements of social development [4-5]. Neither policy adjustment nor control of the application of the death penalty can proceed alone; it must be based on and supported by the transformation of the values of the whole society and the conversion of the social regulation model [6]. In this sense, it is also a social system project that requires overall planning, overall promotion and continuous construction [7-8].

In this paper, based on the two-layer LSTM end-to-end key element extraction method, we perform lexical annotation, and then obtain the word vector of each word in the case description as the input of LSTM through the word vector model to obtain the semantic information

representation of the case description text.

## 2. THE CURRENT SITUATION OF “HEAVY PENALTIES” IN THE FIELD OF CRIMINAL LAW IN CHINA

### 2.1. THE IDEA OF HEAVY PENALISM IN THE FIELD OF CRIMINAL LAW

#### 2.1.1. THE VALUE OF PENAL PREVENTION

A major feature of Chinese criminal legislation is the introduction of quantitative factors into the general concept of crime, and the allocation of specific quantitative factors such as “aggravating circumstances,” “aggravating circumstances,” and “large amount” in the sub-articles. “The specific quantitative factors, so that Chinese criminal law, at least in the legislation, has the function of narrowing the scope of application of criminal law “crime”. However, due to the excessive abstractness of the sub-paragraphs of the criminal law and the vagueness of the specific crime standards, resulting in the criminal law of this orientation function is greatly reduced. With the seriousness of the crime phenomenon, the “severity” of the penalty is still inevitable. Thus, the concept of crime, which combines qualitative and quantitative factors, is both a strength and an Achilles’ heel of Chinese criminal law.

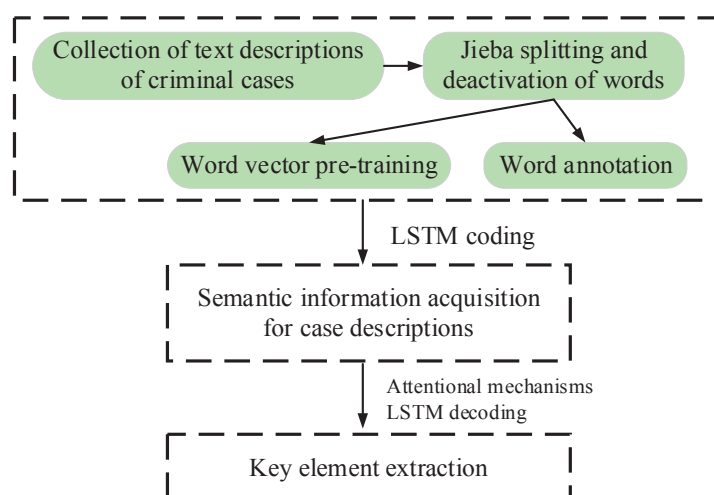
#### 2.1.2. CRIME STATISTICS

Currently, crime statistics in China are still mainly stuck in the general calculation of crime rates. This is not only difficult to explain, but also very likely to mislead people to make a wrong estimation of the real security situation. First of all, can the increase of crime rate indicate the increase of crime caused by the lenient punishment? This seems difficult to determine both in theory and in practice. Because crime is a comprehensive product of the interaction of many social factors. We do not have corresponding tracking surveys and studies on offenders, especially recidivists, repeat offenders and the so-called “chronic offenders”, so we cannot really grasp the specific reasons for the increase in crime in a comprehensive and scientific manner.

## 2.2. TWO-LAYER LSTM-ATTENTION BASED END-TO-END KEY ELEMENT EXTRACTION

### 2.2.1. KEY ELEMENT EXTRACTION

The proposed end-to-end key element extraction method based on two-layer LSTM-Attention mainly includes four parts: word vector training, lexical annotation, semantic information acquisition, and key element extraction, and the structural framework diagram of the method is shown in Figure 1:



**Figure 1.** Two-layer LSTM-Attention based end-to-end key element extraction method

## 2.2.2. LEXICAL ANNOTATION

Since the key elements of the corpus in this paper are the defendant's actions and locations in the case description, i.e., a series of verbs and nouns in the case description, in order to better obtain these key information, we lexically annotate the experimental corpus to better obtain the words corresponding to the verbs and nouns lexically as the key elements through the model of this paper.

## 3. EXTRACTION AND ANALYSIS OF KEY ELEMENTS OF FELONY CASE TEXTS

### 3.1. ABLATION EXPERIMENTS

In order to verify the performance of the proposed method in this paper, and to demonstrate the importance of the Attention mechanism and lexical information to the model in this paper, the corresponding ablation comparison experiments were done using the constructed corpus of different sizes as the test set, respectively, and the results of the ablation experiments are shown in Table 1. The experiments on test datasets of different scales show that the method in this paper is better in performing key element extraction than that without fusing Attention and when fusing Attention only, especially in terms of accuracy rate and F1 value. Although Attention can solve this limitation and the mechanism can focus the important information, and it is also proved by LSTM+Attention experiments that it is somewhat better than LSTM, but this is not yet able to extract the verb and noun words in the case description we want, which can be well extracted by the idea of word recognition in this paper.

**Table 1.** Comparison results of ablation experiments

Method	Small_data			Big_data		
	P	R	F1	P	R	F1
LSTM	69.8%	73.2%	70.8%	69.7%	78.2%	73.6%
LSTM+Attention	73.8%	80.5%	78.2%	78.3%	78.7%	75.5%
Methodology of this article	78.7%	76.3%	79.2%	82.7%	78.9%	81.3%

### 3.2. DEEP LEARNING KEYWORD EXTRACTION

In order to verify that the key element extraction method proposed in this paper is feasible than the existing deep learning based keyword extraction methods in the field of case fact description, this paper uses different scale of case description test corpus for corresponding experimental comparison, and the results of deep learning keyword extraction method comparison experiments are shown in Table 2. On case description test sets of different scales, by replicating the parameters of the baseline method in line with the method in this paper, according to the experiment shows that the method in this paper works better, analyzing the reason, CRF extraction keyword method fails to obtain important semantic information well although it extracts contextual information, while RNN extraction method improves its extraction results compared with CRF despite the integration of semantic information.

**Figure 2.** Comparison experimental results of deep learning keyword extraction methods

Method	Small_data			Big_data		
	P	R	F1	P	R	F1
CRF	50.2%	47.9%	47.3%	47.9%	43.8%	52.6%
RNN	61.7%	42.8%	54.8%	61.6%	52.6%	69.3%
GRU	67.3%	72.6%	64.8%	69.3%	68.3%	71.7%
LSTM+CRF	71.2%	76.9%	69.4%	72.4%	70.7%	78.4%
Methodology of this article	77.5%	77.1%	72.6%	84.4%	74.8%	80.2%

#### **4. CONCLUSION**

There are many factors that influence serious crime rates, and this study draws some conclusions from the study of penalties and serious crime rates in China, some of which are consistent with the expected hypotheses. Also some findings contrary to the impression were found at the same time. And it is hoped that these findings will lead to some suggestions for the prevention of crime and the improvement of criminal policies.

Penalties can only have the effect of preventing crime and reducing crime to a limited extent, and the idea of hoping to deter crime by heavy punishment is actually a misconception in the concept of punishment. The fundamental way to fight crime lies in the progress and improvement of economy, politics, culture and morality, and in the improvement of human values. Therefore, it is important to create an excellent social environment through the implementation of various social policies, and to form a social mechanism to curb crime.

#### **FUNDING**

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# APPLICATION OF MICRO IMPLANT SUPPORT IN ORTHODONTIC TREATMENT IN THE CONTEXT OF BIG DATA

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## ABSTRACT

In this paper, the stability performance of micro titanium implant orthodontic support was investigated by analyzing the application of micro implant support in orthodontic treatment. Based on previous orthodontic clinical data, the healing period of micro titanium implants was analyzed. The role of micro implant support resistance in orthodontics was demonstrated by comparing the probability of adverse events occurring in common treatment. The results showed that micro-implant bracing facilitated the restoration of healthy dental function. After 6 months of treatment, the t-value for masticatory function was 5.879, for speech function was 7.669, and for fixed function was 5.611 in the experimental and control groups. Micro-implant braces reduced the occurrence of dental adverse events. The overall probability of adverse events in the experimental group was low, with only 2 adverse events.

## KEYWORDS

Micro-implants; Orthodontic treatment; Probability of adverse events; Dental health function; Clinical data

## 1. INTRODUCTION

In the past two years, with the progress of medical technology, the level of hospital medical services has been improving. The update of various medical materials has also improved the treatment level of physicians accordingly [1-2]. Orthodontic treatment is a common form of oral treatment, mainly through the correction of malformed teeth in the patient's mouth to improve dental aesthetics and further enhance dental function and protect oral health [3-4]. With the increasing concern for dental health, the number of people receiving orthodontic treatment is also increasing, and micro-implant supports are easy to operate, small in size, and convenient to implant, which have been gradually used in clinical treatment in recent years [5].

This paper focuses on the application of micro-implant bracing in orthodontic treatment and compares micro-implant braced orthodontics with general orthodontic treatment, thus demonstrating its value of micro-implant bracing.

## **2. MICRO IMPLANT SUPPORT IN THE CONTEXT OF BIG DATA**

### **2.1. MINIATURE IMPLANT SUPPORT SYSTEM**

#### **2.1.1. APPLICATION OF MICRO-IMPLANT SUPPORT**

MIA is the direct use of miniature titanium screws tapped into the bone cortex to obtain orthodontic support, which are generally 2-3 mm in diameter and 7-14 mm in length. Currently, miniature titanium screws have become a hot topic in the orthodontic community and are widely used in experimental and clinical practice because they are relatively easy to implant and can be applied almost instantly after implantation, and there is almost no restriction on where they can be implanted. Therefore, miniature titanium screws can be used in a wide range of orthodontic treatments, such as gap closure, orthodontic openings, and upright posterior teeth. However, because the micro titanium screw mainly relies on the mechanical embedding force between itself and the alveolar bone to fix, some scholars believe that the micro titanium screw and the alveolar bone will not form an osseointegration, and the diameter of the micro titanium screw is small, so the biggest problem of the micro titanium screw support system is easy to fall off and break when withstanding large orthodontic force. The factors that affect the success of micro titanium screws include the amount of bone at the implantation site, the length and diameter of the screw, the magnitude and direction of the orthodontic force applied to the screw, etc.

#### **2.1.2. STABILITY OF ORTHODONTIC SUPPORT FOR MICRO TITANIUM IMPLANTS**

Micro titanium implants are used for orthodontic tooth movement and are a stable support. According to previous orthodontic clinical data, microtitanium implants are clinically stable supports, but they do not remain absolutely stable when subjected to orthodontic forces. In the present study, the healing period of the microtitanium implants was 2 weeks. Obviously, 2 weeks is enough time for adequate soft tissue healing but not enough time to achieve osseointegration. Histological studies have shown that a layer of fibrotic tissue forms between the bone and the implant when pressure is applied early. When the fibrous tissue is compressed, the threads of the micro-implant then mechanically embed into the surrounding bone.

## **2.2. ORTHODONTIC TREATMENT**

### **2.2.1. OCCURRENCE AND DEVELOPMENT OF MISSHAPEN COLLAR DEFORMITY**

Orthodontics is the study of the etiological mechanism of malocclusion, diagnosis and analysis, as well as its prevention and treatment, and is a branch of dentistry. The World Health Organization defines malocclusion as “dental-facial anomalies”, which includes not only misalignment and misalignment of teeth, but also various deformities caused by misalignment between teeth and jaws, craniofacial relationship. In the process of children's growth and development, dental, jaw and craniofacial anomalies are common due to congenital genetic factors or acquired environmental factors, such as misalignment of teeth, abnormal jaw relationship between upper and lower dental arches, abnormal jaw size and morphological position, etc. The damage caused not only affects the appearance but also the function. Studies have pointed out that the occurrence and development of malocclusion is very closely related to human evolution.

With the evolutionary development of human history for more than one million years, the production and lifestyle of human beings have changed, as well as their eating habits, and with it the gradual unbalanced degeneration of human chewing organs. Therefore, a series of malocclusions such as crowded teeth and misaligned teeth were gradually produced. The evolution of malocclusion from nothing to something, from simple to complex, is the result of



human evolution.

### 2.2.2. FIXED ORTHODONTIC TREATMENT

The orthodontic treatment method that is currently considered to have the best efficacy both domestically and internationally is fixed orthodontics, and fixed orthodontics includes many types, with the straight wire fixed orthodontic example now commonly used. The process of this fixed orthodontic treatment is divided into approximately initial preparation, follow-up visits to discuss treatment planning, the straight wire fixed aligner treatment phase, and the maintenance phase. The steps in the straight arch fixed aligner treatment phase are: affixing the full mouth fixed aligner, ligating the archwire, monthly follow-up visits lasting 18-36 visits, fixed retention, and active retention. Many factors can lead to prolonged orthodontic sessions or unsatisfactory orthodontic results if the orthodontic process is not followed up on time, or if the aligners fall out frequently [6].

Due to the developmental characteristics of human physiology, the adolescent period is the best time for orthodontics, and the special physiological developmental characteristics and psychological developmental characteristics of adolescents make the cooperative behavior of adolescent orthodontic patients the biggest problem troubling orthodontists and nursing students.

## 3. EFFECTIVENESS OF MICRO IMPLANT SUPPORT IN ORTHODONTIC TREATMENT

### 3.1. FUNCTIONAL ANALYSIS OF DENTAL HEALTH

The differences were not statistically significant when comparing the scores of masticatory function, speech function and fixed function between the two groups before treatment by comparing the micro implant support in orthodontics with normal orthodontics [7]. After 6 months of treatment, the masticatory function, language function and fixed function scores of both groups were higher than before treatment, and the experimental group was higher than the control group, and the difference was statistically significant. Inclusion of implant support can facilitate orthodontic treatment and accelerate the recovery of healthy dental function.

**Table 1.** Comparison of dental function scores before and after treatment

Group	Number of cases	Six months after treatment		
		Masticatory function	Language function	Fixed function
Experimental group	36	8.33±1.77	8.24±1.18	
Control group	36	6.05±1.51	6.34±0.98	6.68±0.97
t		5.877	7.669	5.611
P		0.000	0.000	0.000

### 3.2. PROBABILITY OF ADVERSE EVENTS

During the follow-up period, the incidence of adverse events in the test group was lower than that in the control group, and the difference was statistically significant, i.e.,  $P < 0.05$ . The probability of adverse events after treatment is shown in Table 2. The overall probability of adverse events in the test group was low, with only two adverse events, while more adverse events occurred in the control group with eight occurrences. This indicates that the incorporation of micro-implant support reduces the probability of adverse events during the orthodontic procedure.

**Table 2.** Probability of adverse events after treatment

Group	Number of cases	Gum infection	Tooth loosening	Gum swelling	Adverse event
Experimental group	36	1(2.81)	0(0.00)	1(2.79)	2(5.55) <sup>a</sup>
Control group	36	2(5.58)	3(8.36)	3(8.31)	8(22.26)

Note: Compared with the control group,  $\chi^2=4.181$ , <sup>a</sup>P=0.041.

#### 4. CONCLUSION

In this paper, we investigated the use of micro-implant braces in orthodontic procedures. By comparing the treatment without micro-implant braces, we demonstrated that micro-implant braces ensure healthier dental function compared to other orthodontic treatments, with t-values of 5.879 for masticatory function, 7.669 for speech function, and 5.611 for fixed function in the experimental and control groups after 6 months of treatment, as well as The probability of adverse events was also reduced.

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# RESEARCH ON THE TRANSFORMATION OF FINANCIAL SHARED SERVICE MODEL OF MANUFACTURING ENTERPRISES IN THE CONTEXT OF DIGITAL INTELLIGENCE TECHNOLOGY

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## ABSTRACT

This paper analyzes the limitations of the current financial working model of manufacturing enterprises by exploring the application of the financial shared service model. The financial working model of manufacturing enterprises is optimized by using digital intelligence technology. The digital transformation of the enterprise finance shared model is realized by improving the level of enterprise functions as well as the utilization rate of departmental functions. The results show that the organizational structure of the enterprise is mainly transformed into networked, flat and standardized, in which the networked structure of the enterprise needs to reach 70% and the standardized structure needs to reach 80%. The business processes of the enterprise mainly develop into digital, intelligent and simple, and 75% of the business processes need to reach the level of intelligence.

## KEYWORDS

Digital intelligence; Enterprise finance model; Functional transformation; Digital transformation; Enterprise organizational structure

## 1. INTRODUCTION

Nowadays, the rapid development of modern information technology has provided a broader operating space for various industries and fields, but it is accompanied by unprecedented market pressure and challenges [1-2]. The deepening and improvement of the financial sharing service model has also accelerated the digital transformation and upgrading of modern enterprises to some extent, which can maximize the efficiency of financial data utilization and value-added revenue without losing time and labor costs [3-4]. Therefore, the digital transformation of enterprise finance under the financial sharing model has a non-negligible prospective role in the innovation and upgrading of enterprise management model and long-term development. Li, L et al. analyzed the problems of financial shared services under big data auditing and proposed relevant solutions [5]. Jiang, S established a framework for service model auditing process by fuzzy hierarchical analysis to improve the efficiency of financial auditing [6]. Pflaum, A. A et al. proposed a reference process for digital transformation of companies using IoT technology, which provides a reference method for corporate transformation [7].

This paper mainly relies on digital intelligence technology to develop strategies related to the transformation of manufacturing enterprises by analyzing the financial shared service model.

## 2. RESEARCH ON FINANCIAL SHARING MODEL UNDER DIGITAL INTELLIGENCE TECHNOLOGY

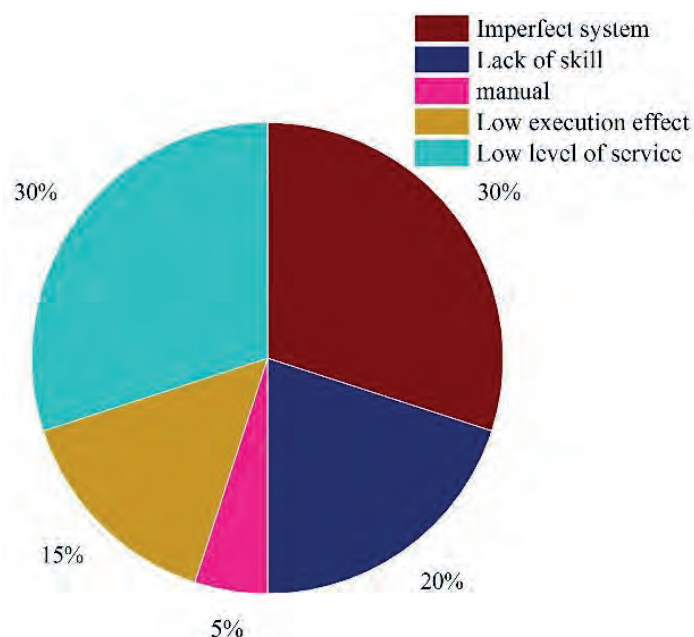
### 2.1. OPTIMIZATION OF ENTERPRISE FINANCE WORK BY FINANCIAL SHARED SERVICE MODEL

#### 2.1.1. FINANCIAL SHARED SERVICES MODEL STUDY

The financial sharing business model began to emerge in the 1980s. A financial sharing center can be understood as a center for task assignment, processing and archiving, mostly starting with a company's long-term development strategy, supplemented by a special organizational structure, system construction and cost savings. The financial shared service model is a distributed management model that promotes synergy and cooperation between business and finance through computer information technology. The financial shared service model is a product of the development of network finance and network technology to a certain stage, and is an inevitable trend of the development of the times. Unlike the traditional financial management model, the most important feature of the financial shared service model is that it simplifies the business processes of internal finance, allowing finance personnel to detach themselves from the complicated processing procedures. It also promotes the transformation of financial functions.

#### 2.1.2. LIMITATIONS OF THE FINANCIAL WORKING MODEL OF MANUFACTURING ENTERPRISES

Although more and more companies are focusing on building financial shared services models and attaching importance to the digitization of financial data, they have not established management systems to match them, leading to loose management and inefficient execution. The same is true for manufacturing enterprises, where the traditional financial work model has many problems and drawbacks. The limitations of the financial working model of manufacturing enterprises are shown in Figure 1, which has the problems of incomplete system, lack of technology, manualization and low business level. The biggest problem is that the financial system is not complete, accounting for 30% of the problem, and the business level is also limited to 30%.



**Figure 1.** Limitation of financial working mode of manufacturing enterprises

## **2.2. FINANCIAL SHARED SERVICES MODEL OPTIMIZES FINANCE FOR MANUFACTURING COMPANIES**

### **2.2.1. INTELLIGENT LEVEL ENHANCEMENT**

In the intelligent environment, cross-border talents with “finance + IT” thinking are especially important. Only financial expertise cannot support the rapid change and development of enterprises, and the original financial personnel may face changes such as job cancellation and work content adjustment. It is suggested to strengthen the diversified knowledge learning of economic management and information technology, and promote part of the financial personnel to transform to composite positions, starting from system operators, and through accumulating experience and expanding skills, realize the secondary transformation to technical personnel of financial sharing center, with a view to achieving greater development.

### **2.2.2. FINANCIAL DEPARTMENT FUNCTION TRANSFORMATION**

Under the financial sharing model, the application of big data and Internet technology effectively reduces the workload of traditional accounting positions. Therefore, enterprises should transform most accounting positions into management accounting positions responsible for budgeting, report analysis, performance assessment, etc., so that accounting financial personnel can gradually participate in enterprise management and decision making, and continuously provide assistance to improve enterprise operation. For example, enterprises can arrange some cost accounting personnel in cost budgeting, cost variance analysis and other management-oriented positions, mainly responsible for analyzing the impact of changes in corporate costs, the reasons for differences in the implementation of the cost budget, to provide a basis for the enterprise management to improve the cost management process. Secondly, the establishment of financial risk analysis positions. This position is mainly responsible for collecting and mastering the relevant information in the market that affects the business management of the enterprise, and by analyzing the data generated in the daily business activities of the enterprise, digging out the potential financial risks and providing the enterprise with financial risk warning and solutions, so as to enhance the value of the enterprise financial management and promote the healthy and stable development of the enterprise.

## **3. ENTERPRISE FINANCIAL TRANSFORMATION BASED ON FINANCIAL SHARED SERVICE MODEL**

### **3.1. ANALYSIS OF ENTERPRISE FINANCIAL ORGANIZATION STRUCTURE**

In the process of financial digital transformation under the financial sharing model, in addition to requiring the participation of finance department personnel, a more complete organizational structure must be formed with the cooperation of other organizational departments to standardize the transformation development process and lay a good foundation for the long-term development of the enterprise. The organizational structure of the transformed manufacturing enterprise based on the financial shared service model is shown in Table 1. The organizational structure of the enterprise is mainly transformed into networked, flat and standardized, in which the networked structure of the enterprise needs to reach 70% and standardized needs to reach 80%. The business process of the enterprise mainly develops to digitalization, intelligence and simplification, and 75% of the business needs to reach the level of intelligence.

**Table 1.** Manufacturing enterprise organization structure

<b>Corporate organizational structure trends</b>	<b>networked</b>	<b>flattening</b>	<b>normalize</b>
degree	70%	50%	80%
Enterprise business process optimization	digitization	intelligentize	simplify
degree	70%	75%	60%

### **3.2. ANALYSIS OF CORPORATE FINANCE FUNCTIONS**

Under the financial sharing model, enterprise financial management not only needs to analyze financial data, but also needs to organize and analyze various non-financial data. Therefore, the construction of financial sharing center has very high requirements for the professionalism of staff, who need to master both accounting expertise and computer technology, and the construction of financial sharing center is also inseparable from system development and operation managers. Therefore, in order to actively promote the transformation of enterprise financial management, it is necessary to build a professional financial management staff team. First, it is necessary to strengthen personnel exchange. This includes the exchange of staff of each business module of the sharing platform, the exchange of personnel between the sharing platform and the finance of the operating enterprise, and the short-term exchange between the finance personnel and the business. Through exchange and adjustment, the business integration can be maximized and the comprehensive business level of the finance personnel can be helped to improve. Second, strengthen the comprehensive training of enterprise financial management personnel. Regularly educate and train enterprise financial management personnel and form a long-term education and training mechanism to continuously improve the professional level of enterprise financial management personnel.

## **4. CONCLUSION**

This paper explores the limitations of the financial work model of manufacturing enterprises and digitally transforms the financial work of manufacturing enterprises based on the financial shared service model. The first step in the transformation of the financial work of manufacturing enterprises is to improve the intelligence of the enterprises. The organization structure of enterprises should be networked, flattened and standardized, of which 70% should be networked and 80% should be standardized.

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# RESEARCH ON THE SYNERGISTIC DEVELOPMENT OF HOTEL MANAGEMENT AND TOURISM EXPERIENCE BASED ON BIG DATA ANALYSIS

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## ABSTRACT

This paper combines big data analysis as well as correlation analysis to explore the relationship between both hotel management and tourism experience. By analyzing the factors that affect the tourist experience, the development direction of hotel management is formulated. Combining the common influence aspects of hotel management and tourism experience, effective strategies for the coordinated development of both are proposed. The results show that hotel service has the largest share in influencing tourist experience degree, with 80% influence, followed by hotel after-sales service with 75% influence. Among the factors influencing tourists' sense of experience, the degree of influence of humanized hotel management is 40%, and the degree of influence of both standardized as well as personalized hotel management is 30%.

## KEYWORDS

Big data analysis; Correlation analysis; Hotel management; Tourism experience; Coordinated development strategy

## 1. INTRODUCTION

Hotels have a strong function as a place to provide accommodation and food for tourists, and quality hotel services can make tourists' body and mind relaxed [1-2]. Make tourists get a good travel experience. However, in terms of the current development of hotels, the management mode of some hotels is relatively backward. Many hotels do not focus on providing tourists with quality services. Only the pursuit of creating more economic benefits. In addition, the hotel management lacks humanization [3-4]. Tourists do not get a better stay experience. Scientific management is an important guarantee to improve the service level of the hotel, in the face of the increasingly competitive market environment. If the hotel wants to continue to develop, it must keep pace with the times and innovate the hotel management mode [5].

Gao, B et al. investigated the correlated factors affecting hotel ratings by surveying hotel reviews in different cities. The ratings of hotel product features were illustrated through robustness tests [6]. Lin, Y. X et al. investigated the positive relationship between ITA and hotel performance through traditional and dynamic panel regression models [7].

In this paper, we use big data technology to analyze the correlation between hotel management and tourism experience, and on this basis, we propose a strategy for the



synergistic development of both.

## 2. ANALYSIS OF THE ASSOCIATION BETWEEN TOURISM EXPERIENCE AND HOTEL MANAGEMENT

### 2.1. TOURISM DEVELOPMENT MODEL UNDER TOURISM EXPERIENCE

#### 2.1.1. TRAVEL EXPERIENCE

Tourism experience is considered to be the culmination of a specific experience formed when tourists visit a specific tourist destination, a combination of multiple complex factors, and the impressions of tourists' feelings and attitudes toward the destination. There are many studies on tourism experience, but this paper is biased to believe that tourism experience should be the psychological feelings that tourists have during the tourism process, mainly in the form of emotions. Tourism experience can be distinguished in terms of intensity, validity and length of memory.

#### 2.1.2. EXPLORING THE INFLUENCING FACTORS OF TOURISM EXPERIENCE

##### (1) Entertainment projects and interaction

The main purpose of tourists' tourism is to experience various amusement facilities and to watch performing arts projects. The appearance, function and entertainment of various facilities, the audio-visual effect, theme and content of performing arts activities, the various interactions with service and performing arts personnel, and the cultivation of other customers' speech and behavior, all these factors will stimulate the visitors' vision, hearing, touch and emotion, so that they can obtain a variety of sensory functional experience and emotional experience.

##### (2) Hardware facilities and environment

Visitors gain direct experience through the use of supporting hardware in the hotel, the cruise ship decoration and the atmosphere of the space environment, generating the five senses, thinking and judging, and generating experience.

### 2.2. INTERACTION OF HOTEL MANAGEMENT AND TOURISM EXPERIENCE

##### (1) Hotel management can improve tourists' travel experience to a certain extent.

As mentioned above among the factors affecting tourists' experience, the management of hotel in-store facilities and the attitude of hotel attendants can affect tourists' tourism experience. The influence of hotel management on tourism experience is shown in Table 1. Hotel management mainly includes hotel facility management, hotel service management, and hotel after-sales management. Among them, hotel service is the most influential to tourists' experience degree, with the influence degree of 80%, followed by hotel after-sales, with the influence degree of 75%.

**Table 1.** The impact of hotel management on travel experience

Hotel management	Hotel facilities	Hotel service	Hotel after-sales service
Standard	perfect	good	good
Tourist experience degree	preferably	normal	No good
Tourist experience degree	70%	80%	75%

##### (2) The requirements of tourists' experience further promote hotel management

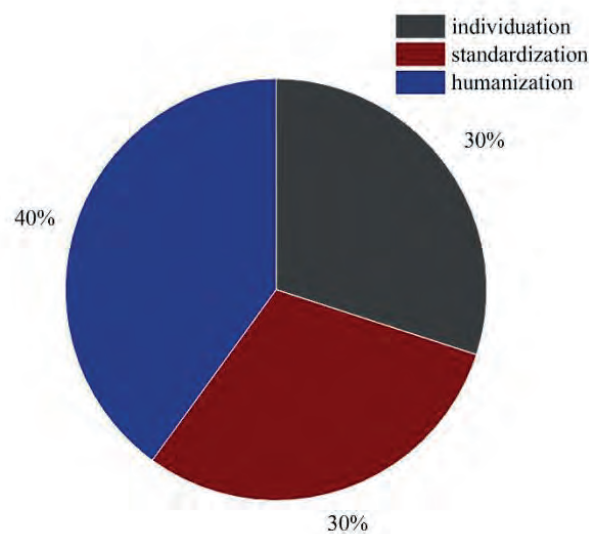
As the saying goes, if there is a demand, there will be a market, and the demand of tourists for hotels will push the hotels to make changes to a certain extent. For example, if tourists need to watch the starry sky at night, the hotel will transform the hotel bed according to the

tourists' demand and replace the roof of the room with glass material.

### 3. ANALYSIS OF STRATEGIES FOR THE COORDINATED DEVELOPMENT OF HOTEL MANAGEMENT AND TOURISM EXPERIENCE

#### 3.1. ANALYSIS OF THE INTEGRATION OF THE CHARACTERISTICS OF STANDARDIZED AND PERSONALIZED SERVICES

Hotel management affects the visitor experience to a certain extent. The management requirements of hotels are shown in Figure 1, which mainly include personalization, standardization and humanization. Among them, humanized hotel management can well improve tourists' experience. Among the factors affecting tourists' experience, humanized hotel management accounts for 40%, and standardized and personalized hotel management accounts for 30%.



**Figure 1.** Hotel management requirements

Travel is a recreational and leisure activity for tourists, and accommodation is the most basic need of tourists during the travel process. Hotel managers must design and provide professional services from the tourists' point of view. Hotels that are able to provide personalized services are able to create a brand effect and gain the favor of customers in the market, thus forming a good reputation. Personalized service work is essential for tourists. Therefore, the design of the hotel service plan, the designer must consider the actual needs of tourists, to provide the most intimate service for tourists. Specifically, it is necessary to understand the purpose of tourists to come to the hotel city, and provide them with the corresponding tourist guide and other services.

#### 3.2. HOTEL INFORMATION TECHNOLOGY IMPROVEMENT ANALYSIS

Information technology has gradually penetrated into various industries, the tourism industry and the hotel industry is no exception, and the whole area of tourism is the level of information technology for the hotel has put forward the corresponding requirements. With reliable network technology support, hotel information, tourism products and traffic information of the surrounding tourist attractions can be fed back to consumers at the first time, while consumers can complete online transactions with the hotel through information technology, and the promotion and marketing of the hotel also need to use information technology. From the perspective of using experience, the level of information technology of the hotel will to a certain extent affect the experience of consumers, so the development of convenient

information technology services has become an important strategy for the development of hotel management innovation under the whole area of tourism. How to determine the development tendency and development focus of the hotel in this aspect of information technology depends on consumer feedback, so the hotel in the process of information technology development also need to collect consumer feedback in a timely manner, and effective analysis and processing, and thus help the hotel to find the correct, humane direction of information technology development, to meet the basic needs of consumers, and to provide consumers with personalized information technology use experience This is undoubtedly an important role for the long-term development of the hotel.

#### **4. CONCLUSION**

This paper analyzes the relationship between tourism experience and hotel management by using the method of big data analysis. It is believed that tourism experience can, to a certain extent, force the reform and innovation of hotel management, and the improvement of hotel management ability can also improve the experience of tourists. Hotel service is the most influential to tourists' experience degree, with the influence degree of 80%, followed by hotel after-sales, with the influence degree of 75%. In the percentage of factors affecting tourists' sense of experience, humanized hotel management accounts for 40%, and standardized as well as personalized hotel management both account for 30%.

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# RESEARCH ON THE INTEGRATION OF AUTOMOTIVE INFORMATION TECHNOLOGY AND UNIVERSITY EDUCATION INNOVATION MODEL IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

In order to explore the innovative teaching mode of college education, this paper analyzes automotive information technology and combines it with college education innovation in the context of deep learning. By exploring the connotation of deep learning of automotive information technology in colleges and universities, the sudden review of teaching atmosphere under deep learning constructs a new model of integration teaching in colleges and universities with four teaching dimensions such as relationship orientation, integration orientation, context orientation and emotion orientation. After teaching practice, students' attendance increased by 0.13, students' satisfaction and concentration increased by 0.18, students' class participation increased by 0.23, and students' class concentration increased by 0.18, based on the deep learning context of integrated teaching is feasible.

## KEYWORDS

Automotive information technology; Deep learning; Relational vector; Integration vector; Situational vector; Affective vector

## 1. INTRODUCTION

Automotive information technology is widely used, and the traditional college automotive information technology teaching mode can hardly meet the diversified development needs and personalized learning needs of modern college students, so it is imperative for colleges and universities to carry out automotive information teaching reform work [1-2]. College education is a key component of China's talent cultivation system, and in the new era of education reform, the traditional college education model has exposed more and more drawbacks, while the concept of quality education is getting more and more attention from the society [3-4]. Therefore, how to effectively innovate the college education model to strengthen the quality education results of students becomes an important teaching task faced by the majority of college educators [5].

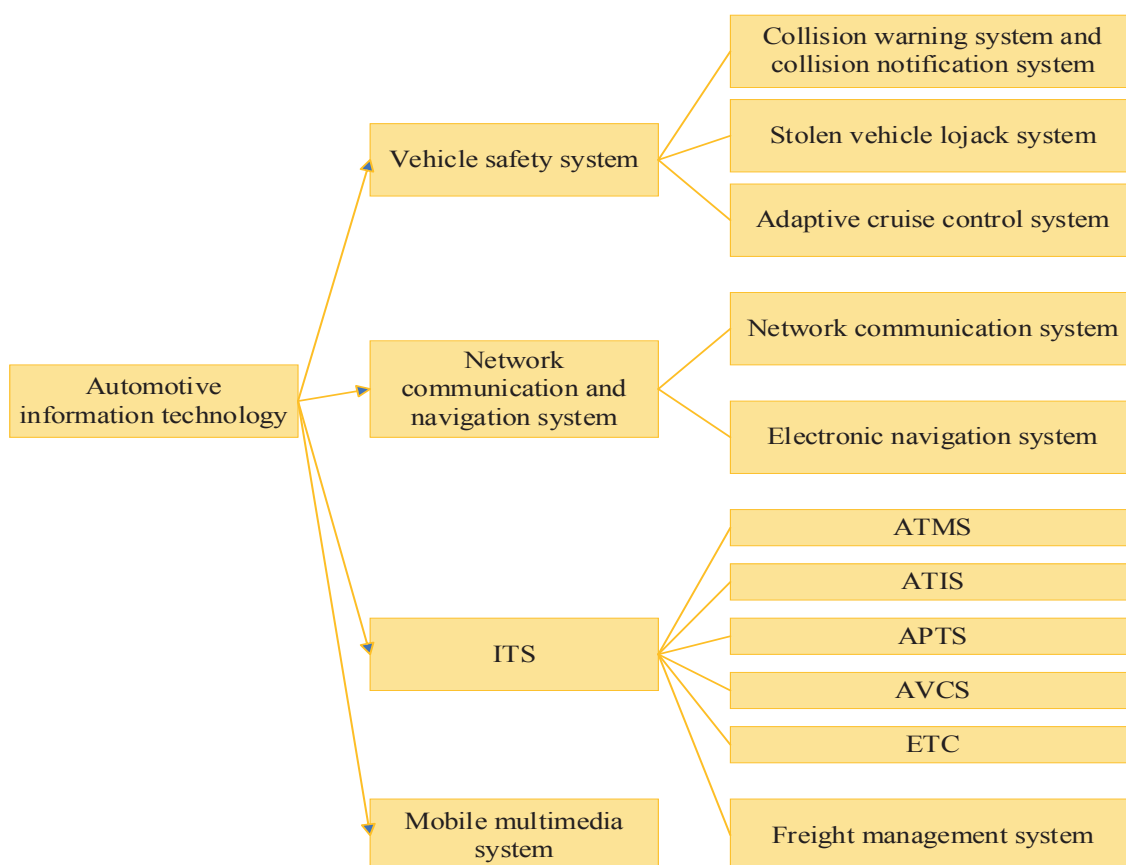
Deep learning means that students build on their learning of traditional knowledge understanding to critically understand what they have learned [6]. Students have to integrate their newly learned knowledge into the old knowledge structure and look for connections between the new knowledge and the old knowledge, so that deep learning can transfer the old

knowledge to a completely new context and allow students to better solve the problems they encounter [7-8]. Deep learning is characterized by understanding, criticism, communication, and reconstruction, and it is problem-oriented to better analyze and solve problems, so that “deep learning” can be applied throughout the efficient classroom teaching, which can trigger students’ deep thinking and improve their problem-solving ability [9].

In this paper, we will first analyze vehicle safety information technology, network, communication and navigation information technology, intelligent transportation system and mobile multimedia system information technology in the field of automotive information technology. The goal of university education innovation is to lead students to actively participate in activities, experience pleasure and happiness, and achieve healthy and comprehensive development. Under the concept of deep learning, the “ecological environment” of college atmosphere is built with the drive of automotive information technology innovation, the “leading effect” of college education atmosphere is brought into play with the appeal of real teaching situations, and the “emotional rationality” of college education atmosphere is nurtured with the aim of emotional experience education. The “emotional rationality” of college education atmosphere is based on the real teaching situation.

## 2. AUTOMOTIVE INFORMATION TECHNOLOGY

The current application items of information technology in the field of automobile and transportation are quite a lot, which can be roughly summarized into four aspects, and the application areas of automotive information technology are shown in Figure 1. That is, vehicle safety system, network, communication and navigation system, intelligent transportation system and mobile multimedia system.



**Figure 1.** Application of automotive information technology

## **2.1. VEHICLE SAFETY INFORMATION TECHNOLOGY**

Vehicle safety systems include the Collision Warning System and Crash Notification System, Adaptive Cruise Control, and Stolen Vehicle Recovery System. Collision warning systems and crash notification systems use radar, sonar, and laser beams to scan for potential obstacles and send warning signals to provide precise vehicle location information to aid agencies (120) in the event of an impending collision. Adaptive cruise control systems scan the road ahead with radar, sonar or laser beams by controlling the vehicle after setting a desired lower driving speed. Stolen vehicle recovery systems use the Internet to set an alert zone for the car and put it into an anti-theft state.

## **2.2. NETWORK COMMUNICATION AND NAVIGATION AND INTELLIGENT TRANSPORTATION INFORMATION TECHNOLOGY**

The network communication system receives network news, e-mail and other information through portable computers and cordless phones without the driver's eyes leaving the forward direction and hands leaving the steering wheel, and communicates the results to the driver by voice control, which can be activated by touching a button on the steering wheel. Car electronic navigation system is a new technology developed on the basis of GPS, the principle is a device that can receive positioning satellite signals, calculate the precise longitude and latitude where the car is and the speed and direction of the car through microprocessor, and display it on the monitor. The intelligent transportation system is divided into ATMS, ATIS, APTS, AVCS, ETC and mobile cargo management system.

## **2.3. MOBILE MULTIMEDIA INFORMATION TECHNOLOGY**

Mobile multimedia technology is embodied in smart wireless products, telecommunication devices and information processing products, including the provision of voice recognition systems. The system allows the driver not to manually operate the entertainment system, it can also be integrated into the Internet functions in the vehicle, so that people in the car can browse the Internet, send and receive e-mail and stock trading, while using the "plug and play" approach so that car consumers can easily and quickly replace their multimedia products to enjoy more. The "plug-and-play" approach allows car consumers to easily and quickly replace their multimedia products and enjoy a wealth of new services.

## **3. EXPLORATION OF INTEGRATED TEACHING MODE IN THE CONTEXT OF DEEP LEARNING**

Deep learning needs the echo of classroom teaching practice to gain lasting vitality. Deep learning has received great attention in the field of classroom teaching research, which not only triggers heated discussions in the academic field, but also becomes an important issue at the level of classroom teaching practice. The integration of automotive information technology and university education innovation model cannot be achieved without the support of deep learning concept.

### **3.1. THE CONNOTATION OF INNOVATION MODEL IN HIGHER EDUCATION**

Teachers should create a teaching atmosphere suitable for deep learning and deep learning based on the core content, so that students can be in a real and appropriate teaching atmosphere, which can promote their deep understanding and constructing the meaning of teaching, and then optimize the cognitive structure and enhance their core literacy. Secondly, deep learning should focus on students' learning process, in which teachers should create a teaching atmosphere for deep learning, lead students to actively participate in activities,

experience pleasure and happiness, and obtain healthy and comprehensive development, so as to realize deep learning in classroom teaching.

### **3.2. A REALISTIC REVIEW OF THE TEACHING ATMOSPHERE UNDER DEEP LEARNING**

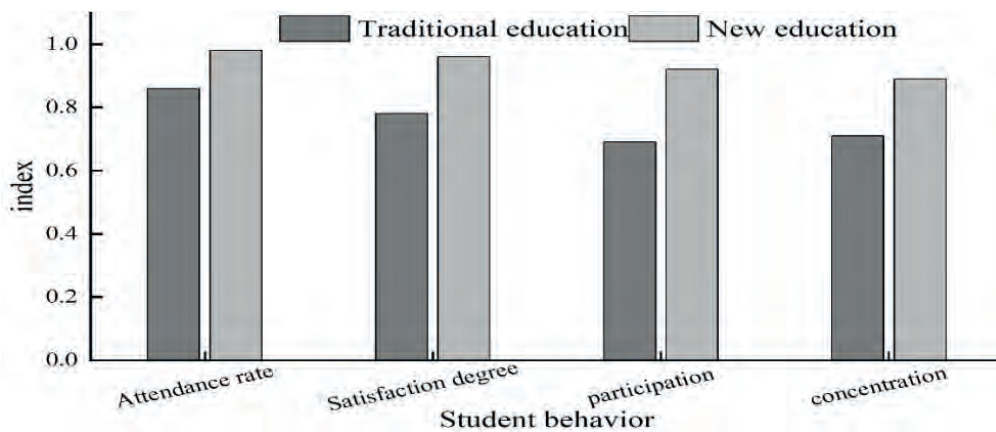
Teaching atmosphere is one of the elements of teaching and learning, which directly or indirectly affects teaching effectiveness. Teachers do not pay enough attention to creating teaching atmosphere, mainly from the emotional field of deep learning, spatial and temporal field, life field and psychological field, etc., to examine the real-world dilemma of classroom teaching atmosphere. Teacher-student interaction is the key to improve the effectiveness of teaching, teaching atmosphere variables, information technology applications have an important impact on students' interest in learning, and optimizing the teaching atmosphere with information technology is the key to the effective use of information technology in college teaching. Teaching context is emotional and cognitive, and creating real teaching context has extremely important value and significance for college teaching.

### **3.3. CONSTRUCTION OF INCLUSIVE EDUCATION UNDER DEEP LEARNING**

Based on the concept of deep learning, the purpose of optimizing the educational atmosphere is to make the classroom in colleges and universities become the best occasion for active thinking and emotional resonance, and we mainly discuss the appropriate direction of optimizing the educational atmosphere in colleges and universities from the dimensions of relationship, integration, context and emotion. With the logic of collaborative development of teachers and students, the "common governance subject" of education atmosphere is adjusted. With the innovation of automobile information technology as the driving force, the "ecological environment" of university atmosphere is constructed. With the real teaching situation as the demand, the "leading effect" of college education atmosphere is brought into play. With the purpose of emotional experience education, the "emotional rationality" of college education atmosphere is cultivated.

## **4. APPLICATION AND ANALYSIS OF INTEGRATED TEACHING IN THE CONTEXT OF DEEP LEARNING**

In order to investigate the feasibility of the integration of automotive information technology with the innovative model of college education in the context of deep learning, the integrated teaching model was applied to college teaching for one semester, by comparing the attendance rate, student satisfaction, class participation, and class concentration between the new model of teaching and the traditional model. The comparison was conducted by first excluding the factors of individual students' influence on teaching differences. Figure 2 shows the results of the comparison between using the traditional instructional mode and the integrated instructional mode. In the new teaching mode, students' interest increased greatly, students' attendance increased by 0.13, students' satisfaction increased by 0.18, students' class participation increased the most, by 0.23, and students' class concentration increased by 0.18. Integrated teaching is feasible based on the deep learning context.



**Figure 2.** Comparison between traditional teaching methods and new teaching methods

## 5. CONCLUSION

This paper analyzes automotive information technology and aims to integrate automotive information technology with the innovation model of university education in the context of deep learning. With the logic of collaborative development of teachers and students, it adapts the “common governance subject” of education atmosphere. With the innovation of automotive information technology as the driver, the “ecological environment” of college atmosphere is constructed. With the real teaching situation as the demand, the “leading effect” of college education atmosphere is brought into play. With the purpose of emotional experience education, the “emotional rationality” of college education atmosphere is cultivated. After the application of the constructed teaching, the students’ attendance, class participation, concentration, and satisfaction are all improved, so the integrated teaching in the context of deep learning is feasible.

## FUNDING

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# RESEARCH ON CULTIVATION OF LOGISTICS COMPOSITE TALENTS IN GUANGDONG, HONG KONG, MACAO AND GREATER BAY AREA BASED ON DEEP LEARNING AND LOGISTICS INTEGRATION CONTEXT

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## ABSTRACT

This paper first examines the intrinsic mechanism based on deep learning and the logistics development of the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) in a setting of the integration of logistics with the value orientation of improving the region's overall competitiveness, the development objective of creating a contemporary logistics service system, as well as the inherent necessity of encouraging the growth of geographically associated sectors. Then the features of the talent demand are used to examine the need for talent in the logistics growth of the GBA. The logistics composite talents are cultivated in terms of repositioning the talent training objectives, building internationalized logistics professional curriculum and teacher training groups and international logistics laboratories and modern logistics training bases, and carrying out logistics practical training projects in GBA.

## KEYWORDS

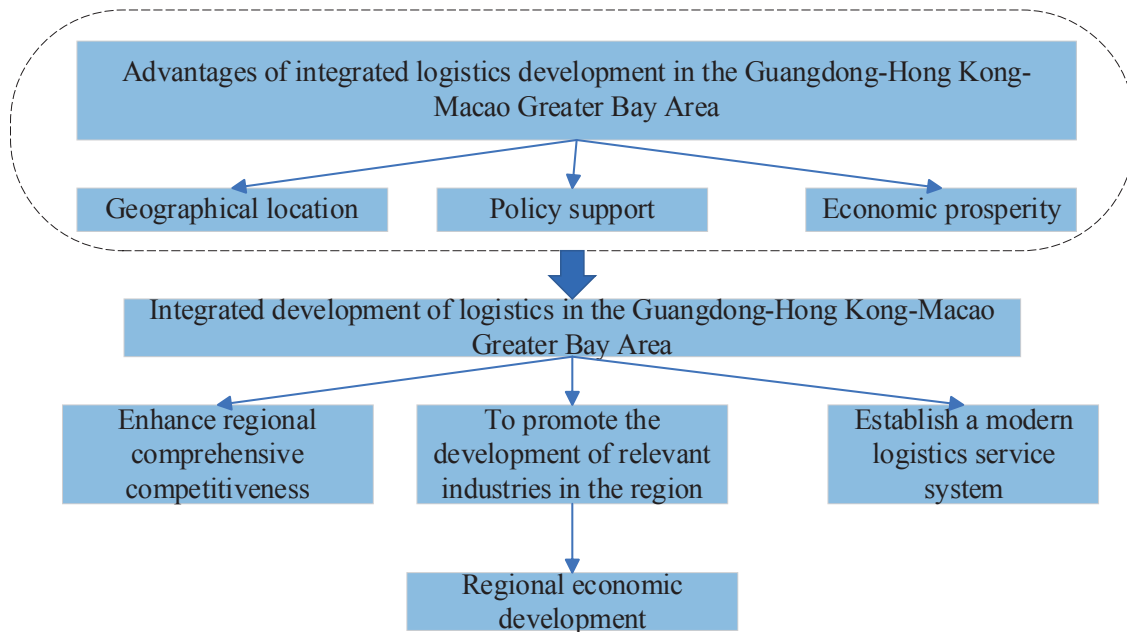
Deep learning; Logistics integration; Guangdong-Hong Kong-Macao Greater Bay Area; Logistics talents; Logistics services

## 1. INTRODUCTION

Due to its obvious position, strong economic power, concentration of creative components, priority internationalization level, and solid basis for collaboration, the GBA has inherent growth advantages [1-2]. The GBA 's interconnected infrastructure has increased the scale of infrastructure construction as well as constantly optimized and enhanced the information infrastructure, thereby encouraged the smart and environmentally friendly development of port logistics [3-4]. The development of port logistics in China has been greatly aided by the strengthening of infrastructure building in the GBA, which has decreased port logistics costs and can handle the long-distance transportation of heavy cargo. By creating an essential buffer region for the Silk Road Economic Belt and the 21st-century maritime Silk Road by virtue of the region's two-way opening, the GBA offers chances and circumstances for the further growth of China's "One Belt, One Road" initiative [5-6]. Building a GBA is an important strategic initiative to support reform and opening up in the modern period, a project to develop a completely new model of comprehensive opening up, and a new strategy to promote the development of "one country, two systems." [7]. The support of talent is essential to the GBA's economic growth, and the expansion of the region's port and shipping logistics sector will increase need for qualified port and shipping management personnel, which urgently needs a large number of practical talents with strong social adaptability and high comprehensive quality [8]. How to implement talent reform in port and marine logistics management and produce high-caliber practical talent for the growth of GBA is a crucial component of higher vocational education's practical curriculum to support the national strategic development strategy, which has significant theoretical research and practical application value [9]. Using deep learning and a foundation in logistics integration, we study in this work how to educate logistics composite skills in GBA.

## 2. INTRINSIC MECHANISM OF LOGISTICS DEVELOPMENT IN GBA

The GBA's logistics development, which is based on deep learning and a background in logistics integration, has an inherent structure of the value introductions of enhancing the region's overall competitiveness, the intrinsic requirement of fostering the growth of related industries in the region, and the long-term objective of creating a modern logistics service system, among other things. Figure 1 depicts the fundamental framework for the growth of logistics in the GBA according to deep learning and logistics integration.



**Figure 1.** Internal mechanism of logistics integration development

### 2.1. VALUE ORIENTATION OF ENHANCING REGIONAL COMPREHENSIVE COMPETITIVENESS

The GBA realizes the change of transportation for logistics to logistics services, fosters the change of conventional logistics scattering to the path of modern supply chain integration, and fosters the change of urban local logistics to market-led regional transportation by optimizing the structure of logistics resources, making it advantageous for the creation of a modern, efficient regional logistics system. In order to achieve the informatization, synergy, and internationalization of the GBA city cluster, as well as to improve the region's overall competitiveness, it is crucial that regional logistics are developed in an integrated manner.

### 2.2. THE INHERENT REQUIREMENT OF PROMOTING THE DEVELOPMENT OF REGIONAL RELATED INDUSTRIES

The logistics sector, which is a cross-regional, cross-industry, and cross-sectoral complex modern industry, realizes cluster development in Guangdong, Hong Kong, and Macao by fully utilizing the industrial correlation effect. It also realizes interaction with the logistics supporting industries in the three locations in terms of service information collection and exchange, supply and demand of value-added logistics services, etc., thereby fostering business cooperation between the three locations. Encourage cross-border and regionally integrated logistics industry clusters, utilize the agglomeration and symbiosis effects, and promote the growth of complementary sectors in the Greater Bay Area alongside the logistics sector.

### 2.3. THE DEVELOPMENT GOAL OF ESTABLISHING A MODERN LOGISTICS SERVICE SYSTEM

Become aware of the logistics industry's "chain" evolution. The GBA's "chain" can make logistics operations and logistical methods more effectively connected and encourage a more appropriate spatial layout of the logistics service system by governing the growth of the logistics sector in the areas of distribution, handling, circulation, and processing, loading and unloading, packaging, and logistics data exchange. Recognize the industry's clever

development. Using the Internet of Things, big data, AI, blockchain, and other new information technologies, as well as the global synchronization of technical norms in the logistics business, the informatization of logistics operations, and the improvement of related supporting infrastructure, it is possible to achieve the integrated growth in logistics in the GBA.

### 3. DEMAND FOR TALENTS IN LOGISTICS DEVELOPMENT IN GBA

In GBA, logistics companies and regional economic growth have proposed greater standards for training of logistics professionals and provide beneficial help to regional financial growth via talent training. This is based on deep learning and integration of logistics background. The features of the talent need for logistics development in GBA are shown in Table 1. The GBA, and the demand characteristics for logistics talent are used to examine the need for talent.

**Table 1.** Characteristics of talent demand for logistics development

Supply chain as the core of warehousing talent demand	Supply chain as the core of warehousing logistics is the key link of the GBA logistics
Demand for foreign language talents	Recognition of cultural diversity and mastery of foreign languages is very important for relevant staff to participate in the logistics of the GBA
Logistics information talents	The logistics industry needs to strengthen the connection with the Internet, and strengthen cloud computing, big data and mobile Internet in the logistics industry Application needs logistics information personnel.
Logistics finance talent demand	The financial industry and the logistics industry intermingled, creating Logistics finance, a financial model, is in urgent need of logistics financiers Only.

#### 3.1. THE DEVELOPMENT OF LOGISTICS INDUSTRY CONTINUES TO INCREASE THE DEMAND FOR TALENTS

The logistics sector is a subset of the service sector that offers support for both social and economic development, and the expansion of this sector is directly correlated with economic expansion. The expansion of the GBA, the "Belt and Road" project, economic transformation and upgradation, and the growth of the logistics industry have recently captured the attention of the whole public and governments at all levels. E-commerce, chain management, logistics delivery, cross-border e-commerce, and other novel distribution techniques are all emerging quickly at the same time, and the demand for logisticians is rising quickly as well. The need for logistics skills in information technology is growing as a result of the growth of big data, the Internet of Things, and blockchain technology.

#### 3.2. THE CONSTRUCTION OF GBA URGENTLY NEEDS LOGISTICS COMPOSITE TALENTS

For GBA, which is essential in the construction of the "One Belt, One Road" plan, the Pan-Pearl River Delta serves as a vast development hinterland. The economic openness of China begins in these areas. To effectively support the expansion of the GBA's economy and society, the GBA plans to create a global logistics hub, a modern service industry system, with a focus on the growth of shipping logistics, a vigorous expansion of outside logistics as well as cold chain logistics, and advancement of the development of Guangdong-Hong Kong-Macao logistics collaboration.

#### 3.3. LOGISTICS COMPOSITE TALENT GAP IS OBVIOUS

GBA are all tightly entwined with the "Belt and Road" and have grown to be a crucial part of its support system. GBA all have robust digital economies and have amassed a number of distinct advantages in the growth of digital trade, including "innovation + manufacturing + logistics + financial services," the benefits of the Bay Area, a developed supply chain and production chain system, and a thorough integration of industry and digital technology, all of which provide significant support for the growth of the international e-commerce sector. Cross-border e-commerce is revolutionizing trade, and in order for it to expand, business, information, finance, logistics, and talent migration must all be integrated. The cross-border e-commerce business needs talent to expand in a high-quality way, and there is a growing demand for cross-border composite logistics specialists.

#### 4. LOGISTICS COMPOSITE TALENT TRAINING

In GBA, colleges and universities are the primary places to create logistics composite skills based on deep learning and background in logistics integration. Figure 2 shows the cultivation measures and percentage of logistics composite talents. a1 is to reposition the goal of talent cultivation, a2 is to internationalize the logistics professional curriculum, a3 is to internationalize the teacher training group, a4 is the need to build an international logistics laboratory, a5 is to carry out the GBA A6 is to organize students to participate in various forms of logistics skills competitions, A7 is to build a joint applied talent training model, A8 is to build a modern logistics training base, A9 is to understand the actual needs of logistics talents and carry out misalignment training, A10 is to position the school itself, and building a modern logistics training base is among the top priorities.

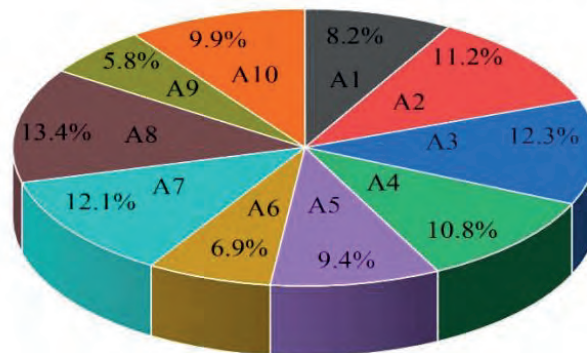


Figure 2. Training measures and proportion of logistics compound talents

#### 5. CONCLUSION

Based on deep learning and background in logistics integration, this article examines the fundamental needs for the growth of logistics in the GBA. Additionally, it determines the training route for logistics composite talents and assesses the labor market need for labor based on the features of the GBA labor market. In addition to creating a globalized logistics professional curriculum and training for teachers group, it repositions the purpose of talent development. It builds a contemporary logistics training facility and an international logistics laboratory and conducts actual logistics training projects in GBA. It establishes a collaborative application talent training approach to position the school itself, conducts out misalignment training, arranges students to compete in various types of logistical skills contests, and recognizes the real demands of logistics talents.

#### FUNDING

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# RESEARCH ON THE INTEGRATION PATH OF COLLEGE STUDENTS' VIEW OF NATIONAL INTERESTS EDUCATION IN COLLEGE CIVIC EDUCATION BASED ON BIG DATA ANALYSIS

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## ABSTRACT

This paper uses big data technology to analyze contemporary college students' view of national interests and sort out the view of national interests of contemporary college students who agree that both individual and society are important but are still at the stage where individual interests are the most important. In order to channel and guide this view of national interests, it is combined with the ideological education of colleges and universities to integrate teaching on the view of national interests of college students. In addition, the ideological and political education in colleges and universities builds a platform of benign communication for college students to guide them to properly safeguard legitimate interests, soothe hostility, shape value rationality and enhance the unique utility of interest pursuit. The quality of the constructed integration education will be evaluated, and the evaluation results show that the number of good quality of integration education is above 80%.

## KEYWORDS

Big data analysis; Profit view education; Civic education; Integrated teaching; Quality assessment

## 1. INTRODUCTION

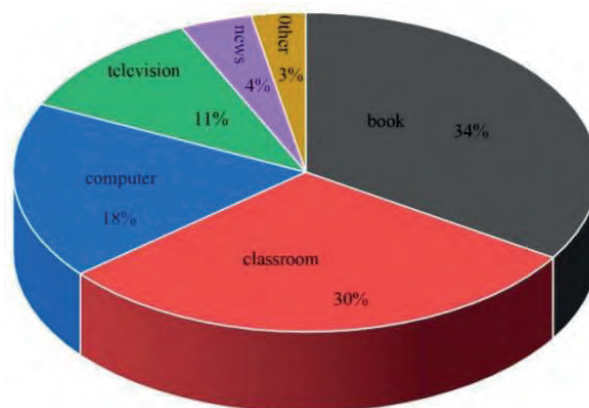
During the period of the planned economic system, the state managed the national economy according to a unified plan, so ideological and political education was mainly focused on solving single-interest relationships, and its existence of interest problems was not reflected [1-2]. In the middle and late last century, leaders carried out the reform of the economic system and implemented the socialist market economy, which led to rapid economic development, but the development also brought many problems, the most prominent of which was the issue of interests [3-4]. Under the conditions of market economy, people realize that the pursuit of their own interests is reasonable and legitimate, not to mention that the pursuit of interests is also the nature of human beings, and interests seem to be the most concerned topic, which makes the issue of interests in ideological and political education work more and more obvious [5]. Everyone speaks of interests and revolves around them constantly, and once they are related to their own interests, they will trigger the most sensitive nerves in people's bodies [6]. The Marxist view of national interests is philosophically based on dialectical materialism, with human liberation and the free and comprehensive development of human beings as the ultimate goal, and promotes the realization of the ultimate goal through the social practice and construction of the people [7]. Based on the Marxist view of national interests, the theoretical and practical basis of the principle of interests in ideological and political education is fully

argued, with emphasis on the essence of the Marxist view of national interests, which recognizes the interests of individuals as a basic value orientation of social life [8]. However, it does not start from the abstract individual, but places the individual and his pursuit of interests in the reality of social history, seeking to achieve the fundamental interests of the broadest number of people [9]. This paper also discusses how to apply the principle of interests in ideological and political education and how to correctly deal with the issue of the relationship between individual, collective and national interests to make changes to ideological and political education work in the new era of socialist market economy [10-11].

## 2. THE PROFIT VALUES OF COLLEGE STUDENTS BASED ON BIG DATA ANALYSIS

### 2.1. COLLEGE STUDENTS' VIEW OF NATIONAL INTERESTS UNDER BIG DATA ANALYSIS

Using big data technology, we analyzed the discourse on the mirror image of socialist core values of contemporary college students, the choice of interests of contemporary college students, and the views of contemporary college students on the interests of scholarships, merit assessment, party membership, employment and marriage, respectively. Figure 1 shows the channels from which contemporary students learn about socialist core values, and the answers are 34% from books, 30% from classroom, 18% from computer, 11% from TV and 4% from newspaper in order, indicating that contemporary college students have insufficient basic knowledge of socialist core values. Contemporary college students are patriotic and responsible occupy the mainstream, care about the construction and development of the Party and the country, expect the society to be clean and clear, and have certain plans and goals for individual ideal pursuit. Some college students do not know enough about the connotation of interests and are not very clear about the natural connection between interests and struggles. College students do not recognize their own and others' attitudes toward interests, and expect to develop toward a view of national interests that gives equal importance to social interests and personal interests. Contemporary college students give priority to factors such as salary and hobbies in employment. The employment benefits they value are firstly material benefits and at the same time get spiritual satisfaction, and few of them choose purely material or spiritual benefits.



**Figure 1.** How do contemporary students learn about core socialist values

### 2.2. CHARACTERISTICS OF CONTEMPORARY COLLEGE STUDENTS' VIEW OF NATIONAL INTERESTS

Through the analysis of big data, we get that contemporary college students, under the joint action of family, school, society and individuals, tend to have a better overall ideological outlook, and have their own unique orientation in the view of national interests, showing distinctive



characteristics. Contemporary college students agree with the view of national interests of both individuals and society, but they are still at the stage of personal interests, agree that personal interests and interests of others are mutually beneficial, choose to fight for interests in a legal and reasonable way, generally pay attention to personal interests, and tend to develop spiritual interests and material interests in a coordinated way. There is still a disconnect between knowledge and action among contemporary college students, and the contrast between theoretical cognition and improvised behavior is obvious.

### **3. THE PATH OF INTEGRATION EDUCATION OF PROFIT VIEW AND CIVIC SCIENCE**

#### **3.1. INTEGRATION OF INTEREST-BASED EDUCATION AND CIVIC EDUCATION**

In the process of social construction and development, various social relations are inevitably touched, including the relations between individuals, between individuals and groups, between groups and groups, and between groups and the state, and all these relations are inextricably linked with “interests”. The integration of ideological and political education and Civic Education is mainly in the scope of interests, the origin of interests, the basis of interests and the principles of interests.

##### **3.1.1. THE SCOPE OF INTEREST AND THE ORIGIN OF INTEREST IN CIVIC EDUCATION**

The emergence and development of ideological and political education coincides with the process of human history. Ideological and political education arises due to human needs, and needs are indeed the premise and basis of interests. Ideological and political education is rooted in the value relationship and value activities of the subject and the object, and the motivation and activities of the subject to consciously meet its needs and interests are the deep value roots of the emergence and development of ideological and political education.

##### **3.1.2. THE INTEREST BASIS OF CIVIC EDUCATION**

We study the basic theory of interest in the field of philosophy, explore the status and role of interest in Marx’s historical materialism, and clarify the relevant discussions on “interest” and “ideological and political education” by classic Marxist writers, so as to enrich the Marxist theory of interest and enrich the foundation of interest in ideological and political education. At the same time, the basis of interest in ideological and political education will be enriched. In this regard, we would like to highlight the internal logic between the basic theory of Marxist interests, ideological and political education and the construction of a socialist harmonious society.

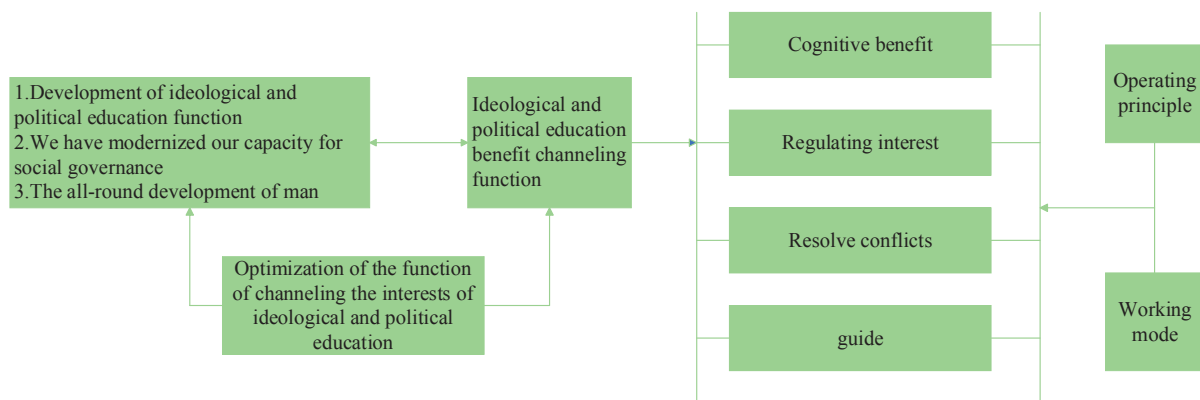
##### **3.1.3. INTEREST PRINCIPLE OF CIVIC EDUCATION**

Only by following the law of interests, ideological and political education work can achieve better educational effects. The theoretical basis of the interest principle as the basic principle of ideological and political education is explored, and the education-oriented role of the interest principle is clarified. In the process of ideological and political education, it is necessary to pay attention to the legitimate interest demands of education subjects and adhere to the principle of interest of fair, just, harmonious and developmental ideological and political education in order to enhance the effectiveness of ideological and political education to the greatest extent.

#### **3.2. INTEREST DIVERSION UNDER CIVIC EDUCATION**

The function of interest diversion function of ideological and political education needs to form a reasonable and scientific professional process, including four links of recognizing interest, regulating interest, channeling interest and guiding direction, and the interest diversion of ideological and political education is shown in Figure 2. Each stage and each link of the process contains rich contents, which are related to each other and interact with each other to

jointly ensure the optimal value of the function of interest diversion of ideological and political education.



**Figure 2.** Process analysis model of ideological and political education benefit channeling function

### 3.3. OPTIMIZATION STRATEGY OF INTEREST-VIEW DIVERSION UNDER INTEGRATED EDUCATION

The actual process of ideological and political education interest diversion function is not the independent operation and sequential development of each work process, but the process of interconnection and interaction between each process. Therefore, this study focuses on optimizing the mechanism of ideological and political education, with the aim of optimizing the mechanism of ideological and political education, so that the work processes can be connected more smoothly and closely, and the effectiveness of the function of interest diversion can be enhanced. The encounter given to the ideological and political education interest diversion function in the era of big data will be more practical and specific to optimize the process of playing the function, so that the various elements of the ideological and political education interest diversion function are more compatible with each other, the articulation between each link is more smooth, and the working mechanism is more coupled, thus promoting the system of ideological and political education interest diversion function to be perfected and effectively played. "People create the environment, likewise, the environment also creates people." People and the environment are interlinked, and the environment is the external condition for human survival and development, which directly or indirectly gives people positive or negative influence. Ideological and political education is to do people's work and optimize its interest-redirection function, first of all, to optimize the environment.

### 4. QUALITY ASSESSMENT OF INTEGRATED EDUCATION

Through literature review and target decomposition, the quality evaluation indexes of integration of profit view education and ideological and political education were decomposed into 2 first-level indicators of education work and education effectiveness, and the first-level indicators in general were not detailed enough. Through argumentation, the education work is again decomposed into 3 secondary indicators of total education, whole process education and all-round education, and the education effectiveness is decomposed into 3 secondary indicators of direct effectiveness, indirect effectiveness and overflow effectiveness. The secondary indicators are still not specific enough to be directly observed, so the secondary indicators are further decomposed into 10 tertiary indicators. The multi-layer fuzzy comprehensive evaluation method was applied to evaluate the three-level indicators, and the evaluation results are shown in Table 1. The overall evaluation results show that the teaching quality of profit view education and Civic Education of college students based on big data analysis is excellent.

**Table 1.** Teaching quality evaluation results

Secondary index	excellent	good	In general	poor
Educate all staff	0.32	0.48	0.15	0.05
Whole-process education	0.40	0.45	0.11	0.04
All-round education	0.42	0.44	0.08	0.06
Direct effect	0.38	0.43	0.12	0.07
Indirect effect	0.46	0.44	0.09	0.01
Spillover effect	0.40	0.51	0.07	0.02

## 5. CONCLUSION

In this paper, we use big data to analyze the interest value education of college students and get the characteristics of contemporary college students' profit view. Since ideological and political education arises due to human needs, and needs are indeed the premise and basis of interests. Ideological and political education is rooted in the value relations and value activities between subjects and objects, and the motivation and activities of subjects to consciously meet their needs and interests are the deep value roots of the emergence and development of ideological and political education. Therefore, this paper combines ideological and political education to channel the values of interests of college students, and constructs an optimal strategy for channeling values of interests under integration education applied to university teaching for evaluation, with good quality of integration teaching.

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## **ABSTRACT**

In this paper, a detailed study of the discontinuous differential system is done by combining the matrix manifold optimization algorithm. By transforming the Grassmann manifold into a linear eigenvalue problem, the Riemannian manifold and the Riemannian metric are studied respectively for the solution of this linear eigenvalue problem, and the corresponding model reduction algorithm is established respectively. The qualitative theory of the discontinuous differential system based on the optimization technique is examined, together with the gradient of the function on the specified matrix manifold on the Riemannian manifold. To get the differential system's periodic solution, update the differential equation to include as the new independent variable. The findings demonstrate that the suggested technique can build a reduced-order system efficiently, and that the reduced-order system can better preserve the dynamical behavior of the original system.

## **KEYWORDS**

Matrix manifold optimization; Discontinuous differential system; Grassmann manifold; Riemannian manifold; Qualitative theory

## **1. INTRODUCTION**

Due to the lack of mathematical analysis tools, the development of the theory of right-sided discontinuous differential equations has been quite slow so far, the development of the theory of right-sided discontinuous differential equations is still in its infancy and many of the theories have not been perfected [1-2]. In the study of the qualitative theory of differential equations, the theory of differential operator spectrum and fractional order differential equations have received the attention of many scholars and had a breakthrough development along with the rapid development of fractal science, biology, automatic control, physics, fractional control systems and fractional controllers, rheology, electroanalytical chemistry, and other disciplines [3-4]. However, due to the nonlocal character of the fractional-order calculus operators and the singularity of the kernels as an integral operator, it is extremely challenging to explore fractional order differential systems with the theory and techniques of integer order differential equations [5-8]. Thus, it is necessary to establish an independent theory of fractional order calculus, which is still in its infancy due to the complexity of its computation and the fact that the elaboration of some of their physical meanings has not yet been generally accepted,

consequently, compared to the study of the theory of integer order differential equations, the study of the theory of fractional order differential equations is still in its infancy [9-12].

## 2. MODEL REDUCTION METHOD BASED ON SYMMETRIC LINEAR EIGENVALUE PROBLEM

### 2.1. RIEMANNIAN NEWTON'S METHOD BASED ON MODEL DESCENDING METHOD

#### 2.1.1. GRASSMANN FLOW PATTERN

Next, the invariant subspace corresponding to the greatest  $r$  Hankel singular value is calculated using the Riemannian Newton technique. The common orthogonal basis of invariant subspaces allows for the construction of the reduced-order system.

The non-tight Stiefel manifold will be denoted as  $ST(r, n)$ . It is a portion of the Euclidean space  $R^{n \times r}$  that is described by

$$ST(r, n) = \{Y \in R^{n \times r} : \text{rank}(Y) = r\} \quad (1)$$

The collection of all  $r$ -dimensional subspaces in the Euclidean space  $R^n$  is represented by the Grassmann manifold  $Gr(r, n)$ . Obviously, every element in the equivalence class can be tensed into the same subspace. As a result, in terms of the equivalence relation, the Rasmann manifold  $Gr(r, n)$  may be seen as the quotient manifolds of the non-tight Stiefel manifold.

#### 2.1.2. RIEMANNIAN MANIFOLDS

Define the gradient of the smooth real-valued function  $f$  on the matrix manifold, which can be defined as the Riemannian manifold  $M$ . In the tangential space  $T_yM$  at  $Y$ , the gradient  $\text{grad}f(y)$  of  $f$  at  $Y \in M$  is the only element that satisfies:

$$(\text{grad}f(y), \xi y)y = Df(y)[\xi y], \forall \xi y \in YyM \quad (2)$$

where  $\text{grad}f(y)$  is the Riemannian metric.

To obtain the direction of descent, solve the following Newton's equation for  $\eta y \in T_yM$ :

$$\text{Hess}f(y)\eta y = -\text{grad}f(y) \quad (3)$$

The following characteristics describe a withdrawal  $R$  on a manifold  $M$ , which is a smooth map from tangent bush  $TM := \cup_{Y \in M} T_YM$  to  $M$ . Let  $R_Y$  stand for  $R$ 's limitation on  $T_YM$ .

(1)  $R_Y(0_Y) = Y$  where  $0_Y$  denotes the zero element in  $T_YM$ .

(2) holds  $T_{0_Y}T_YM \square T_YM$ ,  $R_Y$  satisfies:

$$DR_Y(0_Y) = \text{id}_{T_YM} \quad (4)$$

where  $\text{id}_{T_YM}$  denotes the unit mapping on  $T_YM$ .

By definition, Riemannian exponential mapping is also withdrawn. However, it is usually more arithmetic to compute Riemannian exponential mapping. To reduce the operations, other withdrawals can be used instead of the exponential mapping.  $\eta y$  is obtained by solving Newton's equation, and then  $\eta y$  is returned to the manifold  $M$  by withdrawing the mapping. iteration is eventually obtained as an iterative sequence. The theorem demonstrates the local superlinear convergence of the iterative sequence generated using the Riemannian Newton's

technique.

## 2.2. RIEMANNIAN NEWTON METHOD FOR SOLVING SYMMETRIC LINEAR EIGENVALUE PROBLEMS

### 2.2.1. RIEMANNIAN METRIC

It is evident that the  $-F$  greatest  $r$  eigenvalues defining the cost function on  $ST(r, n)$  have a squared connection with the linear system's  $r$  largest Hankel singular value:

$$\bar{f}(Y) = \text{tr}\left(\left(Y^T Y\right)^{-1} Y^T F Y\right) \quad (5)$$

and natural mapping:

$$\pi : ST(r, n) \rightarrow \text{Gr}(r, n) : Y \mapsto Y = \text{span}\{Y\} \quad (6)$$

Since  $\bar{f}$  depends only on the subspace into which  $Y$  tensor, regardless of how the exact foundation of the subspace is represented

$$f(Y) = \text{tr}\left(\left(Y^T Y\right)^{-1} Y^T F Y\right) \quad (7)$$

$\bar{f} = f \circ \pi$  is satisfied by the definition on the Grassmann manifold  $\text{Gr}(r, n)$ . Assign the Riemannian metric listed below to each tangent space  $\text{Gr}(r, n)$ .

$$\langle \xi_Y, \eta_Y \rangle_Y := \langle \bar{\xi}_Y, \bar{\eta}_Y \rangle_Y = \text{tr}\left(\left(Y^T Y\right)^{-1} \bar{\xi}_Y^T \bar{\eta}_Y\right) \quad (8)$$

### 2.2.2. INVARIANT SUBSPACE

The crucial point  $Y_*$  such that  $\text{grad}f_{Y_*} = 0$  can be sought in order to get an invariant subspace of  $F$ . One may anticipate that  $Y_*$  is going to be the invariant of the subspace matching to the  $r$  lowest eigenvalues of  $F$  by selecting acceptable beginning values. The retreat from the tangent space  $T_Y \text{Gr}(r, n)$  to the Grassmann manifold  $\text{Gr}(r, n)$  when  $\bar{\eta}_Y$  is established is described by the features of Riemannian quotient manifolds as

$$Y_+ = \text{span}\{Y + \bar{\eta}_Y\}, \quad \bar{\eta}_Y \in H_Y \quad (9)$$

In practical operations, the non-singular matrix  $Z_+ \in \mathbb{R}^{r \times r}$  can be chosen such that  $Y_+ := (Y + \bar{\eta}_Y)Z_+$  is a standard column orthogonal matrix. Clearly,  $Y_+$  satisfies  $\text{span}\{Y_+\} = \text{span}\{Y + \bar{\eta}_Y\}$ .

To obtain  $\bar{\eta}_Y$ . Next, the numerical solution of Newton's equation, Eq. 9, is discussed. For simplicity, choosing a suitable non-singular matrix  $Z_+$  that  $Y$  is standard column orthogonal and  $Y^T F Y$  donates a diagonal matrix, i.e.,  $Y^T F Y = \text{diag}\{\rho_1, \rho_2, \dots, \rho_r\}$ , then Newton's equation, Eq. 9 can be decoupled as

$$\begin{cases} P_Y^h (F - \rho_i I_n) P_Y^h \bar{\eta}_i = -(I_n - y_i y_i^T) F y_i, \\ Y^T \bar{\eta}_i = 0 \end{cases} \quad (10)$$

where, accordingly,  $\bar{\eta}_i, y_i \in \mathbb{R}^n (i = 1, 2, \dots, r)$  is the  $i$ th column of  $\bar{\eta}_Y$  and  $Y$ . Since  $Y^T \bar{\eta}_i = 0$ ,

equation 10's first equation is equal to

$$(F - \rho_i I_n) \bar{\eta}_i + Y l_i = -(I_n - y_i y_i^T) F y_i \quad (11)$$

where  $l_i \in \mathbb{R}^r$ . therefore. The saddle point issue is further derived from Eq. 11 as

$$\begin{bmatrix} F - \rho_i I_n & Y \\ Y^T & 0 \end{bmatrix} \begin{bmatrix} \bar{\eta}_i \\ l_i \end{bmatrix} = \begin{bmatrix} -(I_n - y_i y_i^T) F y_i \\ 0 \end{bmatrix} \quad (12)$$

The related model reduction algorithm in the Riemannian Newton approach is provided based on the aforementioned study. Table 1 displays the Riemannian Newton method-based model reduction methodology for linear systems.

**Table 1.** Model reduction algorithm based on Riemannian Newton method

Input	Linear system, reduced order $r$ , maximum number of iterations $N$ .
Output	The coefficient matrix of the reduced-order system
1	The controllable Gram matrix $P$ and the observable Gram matrix $Q$ are computed.
2	Calculate the Cholesky factor $L_c$ , and let $F = -L_c^T Q L_c$
3	The column-orthogonal matrix $Y_0$ is chosen such that $Y_0^T F Y_0$ is diagonal.
4	<i>for</i> $i = 1, 2, \dots, N$ <i>do</i>
	Solve $\bar{\eta}_{Y_i}$ from the equation
	The column-orthogonal matrix $Y_{i+1} = (Y_i + \bar{\eta}_{Y_i}) Z_i$ is chosen such that $Y_{i+1}^T F Y_{i+1}$ is diagonal.
5	$V = Y_{N+1}$
6	<i>return</i> $\tilde{A} = V^T \hat{A} V, \tilde{B} = V^T \hat{B}, \tilde{C} = \hat{C} V$ .

### 3. QUALITATIVE ANALYSIS OF DISCONTINUOUS SYSTEMS

Applying a column coordinate transformation  $x_1 = x_1, x_2 = \rho \sin \xi, x_3 = \rho \cos \xi$  to the system, the system becomes

$$\begin{cases} \dot{x}_1 = \rho \sin \xi + \mu(2\rho^2 - |x_1| - \text{sign}(x_1)), \\ \dot{\rho} = \mu(2\rho^2 - |x_1| - \text{sign}(x_1))(\sin \xi + \cos \xi), \\ \dot{\xi} = 1 - \frac{\mu}{\rho}(\sin \xi - \cos \xi)(2\rho^2 - |x_1| - \text{sign}(x_1)). \end{cases} \quad (13)$$

Let  $\xi$  be the new independent variable and the differential system becomes

$$\begin{cases} \frac{dx_1}{d\xi} = x_1' = \rho \sin \xi + \mu(\sin \xi^2 - \sin \xi \cos \xi + 1)(2\rho^2 - |x_1| - \text{sign}(x_1)) + O(\mu^2), \\ \frac{d\rho}{d\xi} = \rho' = \mu(\sin \xi + \cos \xi)(2\rho^2 - |x_1| - \text{sign}(x_1)) + O(\mu^2), \end{cases} \quad (14)$$

By mathematical software, when  $-1 < a < 0$ , the Jacobi determinant of  $(f_1, f_2)$  in  $(x_1^0, \rho^0)$  is constantly greater than 20, i.e., not 0. Then, by Theorem 13, the system has a periodic solution:

$$(x(\xi, \mu), \rho(\xi, \mu)) = (x_1^0 + o(\mu), \rho^0 + O(\mu)) \quad (15)$$



Now, we must determine the periodic solution of the system, which corresponds to the periodic solution already found. Returning to the system, replace the independent variable back to  $t$  to obtain the periodic solution:

$$(x(t, \mu), \rho(t, \mu), \xi(t, \mu)) = (x_1^0, \rho^0, t(\bmod 2\pi)) + O(\mu) \quad (16)$$

#### 4. CONCLUSION

This work investigates several forms of model reduction techniques in combination with matrices manifold optimization algorithms. Model reduction algorithms are developed using the Riemannian Rayleigh quotient repetition and the Jacobi-Davidson technique, respectively, for linear systems, where the computational issue of Hankel singular value problems has been transformed to a linear eigenvalue issue and a broader eigenvalue problem, respectively. Second, the closed-loop system model reduction approach and the structure-preserving modeling reductions method are developed after studying the H2-optimal model reduction for linked systems with differential polynomial subsystems on Grassmann manifolds. In order to demonstrate the presence of periodic solutions and determine the approximative expressions of periodic solutions, the periodic solution issue of continuous segmentation linear systems is investigated.

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# OUTSTANDING PROBLEMS FACING THE DIGITAL TRANSFORMATION OF RURAL AGRICULTURE AND STRATEGIES TO PROMOTE IT

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## ABSTRACT

In the context of rural agricultural revitalization, rural agriculture is transforming to digitalization. This paper analyzes the development status of agricultural digital transformation in the 5G era, and sorts out the problems faced by agricultural rural digital transformation, such as obvious unbalanced characteristics, insufficient infrastructure and farmers' digital skills, and low level of agricultural big data and digital application. In order to solve the outstanding problems faced by the digital transformation of agriculture and rural areas, we combine the increasingly developing 5G technology, strengthen the support and guidance of government departments and the configuration of digital products and services, and build new digital business models, so as to promote the digital transformation of agriculture and rural areas.

## KEYWORDS

Rural agricultural revitalization; Digital transformation; 5G era; Agricultural big data; Digital business

## 1. INTRODUCTION

With the development of economy and society and the change of technological paradigm, human society is gradually moving from the era of industrial revolution to the era of digital revolution [1]. In the process of the development of the digital revolution, the development and application of a new generation of digital technologies with big data, blockchain, artificial intelligence, virtual reality, and the Internet of Things as the core have brought about radical changes to people's production and lifestyle [2-4]. At the same time, the digital economy, with its powerful effectiveness role and unique impact mechanism, is reshaping the global governance landscape and rapidly becoming a new driving force and engine of global economic growth [5-6]. With the changing social demands and strict requirements of industrial development, agriculture, which still relies on traditional production methods, is facing many challenges in terms of ecological and environmental protection, as traditional agriculture demands high energy and is destructive to the natural environment, which, together with the fact that the traditional agricultural production process is not easily regulated, leads to supply-side agricultural product quality problems affecting the potential consumer demand and

consumer confidence of demand-side agricultural products [7]. Therefore, to accelerate the development of high-quality agriculture in a short period of time, we will face many difficulties and urgently need digital system solutions [8]. In order to seize the opportunity of digital economy development, break through the constraint bottleneck of digital transformation of agricultural production, and accelerate and realize the high-quality development of agriculture. In this paper, we analyze the development status of digital transformation of agriculture and rural areas, sort out the problems faced by digital transformation of agriculture and rural areas, and construct the promotion strategy of digital transformation of agriculture and rural areas.

## **2. THE DEVELOPMENT STATUS OF DIGITAL TRANSFORMATION OF AGRICULTURE AND RURAL AREAS**

Digital agriculture is an important part of digital China, an effective means to innovatively promote the development of agricultural and rural informatization, and a strategic initiative to seize the high ground of agricultural and rural modernization. In recent years, China has achieved remarkable results in promoting digital agriculture and rural development, but also faces many challenges. At present, mobile Internet terminals represented by cell phones have become agricultural data collection entrances and information carriers, specifically farmers can query agriculture-related information with the help of cell phones, creating favorable conditions for farmers to understand information on supply and demand of agricultural products and grasp agricultural market conditions. In addition, the use of smartphone applets can enable farmers to manage agricultural production more precisely. For example, the Chinese Academy of Agricultural Sciences developed Counting Grain, an applet that allows farmers to solve the problem of manual grain counting in agricultural cultivation and breeding. Relying on image recognition and artificial intelligence technology, the program can automatically identify the number of seeds after farmers upload photos, and the average time to obtain results is only 4s, with an accuracy rate of over 98%. With the support of 5G technology, the application of sensing technology is also widespread, and sensors are able to transmit data from various links to data centers, helping to achieve the goal of agricultural big data analysis. The development of agricultural digital transformation in the 5G era has already achieved certain results, but there is still a broad space for development. For this reason, China should seize the opportunity of the 5G era and actively use 5G communication technology to make up for the shortcomings of agricultural modernization and create favorable conditions for solving the “three rural issues”.

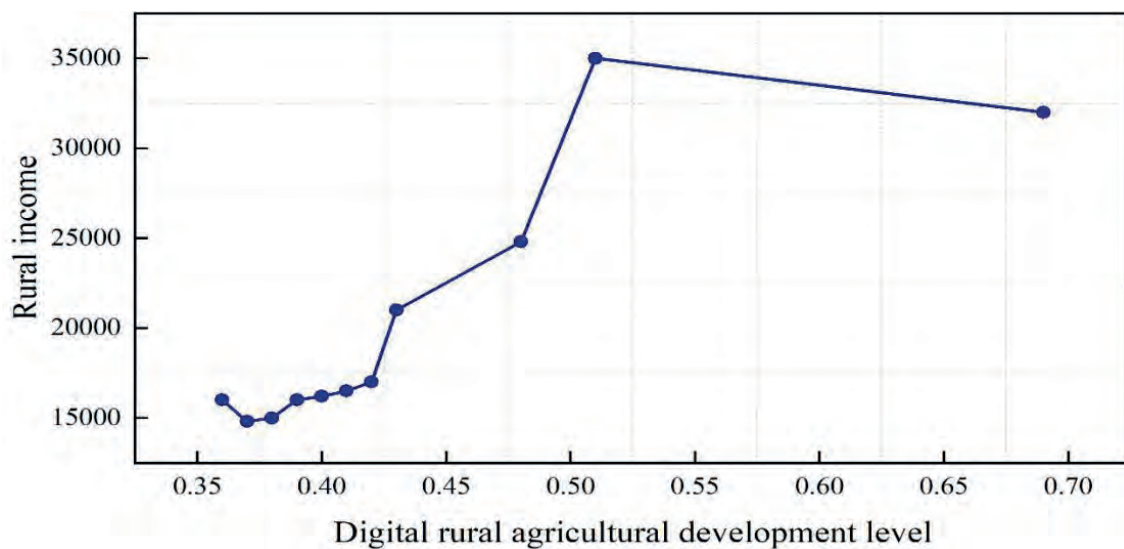
## **3. PROBLEMS FACED BY THE DIGITAL TRANSFORMATION OF AGRICULTURE AND RURAL AREAS**

With the rapid development of digital economy, agricultural digitization has become an important means to solve the problems of “three rural areas” and eliminate the “digital divide” between urban and rural areas. At the present stage, there are problems such as regional imbalance, lack of in-depth application and data sharing in China's agricultural digitalization.

### **3.1. CLEAR IMBALANCE CHARACTERISTICS**

The digital transformation of agriculture in different regions of China is at different stages, and the overall pattern of strong East and weak West and regional imbalance is difficult to change for a while. In general, the development of agriculture in different regions of China shows the coexistence of three stages: traditional agriculture, small-scale agriculture and automated agriculture. Yunnan, Guizhou, Sichuan and other western regions with poor production conditions are still in the traditional agriculture stage, mainly using traditional farming tools. The main production areas in the northeast, east-central and western plains are in the stage of small-scale agriculture mainly using mechanized tools, while the coastal,

eastern and central-western economically developed regions have entered the stage of automated agriculture using computers as the main tool. Figure 1 shows the disposable income of rural residents and the level of rural development of digital agriculture in major provinces of China in 2020. The income of rural residents is highly positively correlated with the level of digital development of regional agriculture. A total of nine provincial-level administrative regions have a per capita disposable income of rural residents higher than the national average, and all of them are provinces and cities in the eastern region. There is a significant urban-rural gap in the income of rural residents, which restricts the achievement of common prosperity.



**Figure 1.** Disposable income and the level of rural development of digital agriculture

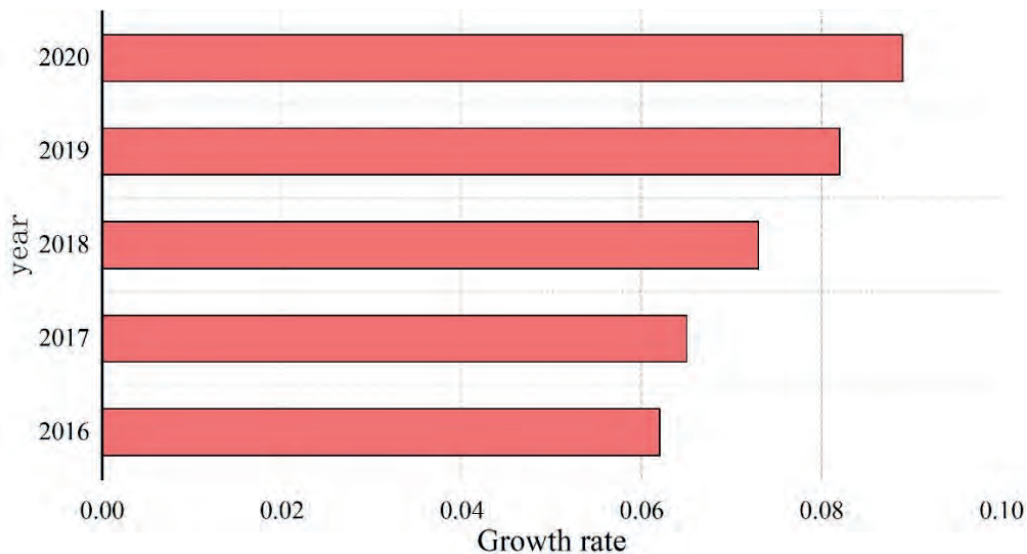
### 3.2. INADEQUATE INFRASTRUCTURE AND DIGITAL SKILLS OF FARMERS

Compared with cities and towns, there is still a large gap in the construction of rural information infrastructure and network service supply. The enthusiasm of rural network construction is not strong, and traditional information infrastructure is backward. Some rural network infrastructures are costly and difficult to lay and operate, and there is little enthusiasm to invest in rural broadband construction, making it difficult for rural networks to further support digital applications. Unlike urban areas, rural areas themselves have low information penetration and Internet penetration, with data as of March 2020 showing that the Internet penetration rate in rural areas is only 46.2%, a significant chasm gap compared to 64.5% nationwide and 76.9% in cities and towns. The overall digital skills of farmers are insufficient to meet the needs of agricultural digital transformation, and the lack of internet usage skills and low literacy of farmers has led to a large number of “information-poor households” in rural areas, unable to adapt to the new digital trend.

### 3.3. THE LEVEL OF AGRICULTURAL BIG DATA AND DIGITAL APPLICATION IS NOT HIGH

China's “dormant” data on agriculture needs to be activated, and the value of data elements has not been fully released. The digitization of agriculture needs to fully explore the value of “three rural” data, but the current level of agricultural data sharing is limited and the quality is not high. At this stage, in the process of data mining and integration in rural and agricultural areas, there is a lack of policy funding, talent training, project construction, technical services and other areas needed to support the rural digital economy, and the active promotion is not strong. At present, there are many websites and data platforms in agriculture, but the level of each platform is not clear, the content covered is not consistent, the layout of the architecture

is not reasonable, and interconnection and interoperability cannot be achieved yet. There is no technical support for the convergence of data formats from different regions, industries and fields. Lack of convenient and efficient data query, browsing, retrieval and distribution technology. The promotion of agricultural digital applications is at the initial stage, and the value-added space of the agricultural value chain has not been fully explored. Figure 2 shows the penetration rate of agricultural digital economy from 2016 to 2020. the growth rate is high from 2016 to 2018, followed by a slow growth rate. Affected by factors such as insufficient technology supply, agricultural digitization is still at the stage of general, single-technology application, lacking highly sophisticated and precise technologies, and the degree of integration is not high, so the role of liberating and developing productivity, tapping and releasing the potential of agricultural digital economy is not yet obvious.



**Figure 2.** Penetration rate of agricultural digital economy from 2016 to 2020

#### **4. AGRICULTURAL RURAL DIGITAL TRANSFORMATION PROMOTION STRATEGY**

##### **4.1. STRENGTHEN THE SUPPORT AND GUIDANCE OF GOVERNMENT DEPARTMENTS**

Agricultural digital construction work is a long-term development process that requires a lot of financial and technical support. Government departments need to invest a lot of work to support, strengthen the top-level design of government departments in the construction of agricultural information technology, especially with a perfect information technology organization system to promote the development process of digital construction. Strengthen the top-level design and macro-control efforts, according to the development characteristics of the region to build differentiated development measures, the digital construction focus on the information technology mechanism to promote agricultural production and income.

##### **4.2. DIGITAL PRODUCT AND SERVICE CONFIGURATION**

To guarantee service quality without affecting other products, to achieve larger scale service sharing with lower service costs, to optimize the allocation efficiency of public service resources, and to accelerate the equalization of services in urban and rural areas with effective feedback. Agricultural development should give full play to demonstration projects and lead role to guarantee the creation of characteristic agricultural demonstration areas, especially on the basis of the existing demonstration areas to improve the level of infrastructure support to develop industrial chains, create special product brands to provide security services, and build

this area into a higher level of digitalization and functional organism while establishing the core area of services.

### 4.3. NEW DIGITAL BUSINESS MODELS

The digital business model should be based on infrastructure construction, and should also realize the upgrading and expansion of communication networks in rural areas, including 5G and other facilities need to be specially deployed in rural areas to meet the daily needs of production and life. For enterprises, they should actively assume social responsibility focusing on the advantages of technical talents and platforms in terms of Internet platform enterprises, agricultural enterprises and socialized service organizations to expand the excellent goods and services in rural areas and encourage new agricultural business entities to carry out digital applications.

## 5. CONCLUSION

The arrival of the 5G era helps agriculture transform in the direction of digitalization. In this paper, by analyzing the development status of digital transformation of agriculture and rural areas, with the support of 5G technology, the digital development of agriculture has achieved good results. Digital technology development has provided a new development environment and space for agriculture and rural areas and accelerated the promotion of new business models. Faced with the development status of infrastructure level and service level in rural areas to be improved, government departments need to cooperate with rural areas to jointly promote various management programs, not only focusing on the development requirements of digital transformation of agriculture and rural areas, but also reasonably laying out infrastructure construction to make up for the shortcomings in services.

## FUNDING

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# STRATEGIES FOR FINANCIAL TAX MANAGEMENT OF INSTITUTIONS IN THE CONTEXT OF BIG DATA

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## ABSTRACT

Along with the development of various technologies such as big data, various industries in society are gradually moving towards informationization in various aspects such as business management methods, development strategies and operation modes. Mining the hidden value of financial data through big data makes financial analysis more scientific and accurate. The application of big data technology can enable higher-level units to more effectively analyze the financial situation of different subordinate business units horizontally and provide support for the integrated management of each unit. It also puts forward the strategy of financial management informatization of business units from two aspects, namely, financial management system and construction of supervision mechanism, to provide effective support for building modern financial management system of administrative institutions.

## KEYWORDS

Institutions; Financial management system; Supervision mechanism; Informatization strategy

## 1. INTRODUCTION

For a long time, the financial management of administrative institutions in China has been inefficient, and the phenomenon of using funds in violation of the law is endless, even involving serious illegal and criminal problems [1-2]. These problems not only reduce the efficiency of financial capital use in administrative institutions, but also lead to the loss of state funds and seriously overdraw the credibility of administrative institutions, and the reform of financial management in Chinese administrative institutions has a long way to go [3-5]. At present, China has entered the stage of high-quality development, and the high-quality development of the economy and society needs the support of a good administrative and public service environment, which is inseparable from a compliant, orderly and efficient financial management system of administrative institutions, and it is urgent to promote the transformation of financial management of administrative institutions [6-8]. In addition, big data provides new technical support for the transformation of financial management of administrative institutions [9].

The literature [10] explored the capacity of public institutions for climate change adaptation and risk management support in agriculture in Punjab, Pakistan, and the challenges and opportunities that exist. The study found that there are some capacity constraints and deficiencies in climate change adaptation in public institutions that need to be improved and strengthened. The literature [11] describes the application of machine learning and artificial intelligence technologies in corporate financial management and analyzes their advantages in

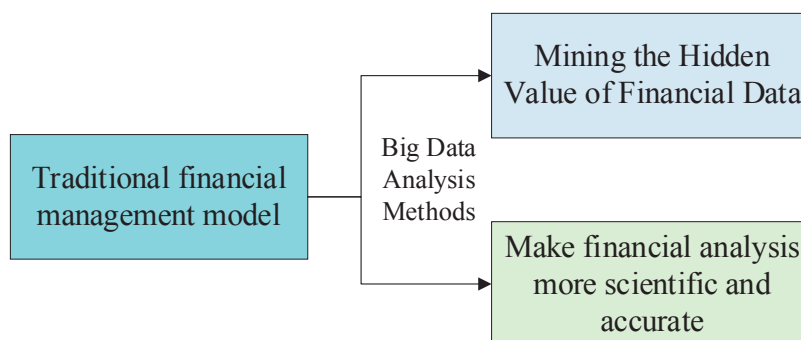


improving financial management efficiency, predicting future trends, and reducing risks. The literature [12] explored the use of deep interactive neural networks and machine learning to predict and classify financial metrics of management control systems in manufacturing industries. The authors describe the application of deep interactive neural networks and machine learning in management control systems and analyze their advantages in predicting and classifying financial metrics in the manufacturing industry.

## 2. THE OPPORTUNITIES BROUGHT BY BIG DATA TO THE FINANCIAL MANAGEMENT OF ADMINISTRATIVE INSTITUTIONS

### 2.1. DIGGING DEEPER INTO THE VALUE OF FINANCIAL DATA

Big data technology provides a new financial management tool for administrative institutions as shown in Figure 1, which can effectively tap the value of financial data. Under the traditional financial management model, financial information is mainly displayed through various comprehensive financial statements and the correlation between different financial indicators is discovered through various financial analysis methods, and the business represented by each financial indicator is highly condensed into a summary data, which cannot well analyze the situation of each business under each indicator. Unlike traditional financial management, using big data analysis method can not only deepen traditional financial analysis, make full use of the 5V characteristics of big data, explore the correlation between different indicators based on massive data, but also conduct structural analysis of data indicators, discover the laws that cannot be found by traditional financial analysis through analyzing different business record data, and explore the hidden value of financial data, making financial analysis more scientific and accuracy.

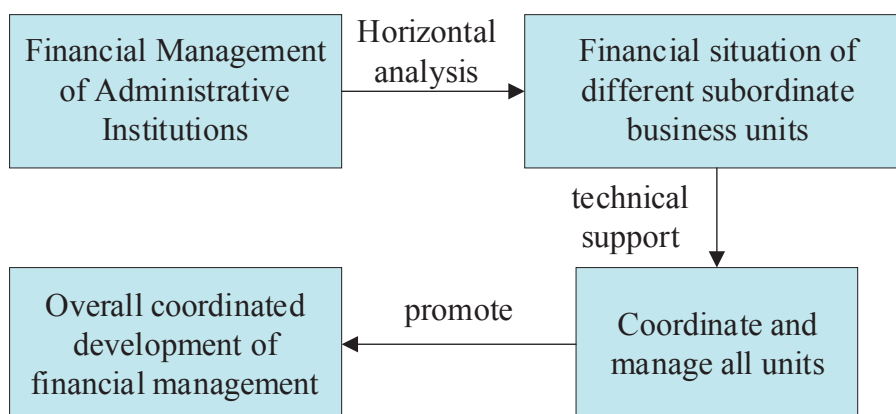


**Figure 1.** Administrative and Financial Management of Education Big Data Technology

### 2.2. PROMOTE COORDINATED FINANCIAL MANAGEMENT OF ADMINISTRATIVE AND BUSINESS UNITS

Big data technology provides new support for coordinating the financial management of administrative and institutional units at all levels. Chinese administrative institutions are divided into several different systems according to the functions they perform, such as public security system, education system, health and health system, etc., and have distinct hierarchical characteristics, with higher-level units managing or guiding lower-level units. The business units within the same system have similar business, which facilitates the superior unit to coordinate the management of its business units, and the application of big data technology can promote more coordinated management of the business units within the system. Under the traditional management method, the higher-level unit obtains financial information data from multiple business units at the lower level in the form of statistical reports, and then conducts statistical analysis to manage and guide the multiple business units accordingly. The application of big data technology can make the superior unit more effectively analyze the financial situation of different subordinate business units horizontally, provide support for the

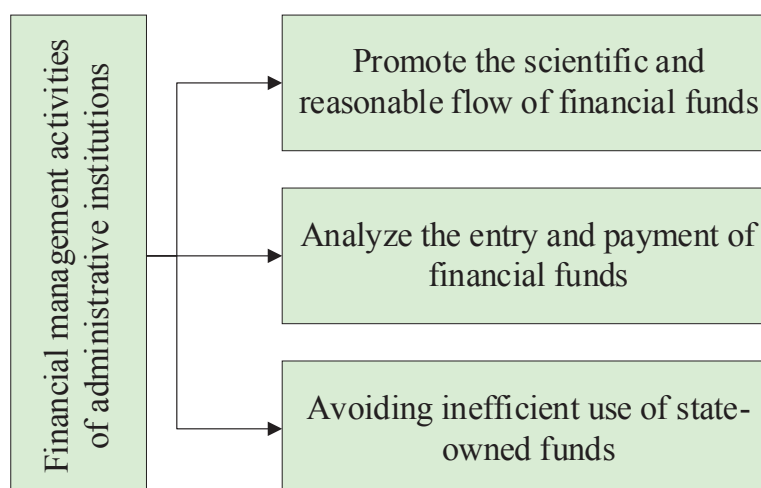
integrated management of each unit, and help the superior unit make better business decisions, and big data promotes the overall coordinated development of financial management as shown in Figure 2.



**Figure 2.** Big Data Promotes the Overall Coordinated Development of Financial Management

### 2.3. PROVIDE MORE EFFECTIVE MEANS OF RISK PREVENTION AND CONTROL

Big data can provide new technical support for the financial risk prevention and control of administrative institutions as shown in Figure 3. Big data can effectively track the financial management activities of administrative institutions, analyze the entry and payment of financial funds, provide timely warning once abnormalities occur, notify business units for verification and audit, discover and dispose of problems at the first time, avoid inefficient use and waste of state-owned funds It even loses, promotes the scientific and reasonable flow of financial funds, and provides effective support for the construction of modern financial management system of administrative institutions.



**Figure 3.** Big data provides new technical support for financial risk prevention and control

## 3. STRATEGIES TO IMPROVE THE LEVEL OF FINANCIAL MANAGEMENT INFORMATIONIZATION IN INSTITUTIONS IN THE CONTEXT OF BIG DATA

### 3.1. ESTABLISH A PERFECT FINANCIAL MANAGEMENT SYSTEM

The perfect financial management system has a very important role for institutions, so it requires institutions to establish a perfect financial management system in the new financial information management, and the actual situation of their units to do a good job of the corresponding financial management information platform construction work, specifically the following aspects: First, according to the financial sector management system, do a good job

of financial management information The platform construction work. Information platform as an important part of the construction of financial information management, its construction, installation, maintenance and other aspects of good and bad directly related to the security of the financial system of the entire institution or not, so it requires financial management personnel to carry out regular and comprehensive security checks on the information platform, in order to ensure the safe operation of the financial information platform as a whole. Second, the formation of a special information security management department, the organization of professionals to update, improve and upgrade the network system of the platform in a timely manner, so as to reduce the chances of financial network vulnerabilities in institutions.

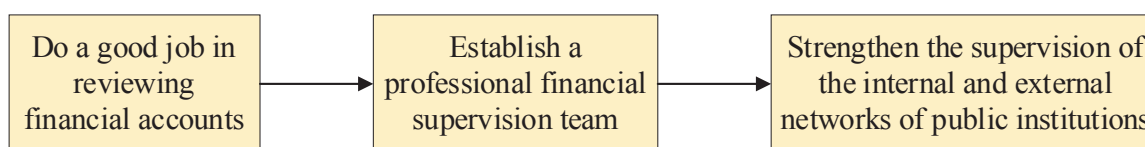
### 3.2. FINANCIAL MANAGEMENT INFORMATION CONSTRUCTION SUPERVISION MECHANISM

Based on the open nature of the Internet, making its use in the process of risk greatly increased, which requires institutions in the process of financial management information technology construction will require financial supervisors to do the following supervision work, financial management information technology construction supervision mechanism is shown in Figure 4.

First, do a good job of financial account auditing. Financial supervisors of institutions should regularly check the actual financial accounts and the corresponding Internet data accounts to avoid large mistakes and bring huge economic losses to the institutions.

Second, the formation of a professional financial supervision team to supervise the management of financial information. Supervision team through the design of scientific and reasonable supervision mechanism to ensure the normal operation of the overall financial information technology.

Third, the use of modern supervision means to strengthen the supervision of the intranet and extranet of institutions, the effective combination of manual supervision and network supervision, so as to ensure the security of property in the process of information-based financial management of institutions.



**Figure 4.** Supervision mechanism for financial management informatization construction

## 4. CONCLUSION

Under the background of big data, administrative institutions should grasp the opportunity of big data development, reasonably respond to the challenges brought by big data development, crack the current problems in financial management by strengthening the application of big data technology, and actively promote the transformation of financial management, so as to promote the high-quality development of financial management of administrative institutions. At the same time, they should also do a good job in extending the financial management information platform and strengthening the market connection, so as to better promote the financial management information construction of Chinese institutions and achieve the strategic goal of comprehensive and integrated development.

## FUNDING

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# THE PRACTICE AND EXPLORATION OF BIG DATA TECHNOLOGY IN THE TEACHING REFORM OF “BUILDING REGULATIONS” COURSE IN COLLEGES AND UNIVERSITIES

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## ABSTRACT

The traditional teaching mode of construction regulations course has not been able to meet the needs of social development, and it is a new training goal to be a compound talent who is both proficient in construction and knowledgeable in law. In the teaching, the problems existing in the teaching practice of construction law should be addressed. From the teaching content, teaching methods, theory and practice and assessment methods and other aspects of reform, while strengthening theoretical knowledge, with a variety of ways to train students to analyze and solve practical problems and the spirit of legal theory, so as to improve the quality of teaching.

## KEYWORDS

Construction regulations course; Teaching content; Teaching methods; Assessment methods; Theory and practice

## 1. INTRODUCTION

Construction regulations is a compulsory or limited basic course for the study of laws and regulations in construction majors, is a basic course of vocational skills, as long as students are employed in the construction industry, through the study, so that senior students can contact the laws and regulations and operational practices needed in China's construction projects, improve the ability of students to apply the knowledge learned to solve practical legal problems related to engineering construction because the course has a strong comprehensive. Interdisciplinarity systemic [1-3]. Therefore, how to teach, turn the many raw theories and boring regulations into something that students can touch and melt into themselves, so as to finally achieve the organic combination and effective application of theory in practice becomes the main exploration of this course in teaching mode and method [4-6].

The literature [7] presents a simplified integral method modeling code written in Python for fast computation in gravitational wave extrapolation. The literature [8] introduces the importance of computability analysis of building codes, analyzes some problems of existing methods, and proposes an improved scheme based on clustering methods. The scheme can effectively perform clustering analysis of building codes, thus reducing the complexity of codes and improving computational efficiency. The authors of the literature [9] describe the purpose of enhancing the code requirements for residential buildings and analyze its advantages in improving the resistance of buildings to natural hazards such as tornadoes. Through a survey and analysis of homes damaged during the Moore tornado, the authors demonstrate the importance of strengthening residential building code requirements and explore directions for their further improvement.

## 2. “CONSTRUCTION REGULATIONS” TEACHING CONTENT REFORM AND TEACHING METHOD REFORM

### 2.1. TEACHING CONTENT REFORM

Flexible selection of teaching propaganda, do a good job in the construction of self-edited teaching materials, the construction of teaching materials on an important position, teaching content reform as shown in Figure 1.

#### (1) Teaching content should pay attention to the timeliness

Supplement the laws, regulations and business management knowledge of architects involved in teaching, update and improve the content of self-prepared teaching materials, including the latest revised norms, the basic system of regulations, the mandatory standards of engineering construction, real estate development and engineering supervision and other related knowledge, so that teaching knowledge to adapt to the needs of the present and future development, but also to adapt to the requirements of the changing economic environment.

#### (2) Teaching content focuses on practicality and practicability

The teaching content is not too much biased towards its academic, systematic and complete, but focuses more on the cultivation of construction practical training ability, and makes use of the profession’s own expression characteristics to feedback the degree of mastery of teaching knowledge from the drawings. Teachers in the selection of course content to abstract and simplify the actual engineering into a design content consistent with the purpose of the course, integrated into the understanding and analysis of the teaching content.

#### (3) The use of cases with practical application

The actual engineering of both positive and negative concrete cases, are the best learning object for students, to consolidate and deepen the content of the course with half the effort.

#### (4) Teaching content should be combined with the characteristics of students

According to the characteristics of “engineering training” of our school, we design and organize the content of self-published teaching materials with the competence and quality requirements of practice qualification as the center, and introduce the concept and method from the problem to attract students’ interest in learning and cultivate their ability to solve professional practical problems.

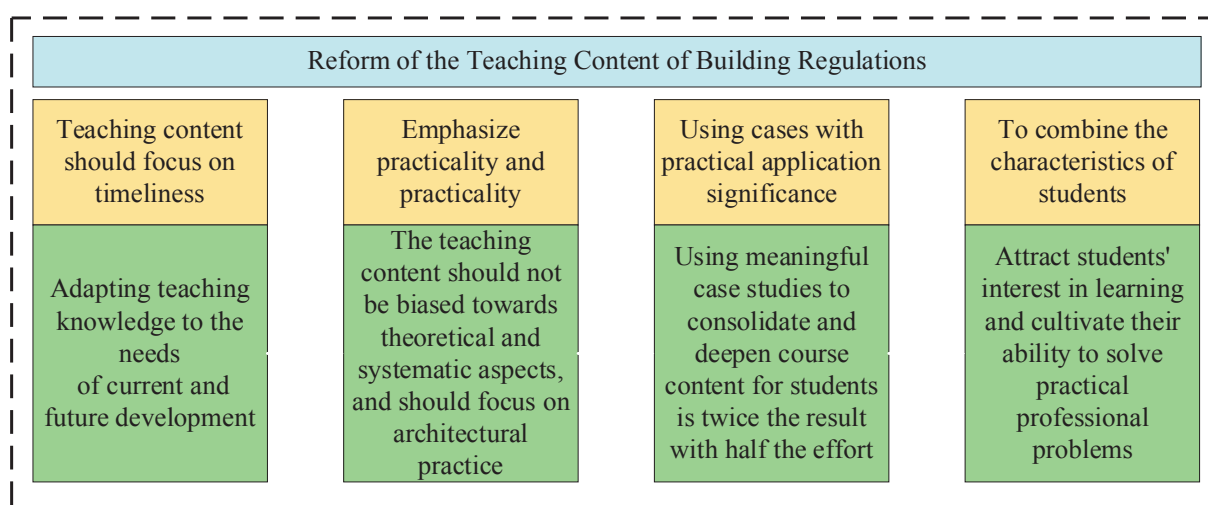


Figure 1. Reform of the Teaching Content of Building Regulations

## 2.2. TEACHING METHOD REFORM

In order to solve the current problems of the teaching knowledge structure of this course and this direction in architecture, the reform of teaching method is proposed as shown in Figure 2.

### (1) Interactive classroom teaching

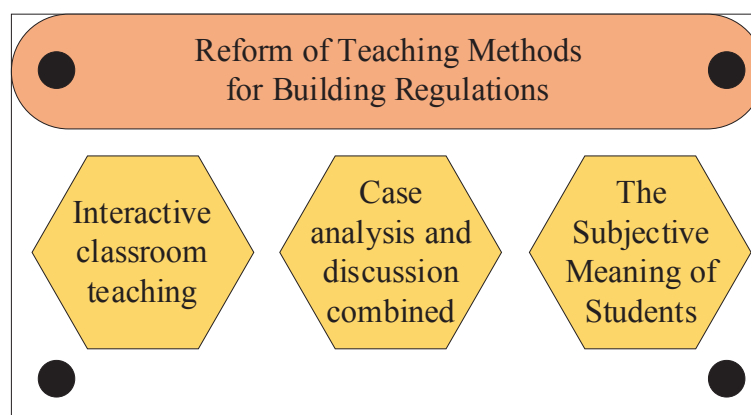
Mobilize students' interest in learning and stimulate their desire for knowledge and enthusiasm for innovation. Students are required to give multi-perspective answers to the questions raised by teachers, emphasizing the uncertainty and multiple meanings of the results, which in turn corroborate the clarity and guidance of construction laws and regulations in design. Case-based, debate and seminar teaching methods appear more often in the course teaching to realize the juxtaposition of architectural knowledge and architectural culture.

### (2) The main significance of students

Give full play to the main role of students in teaching. Mobilize students' subjective consciousness and strengthen theoretical knowledge while at the same time cultivating students' analytical and creative spirit in various ways. Students are trained to absorb the useful components and identify the authenticity from many relevant materials, to understand that the textbook view is only one view and there are different assertions from the textbook, and to understand that although there is an eternal thesis, there is no eternal answer. At the same time, students are encouraged to develop the habit of self-learning, expand their knowledge and broaden their horizons so that they can change from passive indoctrination to active learning, from passive thinking to active inquiry, and from being able to integrate and integrate, and then become adept at subjective thinking, research and discussion of problems.

### (3) Use case study and seminar

Through case teaching, the application of basic theoretical knowledge and the cultivation of practical ability are highlighted in the teaching content, which is conducive to students' flexible use of the knowledge they have learned and solving practical problems. At the same time, the main lines of Construction Law, Bidding and Tendering Law, Contract Law, Regulations on Quality Management of Construction Works, Regulations on Management of Survey and Design of Construction Works and Common Specifications of Construction facilitate students to understand laws and regulations and enhance the strengthening of their professional background.



**Figure 2.** Reform of Teaching Methods for Building Regulations

### 3. REFORM MEASURES OF PRACTICAL TEACHING OF CONSTRUCTION REGULATIONS

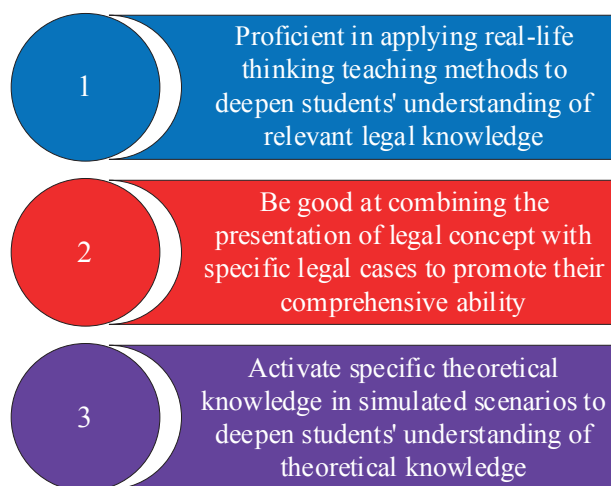
#### 3.1. THEORY TO PRACTICE

The concepts of relevant laws and regulations in the field of construction are numerous and highly practical, and can only be understood, absorbed and internalized by students if they are applied in practice. Therefore, in the specific teaching process of the course, teachers should focus on combining theoretical teaching with practical teaching as shown in Figure 3.

(1) Teachers should apply the laws and regulations contained in the course to try to analyze the relevant legal issues in the current construction field, so that students can develop a good learning mindset of linking theory with practice. Teachers should be good at applying a living thinking teaching method to deepen students' understanding of relevant legal knowledge in the process of teaching theoretical knowledge to students.

(2) Teachers should pay attention to the inspiration of students in the teaching of the course, and be good at combining the narration of legal concepts with specific legal cases to promote the improvement of their comprehensive ability. In the field of construction, there are often some issues such as the determination of liability for construction quality and safety accidents, contractual breach of contract and negligence, and related liability issues, which are the more common legal issues in the construction field that the students will be engaged in the future.

(3) In the teaching of this course, teachers should introduce actual teaching cases, so that the specific theoretical knowledge can be revitalized in the simulated scenarios and deepen the students' understanding of the theoretical knowledge. Relatively speaking, the new way of combining theoretical teaching and practical teaching is also a major test for teachers, which makes them to continuously improve their professional ability and update their teaching methods to help the steady improvement of the course teaching.



**Figure 3.** Emphasize the combination of theoretical teaching and practical teaching

#### 3.2. INNOVATIVE ASSESSMENT METHODS

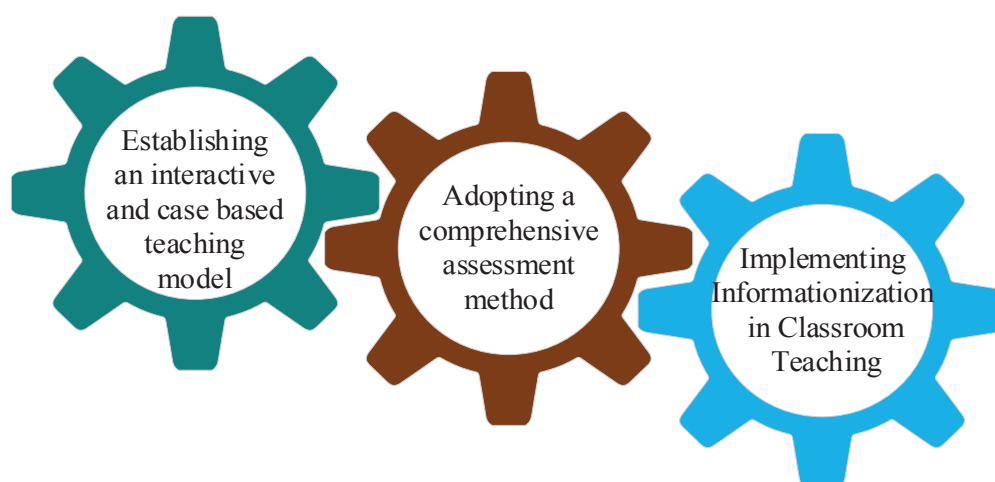
Reforming and updating the old teaching methods are conducive to improving the teaching level and teaching effectiveness of the construction regulations course. The old teaching methods will be innovated, so that it will change from one-way transmission of theoretical knowledge from teachers to students to a more active open classroom teaching with a combination of interactive, case-based and discussion-based teaching methods, and the innovative assessment method is shown in Figure 4. Specifically, we can start from three aspects:



(1) Establishing a combination of interactive, case-based and discussion-based teaching methods. The open classroom with a more active teaching atmosphere must maximize the students' main role in the classroom and strengthen their basic knowledge while promoting their comprehensive ability. It is also necessary to fully stimulate students' enthusiasm for exploring unknown fields, and to adopt interactive, case-based and discussion-based teaching methods in combination with the relevant laws to strengthen students' professional background and enhance their mastery of professional skills and relevant laws.

(2) Adopt an integrated assessment method. Incorporate students' performance in discussions and moot court in teaching into the regular assessment. For example, the paper test mainly assesses students' understanding of the basic knowledge of the course, the discussion performance in the teaching mainly assesses students' views on some controversial issues, and the mock court performance mainly assesses students' ability to apply theoretical knowledge in practice.

(3) Realization of information-based classroom teaching. Teachers use multimedia equipment to teach, and can use the advantages of its vivid and rich resources to mobilize students' multiple senses and improve the teaching quality of the course.



**Figure 4.** Assessment Methods for the Reform of Building Regulations Curriculum

#### 4. CONCLUSION

Therefore, in the teaching practice, teachers in colleges and universities should constantly improve their professional ability and reserve relevant knowledge, and apply different teaching modes and methods according to students' characteristics and talent cultivation modes, focusing on cultivating students' legal awareness required for the future construction field and effectively improving students' legal literacy level.

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# REFORM OF LEGAL EDUCATION AND CULTIVATION OF STUDENTS' LEGAL LITERACY IN CONTEMPORARY UNIVERSITIES UNDER INFORMATION DIFFUSION MODEL

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## ABSTRACT

The research mainly focuses on the lack of legal literacy of college students under the information diffusion mode and the cultivation methods of college legal courses, and analyzes the importance and teaching effect of college legal courses through survey. The results show that only 30.85% of college students approve of the learning effect of law courses, 50.14% of college students think the learning effect is average and there is room for improvement, and put forward measures for legal education reform and students' legal literacy cultivation.

## KEYWORDS

Information diffusion model; Students' legal literacy; Law courses; Emphasis; Teaching effectiveness

## 1. INTRODUCTION

With the popularization of higher education and the rapid development of market economy, the cultivation quality of college students, as the cultivation output of higher education and the reception input of social market, has increasingly become the focus of attention in the fields of education, society and economy [1-3]. The legal literacy of college students, as a necessity for college students to be based in society and to better participate in modernization, is not only related to the self-development of students, but also to the construction of the rule of law society and the harmonious and healthy development of the market economy [4-6]. However, the important value of legal literacy of college students and its status and the current situation of its mismatch is a problem that needs to be solved in front of modern high-quality talent training. How to improve the legal literacy of students, improve the quality of college education, promote the harmonious development of social economy and the implementation of the strategy of the rule of law, still need to be further explored and solved [7-8].

An intelligent system for university legal education is presented in the literature [9]. The system uses artificial intelligence technology to provide a new pedagogical approach aimed at improving student learning and teaching quality. The literature [10] discusses legal and ethical issues in nursing education and provides a necessary guide. This guide can help nursing educators better understand and respond to the issues involved to ensure the quality and legitimacy of nursing education. The literature [11] describes methods and strategies to help educators better teach legal practice and improve students' practice and knowledge.

## **2. REFORM MEASURES OF UNIVERSITY LEGAL EDUCATION UNDER THE INFORMATION DIFFUSION MODEL**

### **2.1. STRENGTHEN THE RELEVANCE AND PRACTICALITY OF LEGAL EDUCATION**

All teaching activities in colleges and universities must take the professionalism and practicality of teaching as the core, and legal literacy is a crucial ability among the comprehensive professional ability of college graduates, which has a close relationship with many aspects of students' employment and after joining the profession. Therefore, the legal education courses need to be precisely designed for different majors, and based on the general legal education, the professional courses that are closely related to the future industry of colleges and universities should be actively developed to ensure the relevance and practicality of the teaching contents. In this regard, teachers can increase the content of the Labor Law of the People's Republic of China and the Labor Contract Law of the People's Republic of China to guide students to ensure their own rights and interests through legal means.

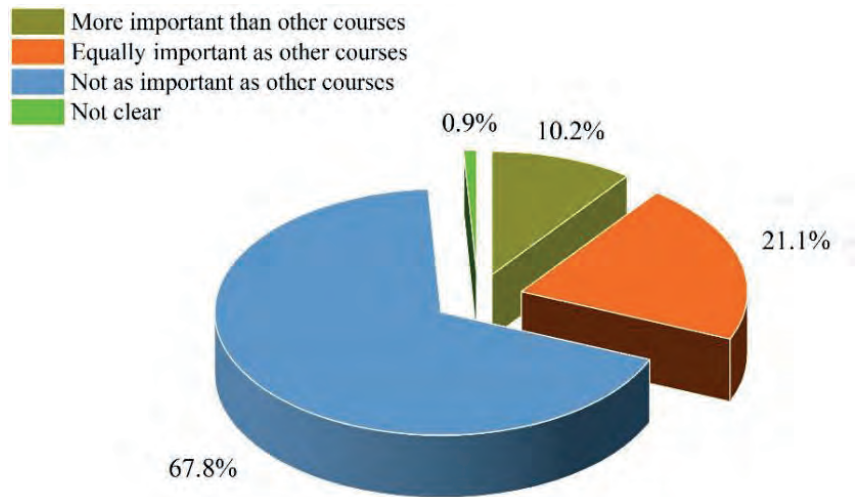
### **2.2. ESTABLISHING A SOUND INDEPENDENT LEGAL EDUCATION SYSTEM**

Universities and colleges, as the main body of education, should focus on quality education for students to ensure the formation of a comprehensive and systematic improvement of the education target ability, and one of the connotations of legal literacy, specifically refers to whether students in universities and colleges have legal awareness, legal knowledge and legal ability. The legal education that takes the teaching of legal foundation in moral education activities as the main line must be based on the general environment of legal literacy education and take it as the guiding ideology, so that it is conducive to positioning the quality standard of talent cultivation in colleges and universities. It also helps to improve the adaptability of the talents in the society of the universities and colleges. As a result, it is not reasonable to integrate legal education with moral education, because morality and law are juxtaposed, and morality mainly restrains people's inner thoughts, while law focuses on restricting people's outer behavior. For this reason, colleges and universities should divorce legal education from moral education and treat it in a professional way, and invest more in human and financial resources, so as to establish a sound and independent legal education system, which can ensure the integration of legal education into the daily life, study and future work of college students, and make the system of legal education in colleges and universities more professional, systematic and standardized, which is of positive significance for cultivating students' legal literacy. This will ensure the integration of legal education into the daily life, study and future work of college students, and make the system of legal education in colleges and universities more professional, systematic and standardized, which is of positive significance to the cultivation of students' legal literacy.

## **3. CULTIVATION OF STUDENTS' LEGAL LITERACY UNDER THE INFORMATION DIFFUSION MODEL**

### **3.1. SURVEY ON THE DEGREE OF IMPORTANCE OF LAW COURSES**

The importance of law courses in colleges and universities is shown in Figure 1. 67.8% of the surveyed students in colleges and universities think that law courses are not as important as math, English and professional courses compared with them. Only about 10% of the college students think that other courses such as language, English and professional courses are not as important as law courses. Besides, only a small number of college students said they did not know.



**Figure 1.** Survey Results on Understanding the Importance of Legal Courses

### 3.2. SURVEY ON THE LEARNING EFFECT OF LAW COURSES

But all the students who enter the college school, mostly in the compulsory education learning stage foundation comparison of college students' own psychological characteristics on the learning effect of college law courses is very deep, most college students have a negative attitude towards the learning effect of students' law courses. As shown in Table 1, only 30.85% of the surveyed college students approve of the learning effect of law courses, 50.14% of the college students think the learning effect is average and there is room for improvement, 15.14% of the college students do not approve of the learning effect, and 3.87% of the college students have difficulty in making a fair and objective evaluation of their learning effect. In addition to the influence of students' psychology on the learning effect of college law courses, there are undoubtedly many other factors that restrict the learning effect of college students' law courses.

**Table 1.** Investigation on the Learning Effectiveness of Legal Courses

option	Number of people	Proportion (%)
The effect is very good	438	30.85
The effect is average	712	50.14
The effect is not good	215	15.14
Difficult to evaluate	55	3.87
total	1420	100%

### 3.3. WAYS TO DEVELOP STUDENTS' LEGAL LITERACY

The way to cultivate students' legal literacy is shown in Fig. 2. The development of today's society is changing rapidly, and the construction of a country under the rule of law has entered a critical stage, which requires more demanding comprehensive quality of builders. Therefore, to ensure that college students can better adapt to the trend of social development and play the role of the "tide" of the times, it is far-reaching to strengthen the cultivation of legal literacy, and this paper cultivates students' legal literacy in the following ways.

(1) Change the ideological understanding and attach importance to the cultivation of legal literacy

Fundamentally change the unscientific position that legal literacy education is secondary to other professional literacy education, reasonably and effectively embed legal education in the teaching of students' professional skills education, put the two on a relatively equal footing,

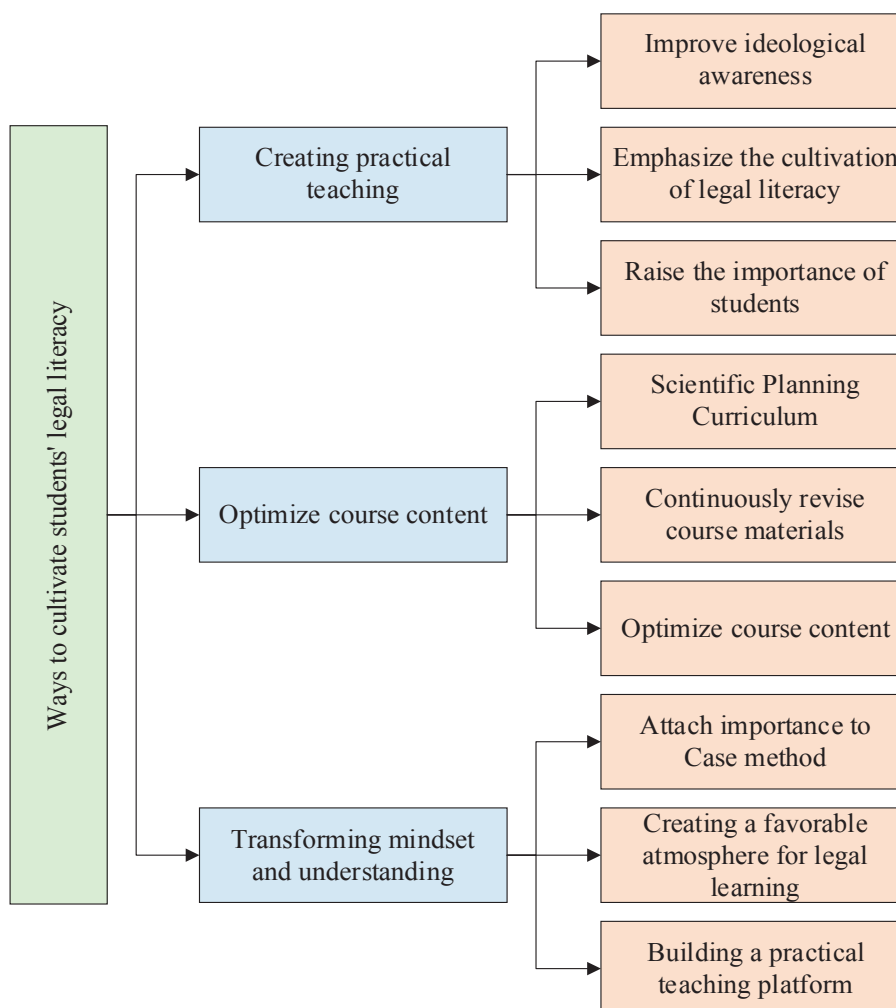
and invest human, material and financial resources to construct a complete and independent legal literacy education system in colleges and universities, so that it is standardized, professional, systematic and scientific.

(2) Promote curriculum reform and optimize curriculum content

Cultivating the legal literacy of college students requires scientific planning of the school's law curriculum. Based on the subject characteristics of law, students' interests and cultural values promoted by the society, the university school should make a series of selective, arranged and organized plans for the law curriculum based on a series of factors such as course objectives, teaching methods, teaching contents and assessment methods of the law curriculum. Teachers should make reasonable use of the quality legal resources in their hands, dig deeper into the real needs of students, continuously optimize the existing legal courses and enrich the content of the courses.

(3) Innovation of teaching forms and creation of practical teaching

In the face of this group of university schools, cultivating students' interest in learning law is undoubtedly the most urgent task. This goal can be achieved by flexible teaching methods, extensive use of multimedia networks, and advanced teaching methods or modes, and by raising students' interest in learning in multiple ways and in multiple dimensions. The effectiveness of good law teaching cannot be achieved without the extensive publicity of legal knowledge and the creation of a good learning atmosphere on campus. "Practice makes true knowledge", to cultivate the legal literacy of college students, we should also focus on the process of legal practice to enhance the reverence and faith in law, etc.



**Figure 2.** Ways to cultivate students' legal literacy

#### 4. CONCLUSION

The cultivation of legal literacy of students in colleges and universities is a comprehensive and systematic education project, and at present, the legal literacy of students in colleges and universities in China is not satisfactory and needs to be improved. As the main body of education, universities and colleges should clarify the problems of current legal education and change the current legal education system by strengthening the relevance of legal education and building a sound independent legal education system, so as to really improve the efficiency of legal teaching and make students' legal literacy improved and be able to flexibly apply the legal knowledge they learn.

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# A STUDY ON THE IMPROVEMENT STRATEGIES OF COLLEGE STUDENTS' ENGLISH SPEAKING ABILITY IN PBL PROJECT TEACHING METHOD COMBINED WITH DECISION TREE MODEL

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## ABSTRACT

This paper studied the characteristics of PBL project teaching method, based on the characteristics of decision tree algorithm, determine the mining target, object, data collection to establish a decision tree data model, the basic information of students using Excel software in Microsoft Office to store the collected data, clear the data that will have an impact on the research results, so as to complete the data pre-processing, using SPSS11.0 statistical software was used to analyze the experimental results, and a  $t$ -test was conducted to test whether there was a significant difference between the gain scores before and after the treatment. A decision tree model-based method for assessing college students' English speaking ability was used to improve the accuracy and scientificity of English speaking ability assessment.

## KEYWORDS

PBL project teaching method; Decision tree algorithm; Mining objectives; SPSS11.0 statistical software

## 1. INTRODUCTION

With the rise of the field of data mining, it has also been widely used and achieved good results in the field of education, and educational data such as student performance data and teaching management data have received more attention and importance [1-2]. People have started to realize that educational data cannot just stay in the stage of storage, query and simple statistics [3-5]. The timely identification of problems or influencing factors in actual teaching and learning has become the key to improve the quality of teaching and learning [6-7]. Researchers have tried to use different kinds of methods to evaluate and measure teaching data, and then discover the potentially valuable information in these educational data for improving teaching and learning and promoting students' development [8-9]. In this paper, a decision tree model was constructed and the data were processed, and students in the experimental group applying the PBL project teaching method showed higher ability to understand the interpretation and presentation of language in the examination.

## 2. PBL PROJECT TEACHING METHOD AND DECISION TREE MODELING

### 2.1. DECISION TREE ALGORITHM AND ITS MODEL CONSTRUCTION

#### 2.1.1. OVERVIEW OF DECISION TREE ALGORITHM

The decision tree algorithm is an instance-based classification algorithm that constructs a decision tree model from a set of irregular, unordered instances and generates classification rules to classify and predict unknown data. In a decision tree, each leaf node is assigned a class label. Non-terminal nodes (including root and internal nodes) contain test conditions for attributes to separate records with different characteristics. The process of constructing a



decision tree using the decision tree algorithm is top-down recursive. In other words, in a practical study, building a decision tree is the process of classifying data according to certain attributes.

### **2.1.2. CHARACTERISTICS OF THE DECISION TREE ALGORITHM**

Compared with other common classification algorithms used in educational data mining, the decision tree algorithm has the following advantages:

a) Faster. The decision tree algorithm is less computationally intensive and has better computational speed than other classification algorithms.

b) Higher accuracy. Due to the simple operation process of decision tree algorithm, the efficiency of problem solving is relatively high, which is conducive to improving its accuracy.

c) Easy to understand. The structure of decision tree is clear and can clearly show the importance of the attributes. Using decision tree algorithm will eventually generate IF... THEN classification rules, which does not require much background knowledge from the user.

d) Highly scalable. Decision tree algorithms can handle both small and large data sets. It can also handle continuous data and discrete data.

## **2.2. PBL PROJECT TEACHING METHOD**

### **2.2.1. PBL TEACHING PROCESS**

The flow of a teaching unit realized is generally as follows:

1) Introduce with a driving question to arouse the interest of the students.

2) Design an interdisciplinary project based on this key question. The most important thing to keep in mind when designing a project is that it is linked to the curriculum standards. If students are involved in the design, it is more likely to increase their sense of ownership of the learning.

3) The purpose of a timeline is to give students a clear idea of time and to teach them to manage their time and plan their tasks.

4) Assessing program outcomes can help educators set standards and teach more efficiently. It allows students to understand how well they understand the content, the progress they have made, and the gaps that exist.

## **3. SPECIFIC APPLICATION OF DECISION TREE ALGORITHM IN THE ANALYSIS OF STUDENTS' SPOKEN ENGLISH**

### **3.1. DECISION TREE MODEL CONSTRUCTION PROCESS**

The process of decision tree construction includes two stages: growing and pruning. The growth process of decision tree, i.e., the building process, divides the attribute values according to certain criteria and gradually builds the decision tree from top to bottom. The essence of pruning is to eliminate the noise or noise like anomalous data.

#### **3.1.1. DETERMINE THE TARGET AND OBJECT OF EXCAVATION**

This study uses the PBL project teaching method of spoken English for college students as an example, and the study is based on data information from undergraduate students who took this course in 2022. This study proposes research preconceptions based on the analysis of the collected data and information, i.e., students' gender, achievement data, and the impact it will have on students' performance, and further explores what kind of impact it will have, and then proposes rationalization suggestions for teaching to improve the quality of teaching.

### 3.1.2. ACQUISITION OF DATA

#### (a) Basic information about the student

The corresponding data tables were created by exporting the basic information collected from the students directly through the school's academic system.

#### (b) Students' grade information

The final grades of students' courses are composed of two parts: regular grades and examination grades according to a certain ratio, and the three data of regular grades, examination grades and final grades can be obtained directly from the academic affairs system.

### 3.2. DATA PRE-PROCESSING

#### 3.2.1. DATA INTEGRATION

Data integration is the combination of data from multiple data sources stored in a consistent data store. In this study, Excel software in Microsoft Office was used to store the collected data. The basic student information table includes the following attributes: serial number, grade 1, grade 2, grade 3, total regular grade, exam grade, and final grade. The total number of data in the data table is 1750. The basic student data table is shown in Table 1.

**Table 1.** Basic information table of students

Serial number	Achievement 1	Achievement 2	Total Grade Point Average	Exam Results	Final Score
1	83	96	87	78	75
2	86	92	85	82	81
3	84	91	73	82	79
...	...	...	...	...	...
1748	94	91	89	86	79
1749	94	82	84	91	80
1750	94	88	97	96	79

#### 3.2.2. DATA CLEANING

Data cleaning means removing data that would have an impact on the results of the study. In the process of sorting the data, it was found that there were some students who did not have test scores for reasons such as not taking the test or for other reasons the score items all had vacant values, totaling 50 data items. These data were considered invalid, and 1700 valid data remained after deletion.

### 4. EXPERIMENTAL RESULTS AND ANALYSIS

Based on the data of college students' English speaking ability in the PBL project teaching method derived from the decision tree algorithm, 20 students' scores were taken to construct the experiment, and the experimental results were analyzed by SPSS11.0 statistical software. The results of comparing the differences of gain scores before and after treatment are shown in Table 2. The difference scores of pre-test 1 and pre-test 2, and pre-test 2 and pre-test 3 were tested separately, and the results showed that there was no significant difference between them. Meanwhile, the gain scores of pre-test 2 and pre-test 3, and pre-test 3 and post-test 1, respectively, were tested by *t* test, and the differences were found to be very significant. This method of segmentation test confirmed the experimental hypothesis from another perspective.

**Table 2.** Comparison of differences in gain scores before and after treatment

	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Pre-test 2 - Pre-test 1	20	0.75	2.50		
Pre-test 3 - Pre-test 2	20	1.55	1.89	1.37	>0.1
Pre-test 3 - Pre-test 1	20	1.29	1.48		
Post-test 1 - Pre-test 3	20	2.21	2.83	2.51	<0.01

## 5. CONCLUSION

In terms of the three modes of language communication, the students in the experimental group applying the teaching method showed a higher ability to understand the interpretation of language and express the presentation than the students in the control group in the examination. In this paper, according to the specific application of decision tree algorithm in the analysis of students' English speaking performance and the analysis of the generated decision tree model, students' final grades consist of exam grades and usual grades, among which students' exam grades have a greater impact on the final grades of the course, and if students' final grades are to be excellent, both exam grades and usual grades must be at least "medium". The final grade is composed of the exam grade and the usual grade. Training college students to consciously use oral communication strategies in English can significantly promote the development of their English speaking ability. The final grade factor variable had an independent significant effect on the choice of oral communication strategies in English for college students, and the major factor variable significantly influenced the choice of achievement strategies, although it did not have an independent main effect on the choice of avoidance strategies.

## FUNDING

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# CORRELATION ANALYSIS OF E-COMMERCE DEVELOPMENT AND IMPROVEMENT OF UNIVERSITY EDUCATION LEVEL BASED ON BIG DATA ANALYSIS

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## ABSTRACT

With the rapid development of network economy and e-commerce. E-commerce development has become an important way for regional college students to start their own business, while college industry education is relatively lagging behind. It is necessary to reverse the concept and goal of talent training in colleges and universities, encourage the development of e-commerce and improve the level of education in colleges and universities. Using a combination of quantitative and qualitative methods, the education input cost and the number of e-commerce patents in a city were selected as parameters to analyze the interrelationship between e-commerce and university entrepreneurship education in a city region by calculating Pearson correlation coefficient values. The results show that the Pearson correlation coefficient is 0.9392, and since 0.9392 is between 0.8 and 1.0, there is an extremely strong correlation between e-commerce development and university innovation and entrepreneurship education in a city, and suggestions for e-commerce development are made.

## KEYWORDS

E-commerce; University education level; Innovation and entrepreneurship; Pearson correlation coefficient; Correlation analysis

## 1. INTRODUCTION

E-commerce refers to information technology and network technology as a means to exchange goods as the center of business activities, is the product of the organic integration of information technology and traditional business model [1-2]. Common e-commerce models include B2A, B2C, B2B, C2C, B2M, etc. [3]. The application of e-commerce can reduce business costs, weaken the dependence of enterprises on the traditional business environment, simplify business processes, and enhance the competitive advantage of enterprises [4-5]. In order to meet the demand for e-commerce professionals in the talent market, many universities have opened e-commerce majors, but the actual teaching effect is not satisfactory, and many students have insufficient practical ability to solve practical work

problems independently [6-7]. Therefore, colleges and universities should face up to the shortage of e-commerce majors in practical teaching and strengthen teaching reform [8].

The literature [9] investigated the impact of e-commerce entrepreneurship education on the development of the marine economy and analyzed it using the entropy value method. The study aimed to explore how to promote the development of marine economy through e-commerce entrepreneurship education. The literature [10] studied the development of e-commerce and its influencing factors in the era of digital technology and provided empirical evidence from 27 EU member states. The study aims to explore the impact of digital technologies on the development of e-commerce and the extent to which various factors influence its development in order to improve the sustainability of e-commerce. Literature [11] The study aims to explore how to improve the quality and competence of cross-border e-commerce talents in universities by improving the training model to meet the needs of cross-border e-commerce development.

## **2. RELEVANCE OF E-COMMERCE TO UNIVERSITY EDUCATION**

### **2.1. COLLEGE EDUCATION CAN BE A NEW ENTRY POINT FOR E-COMMERCE**

The core of the foundation of e-commerce development is the user. Because of the distribution of education resources, some students are unable to obtain sufficient education resources, network education makes it possible to share excellent educational resources, network education market demand is extremely strong. This is the primary factor for the rapid development of online education. Education is a kind of industry, and from the perspective of business, online education in colleges and universities will become a new profit point for e-commerce.

Online education in colleges and universities provides a strong demand and a broad market for e-commerce. People can learn by various methods, but online education has its unique advantages. As a kind of distance education, online education shares the independence of self-learning and has the nature of individual learning outside the structure of the learning community, while at the same time has a strong institutionalized management character on campus. Online education has the characteristics of fun personalization, interaction, intelligence, and mastery, while having more flexible teaching modes that can provide lecture mode, personalized independent learning mode, and collaborative learning mode. The Ministry of Education has approved dozens of universities to carry out pilot modern online education. Network education of pilot universities was expanding, and the coverage is getting bigger and bigger. Once network education is packaged with e-commerce, it will immediately show its unique charm.

### **2.2. COLLEGE NETWORK EDUCATION CAN BORROW THE OPERATION MODE OF E-COMMERCE**

The operation mode of e-commerce, including the information flow, logistics and capital flow involved in e-commerce, has many similarities with the teaching and management mode of modern network education. The B to B and B to C models in e-commerce can find similar models in network education. Network education has two forms: group learning at each branch and individual learning at any location, and the relationship with the school is the B to B and B to C mode. Modern network education applies the operation mode of e-commerce and transforms on top of it to form a business operation mode with its own characteristics, which is the long-term plan for the survival and development of network education. Only when online education is used as both an educational activity and a profitable business activity to truly achieve a win-win situation for both the education provider and the educated, it will be able to exist for a long time and continue to grow and develop.

### 3. ANALYSIS OF THE CORRELATION BETWEEN E-COMMERCE AND INNOVATION AND ENTREPRENEURSHIP EDUCATION IN COLLEGES AND UNIVERSITIES

In order to test the correlation between online entrepreneurship of college students and entrepreneurship education in colleges and universities, this paper adopts a combination of quantitative and qualitative methods, and selects the education investment cost and the number of e-commerce patents in a city as parameters to analyze the interrelationship between e-commerce and entrepreneurship education in colleges and universities in a city area by calculating Pearson correlation coefficient values.

#### 3.1. PEARSON CORRELATION COEFFICIENT

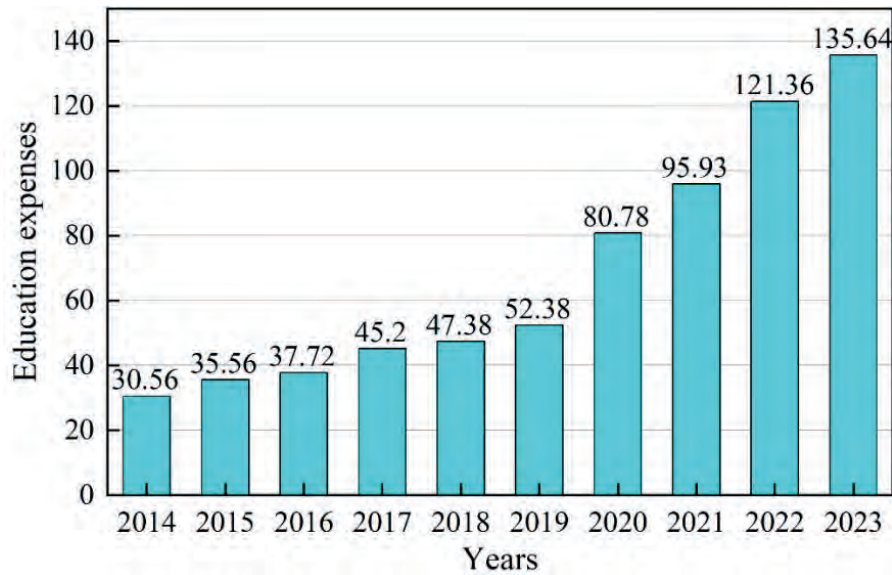
Correlation analysis is the analysis of two or more elements of variables with correlation, so as to measure the closeness of correlation between two variable factors. Pearson correlation coefficient is used to measure whether two data sets are on top of a line, and it is used to measure the linear relationship between fixed distance variables, which is calculated as shown in equation (1) below.

$$r = \frac{N \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{N \sum x_i^2 - (\sum x_i)^2} \sqrt{N \sum y_i^2 - (\sum y_i)^2}} \quad (1)$$

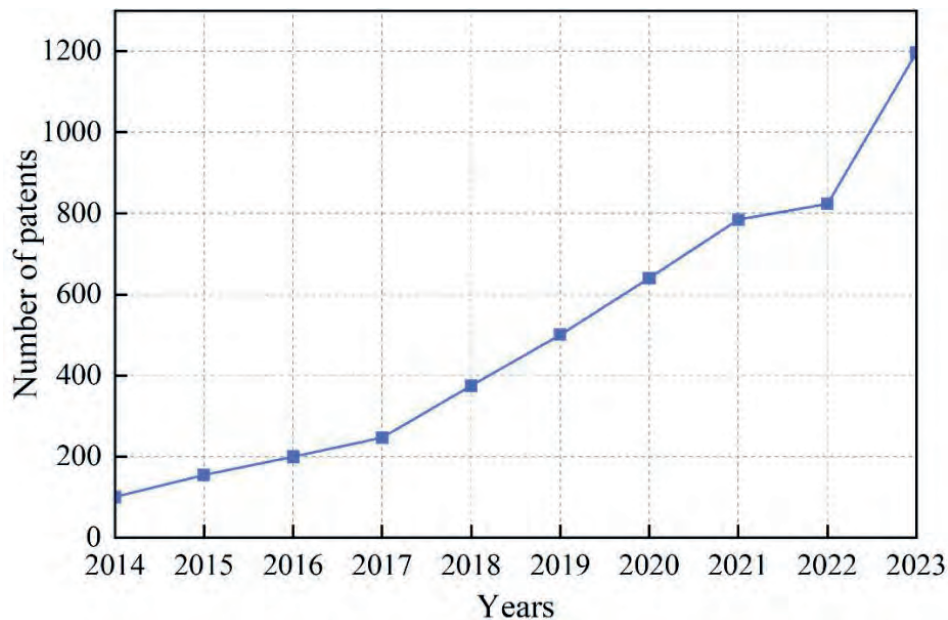
The larger the absolute value of the correlation coefficient, the stronger the correlation. The strength of correlation is usually determined by the following range of values: (1) 0.8-1.0 for very strong correlation, (2) 0.6-0.8 for strong correlation, (3) 0.4-0.6 for moderate correlation, (4) 0.2-0.4 for weak correlation, and (5) 0.0-0.2 for very weak or no correlation. Where  $r$  is the correlation coefficient,  $N$  is the sample size,  $x$  is the independent variable, and  $y$  is the dependent variable.

#### 3.2. CORRELATION ANALYSIS RESULTS

E-commerce development includes innovation awareness, management knowledge, business operation experience and project execution ability, among which innovation ability is an important indicator of e-commerce development, and the number of patent applications and acquisitions is one of the important indicators of a region's e-commerce development, so the selection of education funding investment and the number of regional patents to verify the relationship between e-commerce development and university education has a certain substitutable relationship. Since it is impossible to obtain the specific data on the results of e-commerce development in a city and the funds and manpower invested in entrepreneurship education by each university, this paper will find the cost of education investment in a city from 2014 to 2023 as shown in Figure 1, and the changes in the number of e-commerce patents granted in the corresponding years as shown in Figure 2 by collecting the yearbook data from a city's statistics bureau.



**Figure 1.** Education investment costs from 2014 to 2023



**Figure 2.** Changes in the number of e-commerce patent authorizations obtained from 2014 to 2023

The relevant data in Fig. 1 and Fig. 2 are substituted into Eq. (1) for the calculation, and the results are as follows:

$$r = \frac{2229961 - 1623681}{228.11 \times 2831.11} = 0.9392, \text{ because } 0.9392 \text{ is between } 0.8 \text{ and } 1.0, \text{ so there is}$$

an extremely strong correlation between e-commerce development in a city and innovation and entrepreneurship education in universities.

#### 4. CONCLUSION

Online education in colleges and universities will play an important role in building a modern society with lifelong learning function, and a flexible learning mode mediated by technology will become the development trend. Through correlation analysis, the coefficient of the peeren coefficient between e-commerce development and university entrepreneurship education reached 0.9392, and showed a significant correlation. But how to solve the problem of the long-term development of online education, this paper puts forward the idea of combining



online education and e-commerce in colleges and universities. On the one hand, e-commerce uses education as a breakthrough for its own profitability and forms a new profit point, on the other hand, network education can develop itself in a long term by using e-commerce model or combining with e-commerce to form a better operation mechanism that can guarantee education quality and economic benefits. The use of e-commerce model to solve the modern network education can undoubtedly become a good opportunity for the common development of both.

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# RESEARCH ON THE DILEMMA AND PATH OF ECONOMIC AND TRADE GOVERNANCE OF INTERNATIONAL MULTINATIONAL ENTERPRISES BASED ON INFORMATION FUSION AND PREDICTION MODEL

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## ABSTRACT

Although global trade governance has put all countries in the world under pressure and challenges, global economic and trade rules reorganization is inevitable and urgently needed to be addressed. Based on information fusion, a Bayesian network model is trained by machine learning to obtain an intelligent prediction model of international multinational enterprises' economic and trade risks based on Bayesian network, and a robustness analysis of the Bayesian prediction model is conducted. The results show that the overall prediction accuracy of the international multinational enterprise economic and trade risk prediction model for 10 test cases is 83.04%, indicating that the prediction results of the prediction model have high guiding significance and good robustness. This paper proposes a path to change the economic and trade governance system of international multinational enterprises to promote the possibility of trade growth, and to establish a foundation and remove obstacles for the transformation of global economic and trade governance.

## KEYWORDS

Bayesian predictive model; Robustness analysis; Multinational enterprises; Economic and trade governance system; Change path

## 1. INTRODUCTION

The overall characteristics and trends of the current world economic situation are the deepening and consolidation of the trend of globalization of the world economy, and the consequent rapid expansion of the position and role of multinational enterprises in the development of the world economy, and the global business strategies of multinational enterprises are also bringing profound changes to the development of the world economic landscape [1-3]. The traditional pattern of international economic interactions, mainly commodity trade, has been broken, and the international division of labor has deepened under the impetus of socialization of production and increasingly penetrated into industrial and corporate fields, which makes multinational enterprises play a significant role in a country's economic growth, structural adjustment, industrial upgrading, technological progress and the

evolution of corporate governance structure [4-6]. It is easy to see that, in the current international situation, the quantity and quality of multinational enterprises owned by a country represent its economic strength and international competitive position [7].

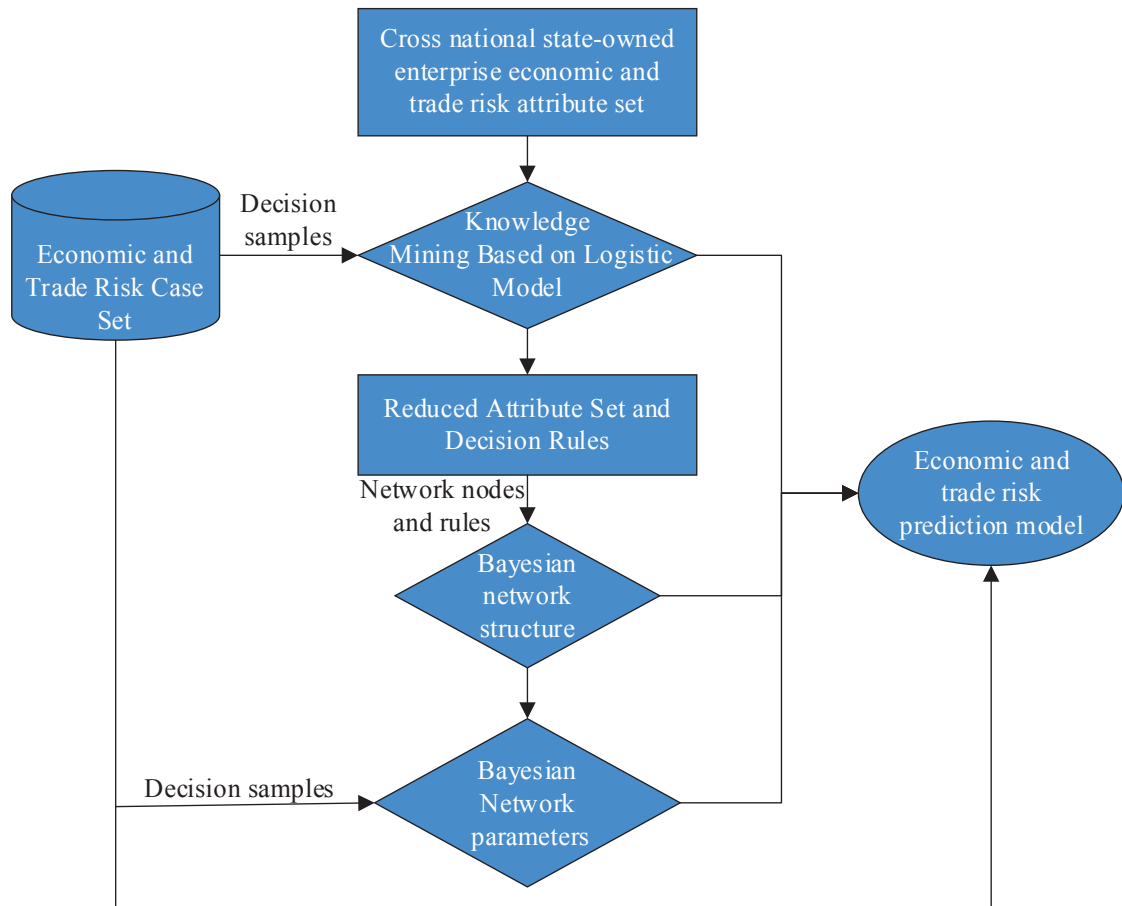
The literature [8] proposes a multi-objective optimization method for industrial park layout design that aims to balance the trade-off between economic benefits and safety. The method can help designers to consider economic benefits along with safety to ensure the sustainability of industrial parks. The literature [9] studied the impact of the U.S.-China trade dispute on the global agricultural market, the U.S. economy, and greenhouse gas emissions. The study aimed to explore the impact of the U.S.-China trade dispute on global agriculture and the economy, as well as its possible impact on greenhouse gas emissions.

## **2. ANALYSIS OF INTELLIGENT PREDICTIVE MODELS FOR ECONOMIC AND TRADE GOVERNANCE OF INTERNATIONAL MULTINATIONAL ENTERPRISES**

### **2.1. BAYESIAN PREDICTIVE MODELING FRAMEWORK FOR INTERNATIONAL MULTINATIONAL ENTERPRISES' ECONOMIC AND TRADE GOVERNANCE**

However, the traditional Bayesian network building process relies mainly on subjective experience, and coupled with the fact that this study involves a large number of influencing factors directly building Bayesian networks is bound to be unconvincing and exceptionally complex, while overly complex Bayesian networks can lead to computational complexity and overfitting problems. In addition, this study involves the prediction of different kinds of economic and trade risks, and the influencing factors of different economic and trade risks are different if the influencing factors identified above are used directly for modeling without consideration, it is difficult to avoid introducing irrelevant nodes in the network, increasing the model noise and reducing its predictive ability.

Therefore, in order to make the Bayesian network establishment process more rigorous and to reduce the network complexity and improve the node correlation, which in turn improves the prediction ability and prediction efficiency of the Bayesian network, this study first analyzes the sample and the influencing factors using a Logistic regression model to uncover the most relevant influencing factors corresponding to each economic and trade risk, as well as the causal relationships between the influencing factors. Based on the output of the logistic regression model, a Bayesian network structure is established to maintain the flexibility and fault tolerance of the Bayesian network inference process, while increasing the accuracy of its network structure. The collected case data are used as samples in the Bayesian network to train the Bayesian network model for machine learning and obtain an intelligent prediction model of international multinational enterprises' economic and trade risks based on Bayesian network. In summary, the basic idea of establishing the prediction model of international multinational enterprises' economic and trade risks in this paper is shown in Figure 1



**Figure 1.** A Prediction Model for Economic and Trade Risks of Multinational Enterprises

## 2.2. BAYESIAN PREDICTIVE MODEL ROBUSTNESS ANALYSIS

Regulatory policy change risk, administrative restrictions and discrimination risk, political violence risk, corruption risk, government default risk, and project-specific protest risk are represented by F1, F2, F3, F4, F5, and F6, respectively. Ten randomly selected samples have been used as a test set in this study to verify the robustness of Bayesian network parameter learning for the prediction of trade and economic risks of international multinational enterprises. The prediction probability greater than or equal to 49.9% is considered as the occurrence of the prediction result of the type of economic and trade risk, and the prediction result less than 49.9% is considered as the non-occurrence of the type of economic and trade risk. The accuracy of the model prediction is calculated by comparing the model prediction results with the actual results of the cases. For example, for test case 2, the prediction results are F1 and F2 occur and F3, F4, F5 and F6 do not occur, while the actual results are F2 occur and F1, F3, F4, F5 and F6 do not occur. The model's prediction results for F1 in case 2 are wrong, and the prediction results for F2, F3, F4, F5 and F6 are correct, i.e., the prediction model's economic and trade risk prediction for test case 2 The accuracy rate is 83.3%. The prediction results of the model for all test cases are shown in Table 1. It can be seen that the overall prediction accuracy of this international multinational enterprise economic and trade risk prediction model for the 10 test cases is 83.04%, indicating that the prediction results of this prediction model have high guiding significance and good robustness.

**Table 1. Robustness test results**

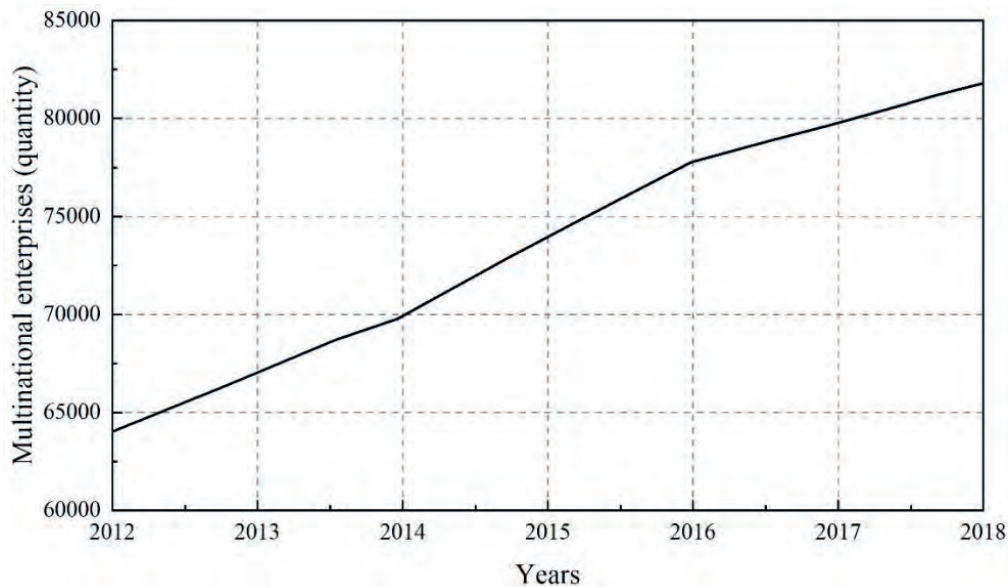
No.	Forecast Results (%)						prediction	reality	Accuracy (%)
	F1	F2	F3	F4	F5	F6			
1	66.6	33.2	66.6	33.2	33.2	33.2	F1;F3	F1;F3	100
2	49.9	49.9	14.2	12.4	18.7	19.9	F1;F2	F2	83.2
3	19.9	49.9	33.2	33.2	74.9	33.2	F2;F5	F5	83.2
4	33.2	19.9	33.2	49.9	22.1	49.9	NO	NO	100
5	66.6	66.6	13.2	49.9	22.1	49.9	F1;F2;F4;F6	F1;F2;F6	83.2
6	19.9	24.9	49.9	24.9	24.9	24.9	F3	F3	100
7	33.2	55.5	45.4	33.2	33.2	66.6	F2;F6	F3;F6	66.6
8	24.9	28.5	11.2	19.9	19.9	39.9	NO	NO	100
9	39.9	49.9	39.9	49.9	33.2	33.2	F2;F4	F2	100
10	42.8	33.2	57.2	49.9	19.9	24.9	F3;F4	F3;F4	100

**3. PATH OPTIONS FOR THE CHANGE OF ECONOMIC AND TRADE GOVERNANCE SYSTEM OF INTERNATIONAL MULTINATIONAL ENTERPRISES**

**3.1. PROMOTE SUSTAINABLE GROWTH OF GLOBAL TRADE WITH NATIONAL CULTURAL EXCHANGE**

Although the development of economic, technological and network media has injected a new impetus for cultural communication, allowing people of all countries to communicate in a timely manner, assuming the medium and mission of national cultural communication, opening new ways for the dissemination and preservation of culture in all countries. But after all, the network, technology media is only as a tool of existence, its flexibility and human contrast, has a relative disadvantage. Therefore, the dissemination of culture not only needs new communication media such as technology, Internet and new media, but also needs the participation and contribution of multinational corporations.

Since the 21st century, the number of multinational enterprises has shown a greater growth trend as shown in Figure 2, and multinational enterprises have gradually become a part of international economic and trade governance, and the participation of multinational enterprises in the formulation of the international economic and trade system has become a reflection of democratization. And the exchange of multinational companies is a mutual cultural exchange between the employees of enterprises and government departments and personnel of other countries, which has a very important significance for the foreign development of national culture and plays an important role in the balance between trade growth and cultural exchange. Therefore, we need to make good use of science and technology, new media as the medium of cultural communication, but also to see the significance of traditional media in cultural exchange. Only by playing the role of all mediums of cultural exchange can we minimize cultural differences between countries, promote the possibility of trade growth, and build the foundation and remove obstacles for the transformation of global economic and trade governance.



**Figure 2.** The number of multinational enterprises is showing a significant growth trend

### **3.2. BUILD INTERNATIONAL CULTURAL TRADE NETWORK TO REALIZE MUTUAL FEEDING OF ECONOMY, TRADE AND CULTURE**

Countries strengthen humanistic exchanges, deepen economic and trade cooperation, and expand the scale of global cultural trade. In fact, each country can formulate different exchange policies for different regional countries to build up their own international cultural trade network, which is of great significance to the development of trade and culture. In addition, countries can give full play to their own social institutions, overseas Chinese, foreign enterprises and foreign students to actively open bilateral and multilateral cultural exchanges and enhance the identification of their own cultures.

Countries can fully study and explore the correlation and historical origin between other countries and their own cultures, accelerate the establishment of cultural networks in the era of “Internet+”, develop cultural products with common cultural aspirations between their countries and other countries, and promote the upgrading of national cultural trade structures.

Establish a cultural trade network and actively utilize the advantages of a cultural trade network. Combine market needs and selectively develop cultural trade markets in different regions in selected target countries. Through publicity and promotion, further enhance the market scope of the country’s cultural trade and realize mutual feeding of culture and economic and trade.

### **4. CONCLUSION**

In this paper, the prediction of six types of international multinational enterprises’ economic and trade risks by Bayesian networks can fully consider the influence of variables on the probability of occurrence of economic and trade risks and the covariance relationship between variables, so as to achieve dynamic prediction and improve the prediction accuracy. The prediction accuracy of the established intelligent prediction model for international multinational enterprises’ economic and trade risks reaches 83.04%, with high sexual robustness. This paper provides certain policy recommendations for international multinational enterprises’ economic and trade governance from the perspective of national culture for economic development and economic and trade convenience, and countries should actively participate in the reconstruction of international economic and trade rules to inject new momentum for the new development of global trade.

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# DESIGN OF A NEURAL NETWORK-BASED INTELLIGENT EXTRACTION METHOD FOR KEY ELECTRONIC INFORMATION

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## ABSTRACT

This paper explores a neural network-based intelligent extraction method for key electronic information. Convolutional neural networks, electronic information extraction mechanisms and data pre-processing are constructed, and the extraction of key electronic information using neural networks is discussed in detail. In order to ensure the accuracy and reliability of the data, data pre-processing methods such as data cleaning, data set division, feature extraction and data normalization are proposed. The results show that the overall accuracy of information recognition is improved by an average of 0.58% and 0.62%, respectively, by using convolutional neural networks. The F1 values of recognition were improved by 2.81% and 2.49%, respectively. It indicates that the method can effectively extract key information with high accuracy and stability. And it provides strong support for the technological innovation and development of related fields.

## KEYWORDS

Neural network; Electronic information; Intelligent extraction; Data preprocessing; Normalization; F1 value

## 1. INTRODUCTION

Intelligent extraction of electronic information is a challenging task that requires a combination of artificial intelligence and electronic information technology to extract key information from a large amount of electronic information in an automated and efficient manner [1-3]. Past research has relied on manual rule formulation and manual mining for information extraction [4-5]. However, these approaches are often limited by rule formulation and have



difficulty in coping with the complex and changing electronic information environment [6]. The existing related literature mainly focuses on the design and optimization of neural network models. For example, some studies use convolutional neural networks (CNNs) for classification and recognition of electronic information text for automated information extraction [7]. Other studies have applied recurrent neural networks (RNNs) and long short-term memory (LSTM) networks to model and predict electronic information sequence data with good results [8]. In addition, there are also studies that integrate deep learning methods with other techniques, such as combining convolutional neural networks and recurrent neural networks to improve text classification accuracy [9]. The purpose of this paper is to explore new ideas of neural network applications and design more suitable methods for electronic information extraction in order to improve the efficiency and accuracy of intelligent information processing.

## 2. NEURAL NETWORK-BASED ELECTRONIC INFORMATION WISE EXTRACTION

### 2.1. CONVOLUTIONAL NEURAL NETWORK

The basic training units of convolutional neural networks include: convolution, nonlinear transform, pooling, Dropout and batch processing. The core units are convolution, nonlinear transform and pooling.

#### (1) Convolution

In the convolution operation, two core parameters are included, the input variable and the convolution kernel. In digital image processing, the types of convolution are classified as, full element convolution, same-size convolution and effective convolution. Suppose,  $X = \{x_1, x_2, \dots, x_n\}$ ,  $X \in R^n$  are the input variables,  $\omega \in R^m$  are the convolution kernel weights are the convolution kernel weights, then we have:

$$y(k) = \sum_{i=1}^m x(k-i+1) \cdot \omega(i) \quad (1)$$

#### (2) Nonlinear transformation

The core of nonlinear transformation is to improve the nonlinear portrayal of the whole network structure by a simple nonlinear mapping of each neuron, also known as the activation function. Currently, the activation functions commonly used in convolutional neural network algorithms are, ReLU, Sigmoid function and tanh function. Their mathematical expressions are respectively:

$$\left\{ \begin{array}{l} \text{Sigmoid}(y) = \frac{1}{1 + e^{-y}} \\ \text{Tanh}(y) = \frac{e^y - e^{-y}}{e^y + e^{-y}} \\ \text{ReLU}(y) = \max(0, y) \end{array} \right. \quad (2)$$

where variable  $y$  refers to the output value of the convolution operation.

#### (3) Pooling

Pooling reduces the spatial dimension of the feature map by aggregating the feature space or type by downsampling, with the main purpose of reducing the computation and ensuring the translation invariance of the features. Expand the perceptual field range, reduce the input dimension of the next layer, and effectively reduce the risk of overfitting. There are many ways

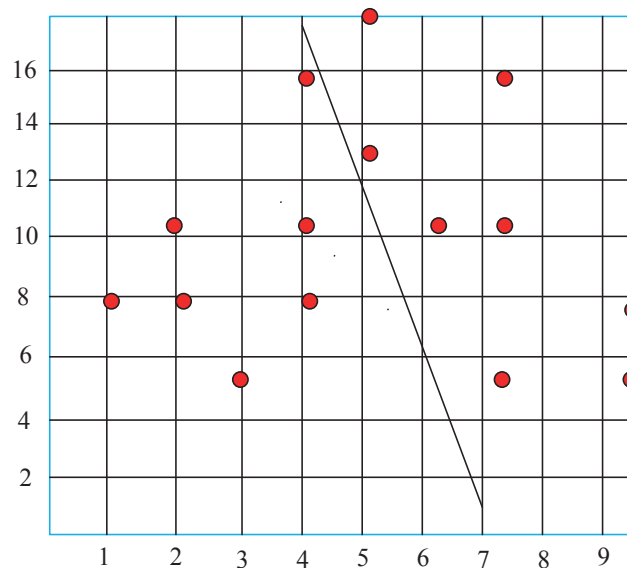
of pooling operations, such as maximum pooling, average pooling, global average pooling, etc. are common.

## 2.2. ELECTRONIC INFORMATION EXTRACTION MECHANISM

Electronic information extraction is actually categorized as a dichotomous task that falls under the category of classification. The supervised classification problem includes two processes: learning and discriminating. In the learning process, an effective learning method is used to extract feature information based on a known training data set, and a suitable classifier is selected to finally obtain an information extraction model; in the discriminating process, a discriminating model is used to extract information from deeper features.

Ideally, in the information extraction task, the data distribution has linear separability. However, in practice, for electronic information, the background structure is complex, and the status quo of many feature categories, small differences between classes and large differences within classes leads to linear indistinguishability of the original data.

Therefore, the existing traditional algorithms usually transform the original image so that the features to be extracted have explicit or implicit separability as much as possible, and then use the classifier for information extraction. In the decomposition process, the linear separability of the data set directly affects the final information extraction accuracy as shown in Figure 1. The traditional algorithm is used to separate the data by linear separation, which easily causes some of the points to be abandoned completely, so the information obtained is inadequate.



**Figure 1. Linear Separated Data**

Given a set of discrete data  $T = \{(x_1, y_1), (x_2, y_2), \dots, (x_N, y_N)\}$ , where,  $x_i \in R^n$ ,  $y_i \in \{+1, -1\}$ ,  $i = 1, 2, \dots, N$ . If there exists a hyperplane  $S$  as

$$\omega \times x + b = 0 \quad (3)$$

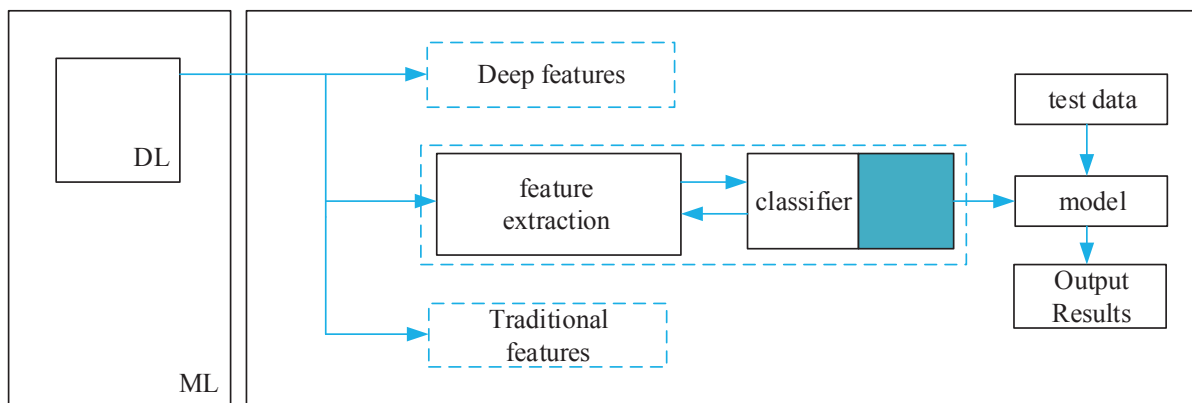
The ability to divide the positive and negative values in the data exactly correctly to both sides of the hyperplane and to satisfy Eq:

$$y_i = \begin{cases} +1, \forall i, \omega \times x_i + b > 0 \\ -1, \forall i, \omega \times x_i + b < 0 \end{cases} \quad (4)$$

Then, the data set  $T$  is linearly divisible; otherwise, the data set is linearly indivisible.

The process of electronic information extraction is usually considered as a process of effective information screening in the field of remote sensing information interpretation, based on various features of the ground features presented by electronic information. The process of identifying feature information through comprehensive image transformation, analytical reasoning, learning and judgment, i.e., extracting feature information from remote sensing simulated images of ground reality and inversion of ground prototypes.

The machine neural learning algorithms are divided into two categories: supervised learning and unsupervised learning from the perspective of sample labeling or not. In this paper, we mainly use convolutional neural network classifier for information extraction, while unsupervised learning algorithms cover a wide range of areas and cannot be exhaustive. Therefore, this paper only analyzes from the supervised learning perspective, and the basic process of machine supervised learning algorithm is shown in Figure 2.



**Figure 2.** Process of Supervised Learning Algorithms

## 2.3. DATA PRE-PROCESSING

### 2.3.1. DATA CLEANING

Data cleaning is an important step in data pre-processing, which aims to remove noise, outliers and duplicate values from the data to ensure the accuracy and reliability of the data. In the intelligent extraction of key electronic information, data cleaning is also very important because the quality of data directly affects the training effect of the subsequent neural network. The steps of data cleaning include, removing duplicate values, handling missing values, handling outliers, etc.

### 2.3.2. DATA SET PARTITIONING

In order to train and test the neural network model, the original data set needs to be divided into three parts: training set, validation set, and test set. Among them, the training set is used to train the model, the validation set is used to adjust the hyperparameters of the model and prevent overfitting, and the test set is used to evaluate the performance of the model. The division of the dataset needs to take into account the number of samples, sample distribution, and category balance.

### 2.3.3. FEATURE EXTRACTION

Feature extraction is the process of transforming raw data into feature representations that can be learned by neural network models. In the intelligent extraction of key electronic information, the goal of feature extraction is to extract features related to key information. Commonly used feature extraction methods include edge detection, texture feature extraction, and color histogram in image processing, bag-of-words model and TF-IDF in text processing, and wavelet transform and time-frequency analysis in signal processing.

### 2.3.4. DATA NORMALIZATION

In order to avoid the impact of scale differences between different features on the training of neural network models, it is necessary to normalize the data so that different features take the same range of values. Commonly used normalization methods include maximum-minimum normalization, Z-score normalization, etc.

## 3. INFORMATION EXTRACTION RESULTS AND ANALYSIS

The depth of the network structure and the width of the perceptual field are crucial in the task of electronic information extraction in complex contexts. Especially in electronic information, expanding the perceptual field can be effective in obtaining more effective features. Therefore, in this paper, we propose two basic training units, RCU and DPU, both of which can effectively improve the network's ability to extract deep features. Where the RCU is the residual convolution unit, which consists of a adaptive block. The DPU is a configurable unit of computation, which is commonly used to optimize the convolution neural network. To demonstrate that the joint constraint of RCU and DPU can effectively improve the recognition accuracy, the recognition ability of single training unit and joint training unit are compared in this section. The accuracy evaluation results are shown in Table 1 under the same training data and hardware and software environment.

**Table 1.** Comparison of the results with either RCU or DPU at the breakeven point.

data set	TEST	OA(%)	P(%)	R(%)	F1(%)	IoU(%)
Massachusetts dataset	Only RCU	98.38	75.41	73.96	73.26	59.63
	Only DPU	98.12	76.35	72.28	76.52	58.44
	Both	98.53	83.85	79.34	74.37	61.27
Gaofen No.2 Dataset	Only RCU	98.02	75.38	77.11	79.05	66.38
	Only DPU	97.96	77.47	80.85	75.73	59.31
	Both	97.83	80.11	80.81	79.66	65.42

When only RCU or DPU units are included in the network structure, the overall accuracy of information recognition is improved by 0.58% and 0.62% on average, respectively. Meanwhile, the F1 values of recognition are improved by 2.81% and 2.49%, respectively. RCU training units are used to increase the network depth in order to obtain more informative features. The DPU, on the other hand, is used to expand the sensing range as much as possible to reach the purpose of improving recognition accuracy while the feature resolution remains unchanged. Therefore, the joint constraint of the two can effectively improve the accuracy of information recognition in high-resolution remote sensing images.

## 4. CONCLUSION

The purpose of this paper is to explore a neural network-based intelligent extraction method for key electronic information. By introducing convolutional neural networks, electronic information extraction mechanisms and data pre-processing, this paper proposes a new method for extracting critical electronic information using neural networks. Through experiments and analysis, this paper draws the following conclusions:

(1) By using convolutional neural networks, the overall accuracy of information recognition is improved by 0.58% and 0.62% on average, respectively. The F1 values of recognition are improved by 2.81% and 2.49%, respectively. It indicates that the method can effectively extract key information and has excellent accuracy and stability.

(2) The data pre-processing method proposed in this paper, including data cleaning, data

set division, feature extraction and data normalization, can ensure the accuracy and reliability of the data, thus improving the efficiency and accuracy of information extraction.

Through the research of this paper, we can better understand the process of intelligent extraction of electronic information and provide strong support for technological innovation and development of related fields. The research results of this paper have certain guiding significance for the intelligent extraction of electronic information and can provide new ideas and methods for the research in related fields.

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# EXPLORATION AND PATH PRACTICE OF ART MAJORS HELPING RURAL REVITALIZATION BASED ON INTELLIGENT DATA ANALYSIS

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## ABSTRACT

This paper focuses on the application of intelligent data analytics and art disciplines in rural revitalization. By introducing intelligent data analysis application in rural revitalization. Specifically, it includes help rules and data pre-processing based on intelligent data analysis. The path mechanism of art majors in rural revitalization is focused on, including the characteristics and advantages of art majors, and the application in rural cultural revitalization, environmental construction and planning and design of tourist attractions. The results show that the synergy between intelligent data analysis and art majors can help promote rural revitalization and improve the quality and efficiency of rural development.

## KEYWORDS

Intelligent data analysis; Art majors; Rural revitalization; Help rules; Data pre-processing; Attraction planning

## 1. INTRODUCTION

With the development of society and the acceleration of urbanization, the population of rural China is gradually decreasing, and the economic development of rural areas is facing great challenges [1-2]. In recent years, more and more researchers have begun to pay attention to the role of art majors in rural revitalization [3-4]. Art majors have the value of inheriting rural culture as well as playing a positive role in the development of rural economy [5]. Art majors play an important role in preserving and inheriting rural culture, and help to explore the cultural resources and characteristics of villages [6]. Researchers have enhanced the value of rural characteristic culture by preserving and inheriting historical and cultural buildings, traditional handicrafts, etc. [7]. Meanwhile, more art graduates returned to their hometowns to start their own businesses and contributed to the development of local cultural industries and rural tourism [8]. The collaboration and cooperation of the researchers through art graduates has led to the expansion of channels and branding of local agricultural products and the improvement of rural tourism [9]. Intelligent data analysis technology, on the other hand, provides a new way of thinking to provide more refined and efficient support to promote rural revitalization through in-depth mining and analysis of art and cultural data [10].

## 2. APPLICATION OF INTELLIGENT DATA ANALYSIS IN RURAL REVITALIZATION

### 2.1. HELPFUL RULES BASED ON INTELLIGENT DATA ANALYSIS

Rule learning, as one of the early intelligent data analysis techniques, is also called “symbolic learning”. Its core is similar to other intelligent data analysis techniques in that it acquires knowledge by learning from existing data, except that the goal of rule learning is to obtain rules that can correctly distinguish data categories. In the rural revitalization work, when the person in charge of helping the poor household makes a revitalization plan, the help measures chosen are only to solve the most urgent problems of the poor household at the surface.

The purpose of rule induction is to clarify the specific conditions for the implementation of policy measures and to provide a more in-depth description of the link between the strength level of measures and the characteristics of poor households, so the chosen method should have good interpretability. On the one hand, compared with neural networks and support vector machines, rule learning and decision trees are more explanatory, so that users can intuitively understand the process of rule generation. The overall framework of rule induction is divided into two parts, including rule set generation and rule optimization, and the schematic diagram of the modules is shown in Figure 1.

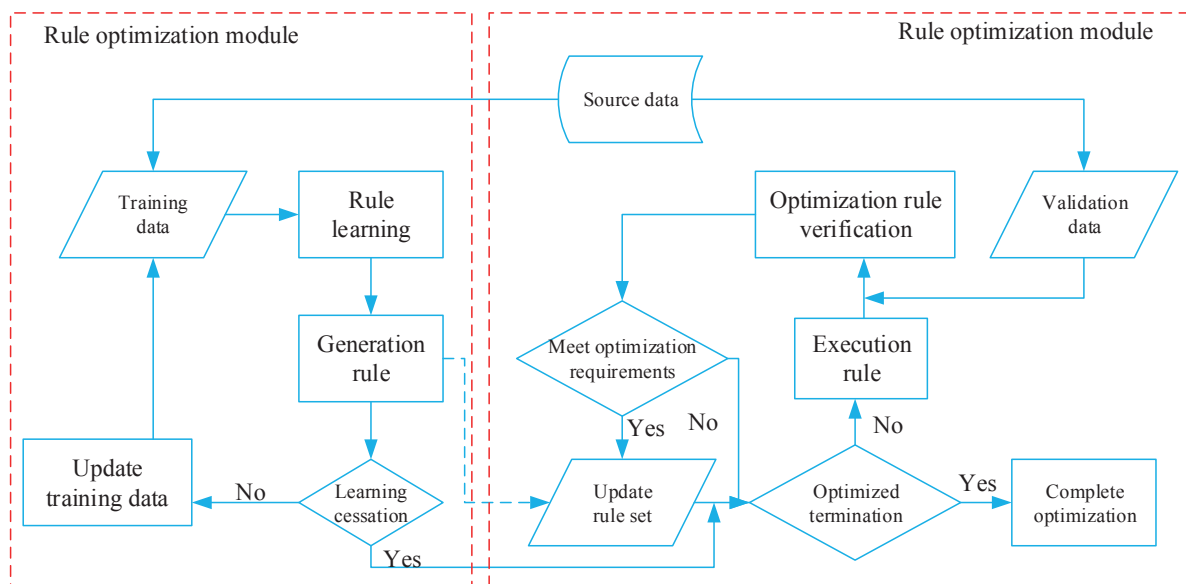


Figure 1. Rule induction module diagram

### 2.2. DATA PRE-PROCESSING

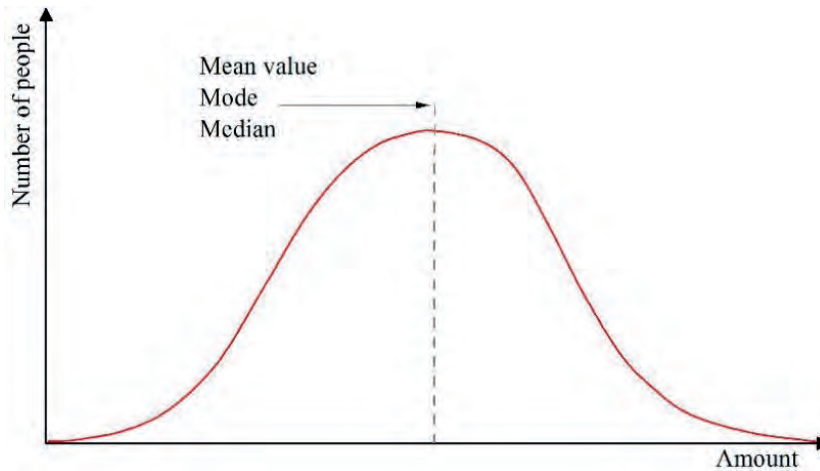
To ensure that the interference of data noise, missing values and inconsistent data is received in the modeling process, data cleaning transformation is required to ensure the accuracy, completeness and consistency of the data. Among them, data cleaning includes the processing of missing values, outliers and incorrect values, and data transformation includes the processing of character variables.

Missing data is a common problem in data mining. If the amount of missing data is small and has little impact on the model, the operation of deletion can be used directly; otherwise, data filling is carried out, and the filled values generally refer to statistics that can reflect the overall distribution pattern of data. The median/mean/plural is a description of the trend of the data center, which can reflect the data concentration distribution to a certain extent. Also, it should be noted that the mean is sensitive to extreme values, and the expression for the mean is

$$\bar{x} = \frac{\sum_{i=1}^N x_i}{N} = \frac{x_1 + x_2 + \dots + x_N}{N} \quad (1)$$

Where,  $\bar{x}$  is the sample mean,  $N$  is the sample number, and  $x_i$  is the sample value.

When the occurrence of missing, the mean value will be selected as the filler value data distribution as shown in Figure 2, the horizontal coordinate is the amount of compensation for following and the vertical coordinate is the number of people counted, at this time the mean, median and plural of the compensation amount basically overlap in a certain range.



**Figure 2.** Data distribution of fill values

In order to control the values of the input variables between 0 and 1, it is necessary to transform some of the data. For example, for the description of the educational level of the main labor force of poor households, it is necessary to quantify the numerical value of the educational level since it is related to the self-development potential to some extent.

For example, in this paper, text data describing educational qualifications need to be converted to numerical data, where the conversion rules for illiteracy as  $\alpha$ , elementary school as  $\beta$ , middle school as  $\chi$ , and high school and above as  $\delta$  are as follows

$$\alpha = \frac{N_1 + N_2 + N_3}{N_0 + N_1 + N_2 + N_3} \quad (2)$$

$$\beta = \frac{N_0 + N_2 + N_3}{N_0 + N_1 + N_2 + N_3} \quad (3)$$

$$\chi = \frac{N_0 + N_1 + N_3}{N_0 + N_1 + N_2 + N_3} \quad (4)$$

$$\delta = \frac{N_0 + N_1 + N_2}{N_0 + N_1 + N_2 + N_3} \quad (5)$$

Among them,  $N_0$ ,  $N_1$ ,  $N_2$  and  $N_3$  are the number of poor households with illiteracy, elementary school education, junior high school education, and high school education and above, respectively.

Similarly, numerical data with attribute values exceeding the range of [0, 1] in this paper, such as the number of students in school (C\_n), the number of major labor force (C\_s), the



area of cultivated land (A) and monetary data such as education grants and medical assistance, and compensation payments for returning farmland to forests, are normalized using the Standard Scaler method in this paper, and the conversion rules are:

$$x = \frac{x - u}{\sigma} \quad (6)$$

where  $u$  and  $\sigma$  are the mean and variance of the sample of the attribute value, respectively.

### 3. PATH MECHANISM OF ART MAJORS IN RURAL REVITALIZATION

#### 3.1. CHARACTERISTICS AND ADVANTAGES OF ART MAJORS

##### 3.1.1. CHARACTERISTICS OF ART MAJORS

Art majors have unique teaching methods and contents, and focus on cultivating students' creativity, imagination and aesthetic ability. These characteristics make art majors have unique advantages in rural revitalization. The teaching methods of art majors focus on practice and experience, which is in line with the practical and experiential nature required for rural revitalization. The teaching contents of art majors cover a wide range of fields, such as painting, music, dance and drama, which have important roles in rural cultural construction, tourism development and cultural product creation. Students of art majors have strong innovation ability and artistic expression, and they can provide unique cultural creativity and cultural products for rural revitalization and promote the development of rural economy. Therefore, art majors have an irreplaceable role in rural revitalization.

##### 3.1.2. ADVANTAGES OF ART MAJORS

The advantages of art majors are mainly reflected in Table 1. The influence of art majors on rural revitalization is mainly focused on four aspects, innovation ability, artistic expression, artistic skills and teamwork. Art majors have unique advantages in rural revitalization and can make important contributions to the development of rural economy and cultural construction.

**Table 1.** Main Advantages of Art Majors

Capacity	Advantage	Mechanism of action
Innovation ability	Students majoring in art have strong innovative abilities	They can provide unique cultural creativity and products for rural revitalization
Artistic expression	Students majoring in art have strong artistic expression skills	They can showcase rural culture and rural style through artistic forms, promoting the development of rural tourism and cultural industries.
Art Skills	Students majoring in art have high artistic skills	They can provide professional technical support for rural cultural construction and the creation of cultural products.
Team work	Art majors emphasize teamwork	They can collaborate with rural cultural institutions, cultural enterprises, and cultural creative teams to jointly promote rural revitalization

#### 3.2. THE APPLICATION OF ART MAJORS IN RURAL REVITALIZATION

##### 3.2.1. THE APPLICATION OF ART MAJORS IN RURAL CULTURAL REVITALIZATION

Art majors can provide support for rural cultural revitalization in many aspects. First, art majors can promote the development of rural culture through the excavation and inheritance of traditional culture. For example, traditional culture can be presented to the audience through music, dance and drama, so that the audience can better understand and know traditional culture, thus stimulating their interest in and love for traditional culture.

Art majors can inject new elements and vitality into rural cultural products through creative

design. For example, design handicrafts with rural characteristics that meet contemporary aesthetics and market demand, promote rural cultural products, and facilitate local economic development.

Art majors can provide platforms and opportunities for rural cultural revitalization through the organization and planning of cultural activities. For example, organize rural cultural festivals, art exhibitions and other activities to attract more people to the countryside, understand local culture, and promote rural tourism and cultural industries.

### **3.2.2. THE APPLICATION OF ART MAJORS IN THE CONSTRUCTION OF RURAL ENVIRONMENT**

Art majors can improve the appearance of the rural environment through landscape design. For example, design landscape elements that meet the characteristics of the countryside, such as small farmhouses and idyllic scenery. Creating rural culture excavation and inheritance Rural revitalization needs to be excavated and inherited from the aspect of cultural connotation. Art majors can promote the inheritance and development of rural culture by researching and creating local characteristic culture and transforming it into cultural products with market value. For example, after researching the local village culture, an art major student found that there is a traditional handicraft making skill in the area, but due to the backward production process and insufficient market promotion, the market influence of the handicraft is very small. By learning about art design and marketing, the student created a series of new handicrafts and promoted and sold them through an online platform, successfully recreating and promoting the local traditional handicrafts and injecting new momentum into local economic development.

### **3.2.3. PLANNING AND DESIGN OF RURAL TOURIST ATTRACTIONS**

Art students can provide ideas and solutions for the planning and design of local rural tourist attractions through their research and creation of local natural scenery and humanistic landscapes. For example, after researching local rural tourism resources, an art major student found a local mountainous area with beautiful natural scenery, but few tourists due to inconvenient transportation and lack of related facilities. By learning about art design and tourism planning, the student designed a series of tourism facilities and activities that were compatible with the distinctive local culture and natural environment, successfully turning the area into a rural tourist attraction with special characteristics and injecting new vitality into the local economic development.

## **4. CONCLUSION**

The purpose of this paper is to explore the practical paths of helping rural revitalization based on intelligent data analysis and art majors. By exploring the application of intelligent data analysis in rural revitalization and the path mechanism of art majors in rural revitalization, this paper draws the following conclusions:

Firstly, the help rules based on intelligent data analysis can effectively improve the efficiency and quality of rural economy, and the information resources of rural people can be better utilized through data pre-processing.

Secondly, art majors have rich and diverse characteristics and advantages, and can promote rural revitalization through applications in rural cultural revitalization, environmental construction and planning and design of tourist attractions.

To sum up, the combination of intelligent data analysis and art majors can optimize the rural economic structure, improve the quality of life of rural residents and achieve the goal of rural revitalization.

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# ANALYSIS OF THE CONSTRUCTION PATH OF COMPREHENSIVE SERVICE PLATFORM FOR UNIVERSITY CONTINUING EDUCATION IN THE CONTEXT OF DATA VISUALIZATION

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## ABSTRACT

This paper firstly constructs a comprehensive platform for continuing education based on data visualization, and visualizes the design of school career data through data visualization layout algorithm. Secondly, the implementation of the data visualization platform in the process of continuing education is discussed, including the implementation of visualization of learning process evaluation and visualization of individual student evaluation. The results show that the learning cognitive evaluation dimension in the process evaluation can understand the teaching goal achievement degree of 0.65. The research of this paper has certain guiding significance and practical value for promoting the development of intelligence and informationization of college continuing education and improving the teaching quality and service level of college continuing education.

## KEYWORDS

Data visualization; Continuing education; Layout algorithm; Academic career data; Individual evaluation

## 1. INTRODUCTION

Continuing education in colleges and universities is a form of education established to meet the needs of various sectors of society for continuous updating of talents and strengthening of their own learning, so that working people can receive a certain degree of continuing education [1-2]. The construction of the service platform is one of the necessary conditions for the development of continuing education in universities [3-4]. With the continuous data visualization technology

development and application, how to give full play to the advantages of data visualization technology in the construction of college continuing education service platform and improve the efficiency and effectiveness of the service platform has become one of the focal points of

research [5]. Data visualization technology has been widely used in many fields, and its application in education and teaching has also been gradually paid attention to [6]. Relevant studies have shown that data visualization has a wide application prospect in learning effect assessment, student behavior pattern identification, and student feedback [7]. In the construction of comprehensive service platform for university continuing education, the service platform based on data visualization can improve the efficiency and quality of services, optimize the utilization and distribution of resources, and better promote the learning and development of students [8-9].

## 2. A COMPREHENSIVE PLATFORM FOR CONTINUING EDUCATION BASED ON DATA VISUALIZATION

### 2.1. DATA VISUALIZATION LAYOUT ALGORITHM

The main task of data visualization is to display complex data relationships visually through a concise and intuitive form. The force-guided layout algorithm is an important underlying algorithm for the representation of network data in information visualization and is applicable to most network data sets. Using data nodes as charges and edges as springs with attractive and repulsive forces between every two data nodes, repulsive forces are simultaneously calculated for each data node and attractive forces are calculated for each neighboring node. The repulsive and attractive forces of the data nodes are summed and their sums are stored in temporary variables for updating the positions of the nodes. By the action of attractive and repulsive forces, each data node keeps moving until the system is balanced.

#### (1) Calculation of attraction force

The attractive force is the force between two adjacent data nodes in the spring simulation system, so that these two adjacent nodes are closer together. The gravitational force between the adjacent data node  $a$  and data node  $b$  is proportional to the distance between data node  $a$  data node  $b$ , denoted by  $F$  the gravitational force between  $a$  and  $b$ , which is calculated as

$$F(a,b) = K(x_a - x_b) \quad (1)$$

where  $x_a - x_b$  is the distance between node  $a$  and node  $b$ , and  $K$  is defined as

$$K = C \sqrt{\frac{s}{|x|}} \quad (2)$$

where  $s$  is the area of the layout area and  $C$  is a constant.

#### (2) Calculation of repulsive force

The repulsive force is a repulsive force between every two data nodes, and its repulsive force is inversely proportional to the square of the distance between the two data nodes, which is calculated by the formula

$$F(a,b) = \frac{k}{|x_a - x_b|^2} \quad (3)$$

#### (3) Update the node position force

The guiding layout derives the velocity of the node by calculating the forces on each node, and the distance the node needs to move is calculated by multiplying the node velocity by the step size. In the KK algorithm, instead of considering repulsive and attractive forces separately,

an energy function minimization model is created. The model is expressed as the two data nodes have repulsive force when the Euclidean distance between them is closer than the theoretical distance. Otherwise, the two data nodes are attracted to each other. Its energy function  $E$  is calculated as

$$E = \sum_{a=1}^{n-1} \sum_{b=a+1}^n \frac{1}{2} k_{a,b} (|q_a - q_b| - s_{i,j})^2 \quad (4)$$

where  $k_{a,b}$  is the elasticity coefficient of nodes  $a$  and  $b$ .  $s_{i,j}$  is the ideal length of the spring, and  $|q_a - q_b|$  is the Euclidean distance of nodes  $a$  and  $b$ .

## 2.2. VISUALIZATION DESIGN OF ACADEMIC CAREER DATA

Data visualization uses computer graphics to display data in the form of graphs or tables on the page, including the processing of interactions, the essence of which is to convert data into visual codes, visual codes are mainly divided into visual markers and visual channels, where the visual channels are divided into location variables and visual variables, the basic visual variables are mainly color, size, texture, direction, shape, brightness, location variables that is the two-dimensional plane of the horizontal and vertical coordinate system, these seven basic variables and the combination of points, lines and surfaces will constitute a very large number of visual channel combinations, too many visual channels will make the visualization effect becomes confusing, the data become difficult to understand.

In this paper, career planning is an important research direction in the field of continuing education, and the construction of a career planning visualization platform contains a large amount of heterogeneous data. The integration of heterogeneous data provides the data basis for the visualization of the platform, and the information behind the data is clearly and effectively expressed through graphical means. By providing better visual analysis, the platform helps people to quickly access and efficiently interpret visual information, and better gain insight and decision from complex data information in the field of study career through an interactive way.

The visualization process of school career data for continuing education is shown in Figure 1. The most important point in the visualization construction process is visual mapping. The data in each dimension of the database is mapped into a graphical structure of people's visual sense. Through the visualization of the graphical structure, the data can fully express its characteristics and be easily perceived and understood by people, helping them to quickly analyze and gain insight into the value of the data. Therefore, what kind of visual coding form to display and whether the layout of the chart is reasonable are the keys to achieve effective visual mapping in the process of visualization construction.

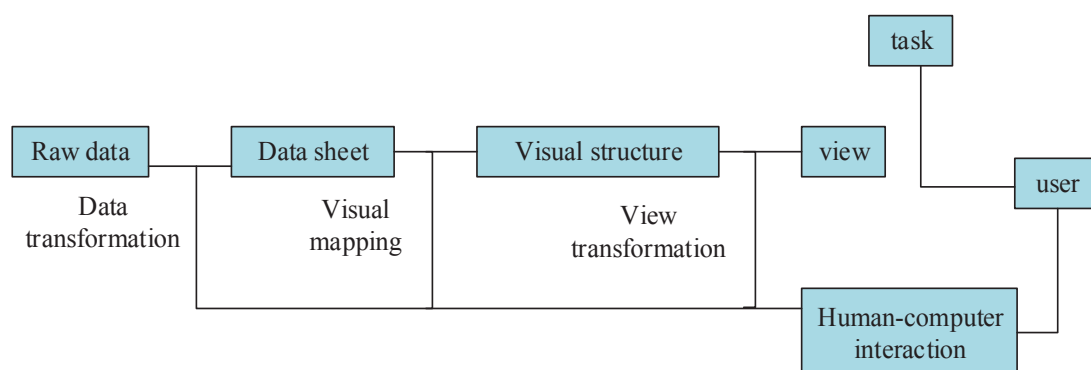


Figure 1. Data visualisation flowchart

### 3. IMPLEMENTATION OF DATA VISUALIZATION PLATFORM IN THE PROCESS OF CONTINUING EDUCATION

Perform statistical analysis of data in the Hive environment, using SQL-like statements and data functions to complete statistical analysis. Or connect to MySQL and query and obtain data through SQL statements according to visualization requirements. The display of data analysis results can be done by using EChart or custom visualization algorithms to draw line graphs, bar graphs or hotspot graphs and other visual graphics as needed.

#### 3.1. IMPLEMENTATION OF VISUALIZATION OF LEARNING PROCESS EVALUATION

Teachers design teaching tasks or activities to accomplish the teaching objectives, and the learning cognitive assessment dimension in the process evaluation provides insight into the achievement of teaching objectives, and the visualization results in the learning process evaluation provides insight into students' performance in classroom learning. Learning cognition-high level thinking evaluation corresponds to homework activities, and low level thinking corresponds to quiz activities. Learning attitude evaluation corresponds to attendance and check-in activities, and learning style evaluation corresponds to resource learning, brainstorming, and discussion activities. The participation rate or score rate of students completing teaching activities is calculated and displayed visually as a ring chart to understand the achievement of teaching objectives and student learning as shown in Figure 2.

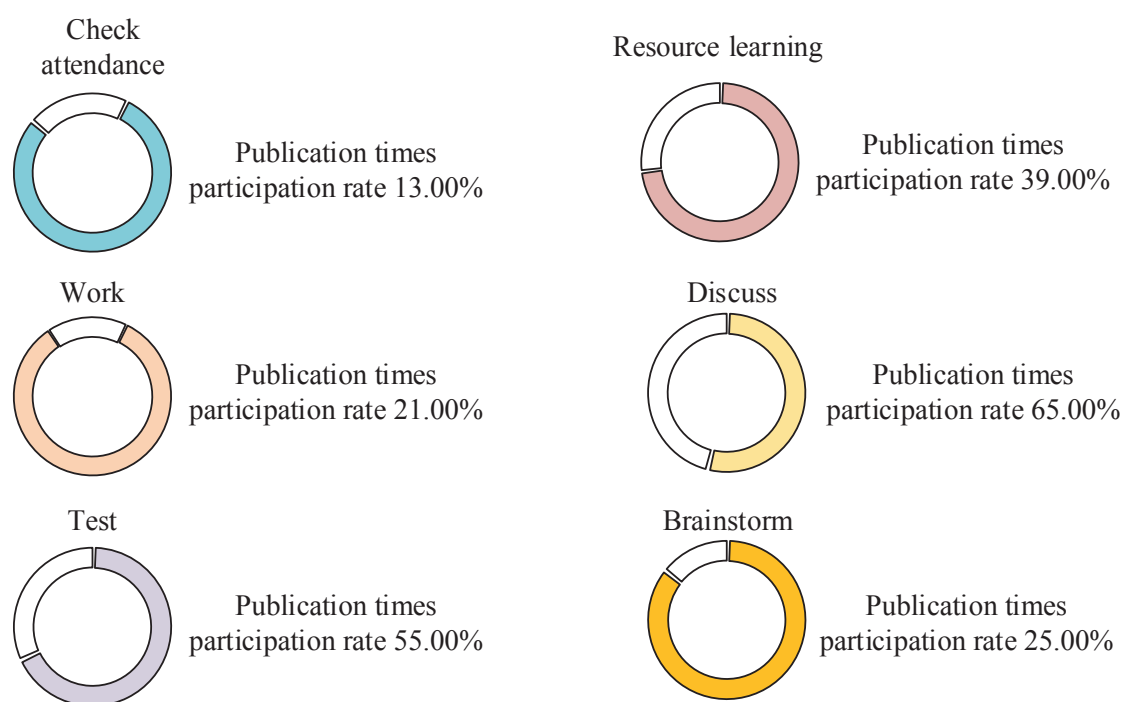
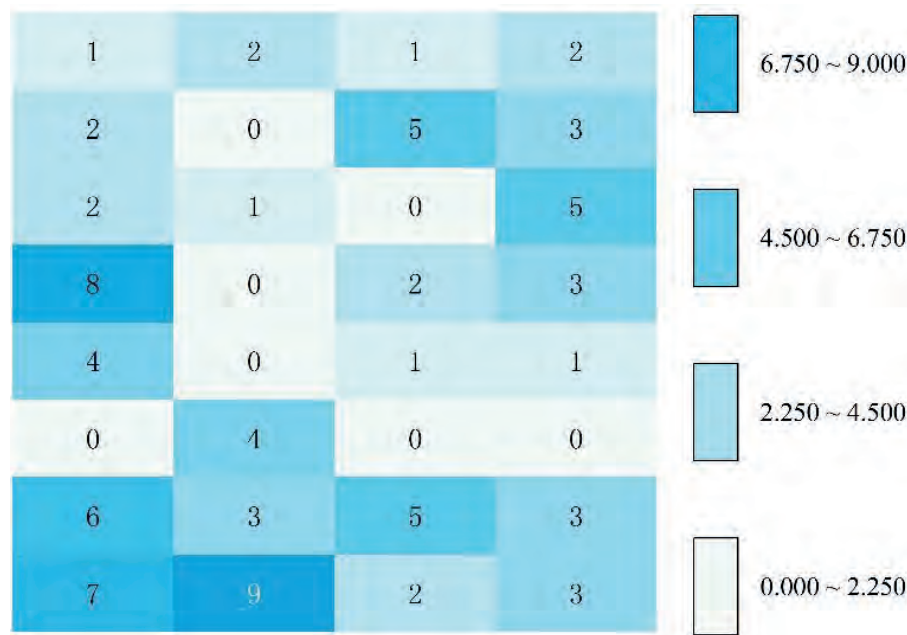


Figure 2. Visualization of learning process evaluation

#### 3.2. IMPLEMENTATION OF INDIVIDUAL STUDENT EVALUATION VISUALIZATION

The classroom teaching process evaluation is mainly designed to evaluate the learning behavior of students' performance in classroom teaching, and to count and display the overall situation of students, which can facilitate teachers to view the general situation of the current teaching class and have a comprehensive understanding of continuing education students. For example, through the heat map of professional learning ability evaluation, we can understand the class prerequisite courses, the number of failed courses, the number of failed courses, and the score distribution of each course, and understand the learning situation of the class in general as shown in Figure 3.



**Figure 3.** Heat map of professional learning ability

#### 4. CONCLUSION

The purpose of this paper is to investigate the construction path of a comprehensive service platform for continuing education in colleges and universities based on data visualization technology. During the research, we found that data visualization technology can help improve the efficiency and effectiveness of the college continuing education service platform, and can enable students to better understand their learning status and discover their strengths and weaknesses, so that they can better develop their personal learning plans and improve their learning effects. In this paper, we propose a data visualization layout algorithm and a visualization design of learning data to optimize the layout and design of the service platform. In the implementation, we propose two implementation methods, learning process evaluation visualization and individual student evaluation visualization. The visualization of learning process evaluation aims to help students better grasp the information of learning progress and class attendance, while the visualization of individual student evaluation helps students discover their own learning status and evaluate their learning outcomes.

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# RESEARCH ON THE APPLICATION OF IMPROVED ABC IN COLD CHAIN LOW CARBON LOGISTICS PATH PLANNING

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## ABSTRACT

This paper takes B2B cold chain distribution between single distribution center and customer point as the research object, selects ABC algorithm as the base algorithm for solving the model, combines the characteristics of cold chain logistics, introduces flower fragrance mechanism and concentration adjustment mechanism of artificial immune algorithm to improve ABC algorithm for the shortcomings of ABC algorithm, and applies the improved ABC algorithm to solve the model. The results show that the BABC algorithm reduces the unnecessary crossings of distribution paths when solving the cold chain low carbon logistics distribution path optimization model, thus allowing the total cost to be reduced by 0.23. It shows that the research of this paper fits the actual vehicle path optimization model and provides a more reliable distribution solution for the enterprise cold chain logistics transportation.

## KEYWORDS

B2B cold chain; ABC algorithm; Cold chain logistics; Floral fragrance mechanism; Immune algorithm; Path optimization

## 1. INTRODUCTION

With the development of social economy and the continuous improvement of people's quality of fresh food, low-carbon and efficient transportation mode in cold chain logistics is increasingly becoming a new research hotspot [1-2]. Path planning is one of the key issues in cold chain low carbon logistics [3]. As one of the most fundamental and critical issues in the field of transportation, path planning has long attracted extensive attention from scholars [4]. ABC method, as an improved costing method, has been widely applied in the field of transportation [5-6]. Related studies have shown that some scholars have designed an improved genetic algorithm with multigenerational competition to optimize the cold chain distribution problem, and the effectiveness of the improved algorithm has been verified by arithmetic examples, and satisfactory results have been achieved [7]. Based on the requirement of service time for cold chain products, the idea of converting the distribution time

between logistics nodes into service radius was proposed to establish the distribution model with the lowest cost considering each network node [8]. In this paper, ABC costing method and path planning are combined and improved ABC method is applied for path planning to achieve cost optimization in cold chain low carbon logistics transportation.

## 2. APPLICATION OF IMPROVED ARTIFICIAL BEE COLONY (ABC) ALGORITHM IN COLD CHAIN LOGISTICS

### 2.1. COLD CHAIN LOGISTICS

#### 2.1.1. APPLICABLE OBJECTS AND CLASSIFICATION OF COLD CHAIN LOGISTICS

The products transported by cold chain logistics are mainly those that are easily affected by the external environment and can be roughly divided into the following three categories as shown in Table 1.

**Table 1.** Cold chain logistics product classification

Product nature	example
Pharmaceutical cold chain	Vaccines, blood products, plasma substitutes, etc
Food cold chain logistics	Meat, eggs, fruit, vegetables, seafood, etc
	Aquatic product processing, slaughter and meat processing, etc
	Frozen food, edible ice, canned, frozen food, etc
Other cold chain logistics	Plant cold chain products, flowers, soft drinks, etc

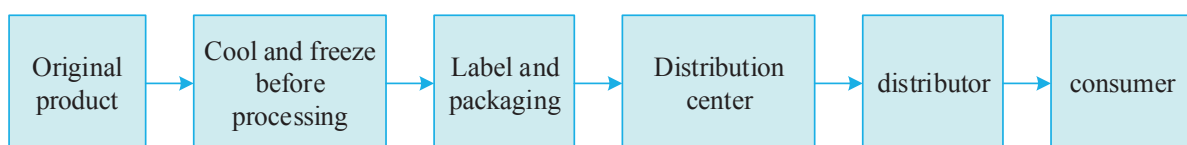
The cold chain logistics products are different and the required cold chain temperature is also different. The classification of cold chain logistics according to the storage temperature zone is shown in Table 2.

**Table 2.** Cold chain logistics storage temperature zone classification

Temperature layer	Temperature zone	Storable product
Ultra-low temperature storage	<-50°C	Vaccines, reagents, plasma, etc
Frozen storage	-20°C-18°C	Ice cream, egg products, cream, etc
Ice temperature storage	-2°C-2°C	Seafood products, fruit juices, etc
refrigerate	2°C-10°C	Medicine, vegetables, bread, yogurt, etc
Low temperature refrigeration	10°C-25°C	Fruit wine, fructose, cosmetics, etc

#### 2.1.2. COMPOSITION OF COLD CHAIN LOGISTICS

Cold chain logistics is a system project, involving all aspects of the product from production to consumption. Usually cold chain logistics products in the whole circulation process, need to go through the production of products, cold chain logistics distribution center, product distributors, and finally to consumers, in all these processes need to be realized in the low-temperature distribution process as shown in Figure 1.



**Figure 1.** Flow chart of cold chain logistics

### (1) Raw product

After output at the place of production, it needs to be cooled or various operations are carried out in a low temperature environment.

### (2) Low-temperature storage

After production at the production site, it needs to be stored in a low-temperature environment to ensure quality.

(3) The most important reason for the decline in the quality of transport and distribution of food is the fluctuation of temperature, in the refrigerated transport link, both to maintain low temperature and to maintain temperature stability.

## 2.2. IMPROVED ARTIFICIAL BEE COLONY (ABC) ALGORITHM

The advantages of ABC algorithm are its few parameters, simple calculation and easy implementation, but the disadvantages also make it difficult to adapt to too many constraints, etc. in the process of solving the actual cold chain logistics vehicle path optimization model. Therefore, this chapter improves the initialization population, honey source search strategy and honey source selection strategy of the artificial bee colony algorithm by fusing the firefly algorithm and the artificial immune algorithm, and increases the local optimization strategy to improve the solution accuracy.

### 2.2.1. HONEY SOURCE SEARCH STRATEGY

Based on the idea of attracting other fireflies by the intensity of light in the firefly algorithm, the improved artificial bee colony algorithm introduces a floral fragrance mechanism, where the nectar source attracts the hired bee by its floral fragrance. As the distance between the nectar source and the hired bee increases, the concentration of floral fragrance becomes lighter, then the attraction decreases, then the possibility of the hired bee finding the nectar source is low.

The floral concentration of the nectar source itself is represented by  $\beta_0$ . Following the formula of the firefly algorithm for calculating attractiveness, the artificial bee colony algorithm is improved to calculate floral concentration, i.e. attractiveness  $\beta_{ij}$ , as follows:

$$\beta_{i,k} = \beta_0 e^{-\gamma(x_{i,j} - x_{k,j})^2} \quad i, k = 1, 2, \dots, m; j = 1, 2, \dots, n \quad (1)$$

Where,  $\beta_0$  indicates the nectar source's own floral concentration, which generally takes the value of 1.  $\gamma$  is the coefficient of decreasing floral concentration with distance and is a constant. The current optimal adaptation value is added to the updated equation for the hired bee to find a new nectar source. The improved search equation, then, is:

$$v'_{i,j} = x_{i,j} + \beta_{i,best} (x_{best,j} - x_{i,j}) + \alpha (x_{c1,j} - x_{c2,j}) \quad (2)$$

Where  $j \in (1, 2, \dots, n)$  and  $c1, c2 \in (1, 2, \dots, m)$  are randomly selected indices, and  $\beta_{i,best}$  indicates the floral concentration of the nectar source with the optimal adaptation value drifting to the nectar source where the hired bee is currently located.  $(x_{best,j} - x_{i,j})$  is the random interference term introduced to prevent the hired bee from falling into a local optimum.  $\alpha$  is the step size factor, which is a constant between [0,1] and is generally a random number distributed according to Gaussian.

### 2.2.2. HONEY SOURCE UPDATE STRATEGY

Artificial immunity algorithm is an optimized search process implemented by imitating the immune mechanism of the biological immune system. In this process, the antibody level is maintained at the most appropriate level by using the comprehensive evaluation method of concentration and affinity through the immune regulation mechanism. To solve the local optimum problem of the artificial bee colony algorithm, the improved artificial bee colony algorithm introduces the concentration evaluation mechanism and incentive degree calculation mechanism of the artificial immune algorithm, which prevents falling into local optimum by calculating the concentration of nectar sources as well as the incentive degree, selecting new nectar sources based on the probability calculated from the incentive degree, suppressing nectar sources with high density, and retaining nectar sources with small concentration but potential.

According to the concentration calculation of the artificial immune algorithm, the affinity of the nectar source is calculated first, and the improved artificial bee colony algorithm takes the nectar source adaptation value as the affinity between the nectar source and the objective function. Then the affinity between the nectar source and the objective function is expressed, as:

$$Q = \{f_1, f_2, \dots, f_m\} \quad (3)$$

The calculation of the affinity between the nectar source and the honey source is then, as:

$$q_{i,j} = \begin{cases} 1, & f_i = f_j \\ \frac{1}{1 + |f_i - f_j|}, & \text{else} \end{cases} \quad (4)$$

The concentration of nectar source  $X_i$  in the current nectar collection  $den_i$ , calculated as:

$$den_i = \frac{1}{N} \sum_{j=1}^n q_{i,j}, i=1, 2, \dots, m \quad (5)$$

It can be seen that when there are more nectar sources with high affinity to nectar source  $X_i$ , the concentration of nectar source  $X_i$  is greater. According to the antibody excitation degree mechanism in the artificial immunization algorithm, the calculation formula for the nectar source  $X_i$  excitation degree  $act_i$  is obtained by considering the affinity degree and nectar source concentration together as:

$$act_i = \sum_{j=1}^n q_{i,j} \times e^{-\frac{den_i}{\mu}} \quad (6)$$

Where,  $\mu$  denotes the regulator,  $\mu \geq 1$ . In the excitation function, nectar sources with high affinity and low density are able to obtain larger excitation values.

### 3. ANALYSIS OF THE OPTIMIZATION RESULTS OF IMPROVED ABC IN THE DISTRIBUTION PATH

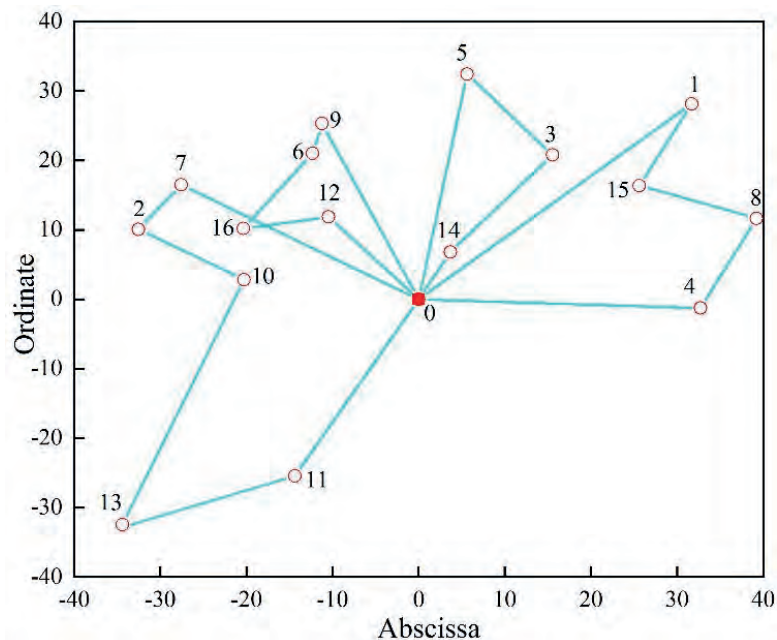
In this paper, we assume that the maximum load capacity of the distribution vehicle is 200, the fixed cost of the vehicle is  $f_k = 500$ . The distribution cost is  $c_{ij} = 500$  yuan/km, the time of each vehicle in the service of each consumer is 10 minutes, the average driving speed of

the distribution vehicle is  $v = 50\text{Km}/h$ , and the carbon tax due to carbon emission is  $P_c = 30$  yuan/g. The distribution route of the basic artificial bee colony (BABC) algorithm to solve the cold chain low carbon logistics distribution path optimization model is shown in Table 3.

**Table 3.** Routes obtained by ABC

vehicle	Distribution route
1	0(1(5(11(7(0
2	0(6(9(0
3	0(10(2(16(15(13(0
4	0(4(3(12(8(14(0

It can be seen that the distribution center needs to send out 4 vehicles to complete the distribution task to 16 consumers, vehicle 1 serves 1, 5, 11, 7, vehicle 2 serves 6, 9, vehicle 3 serves 10, 2, 16, 15, 13, vehicle 4 serves 4, 3, 12, 8, 14, and all vehicles return to the distribution center after completing the distribution. Figure 2 shows the distribution path diagram of the BABC algorithm solving the cold chain low carbon logistics distribution path optimization model.



**Figure 2.** Distribution path diagram of BABC

It can be seen that since the BABC algorithm reduces the unnecessary intersection of distribution paths in solving the cold chain low carbon logistics distribution path optimization model, the total distance of the distribution paths is shorter, which reduces the total cost by 0.23. Comparing the convergence process diagram of ABC algorithm and BABC algorithm, it can be seen that BABC converges faster than ABC algorithm in solving the cold chain low carbon logistics distribution path optimization model, the number of generations of convergence of BABC algorithm is 40 and the number of generations of convergence of ABC algorithm is 80. The number of generations of convergence of the BABC algorithm is 40 and the number of generations of convergence of the ABC algorithm is 80, indicating that the BABC algorithm converges faster and the solution effect is better.

#### 4. CONCLUSION

With the accelerated development of the national economy, the demand for fresh agricultural products is gradually increasing in the proportion of people's daily life. And the

special nature of agricultural products makes it necessary to rely on the special transportation method of cold chain for distribution. The ABC algorithm is chosen as the base algorithm for solving the model of this paper, and the initial solution generation strategy is improved for the problem of discontinuity in the cold chain logistics vehicle path optimization model. In addition, in order to solve the shortcomings of ABC algorithm such as low solution accuracy and easy to fall into local optimum, the flower fragrance mechanism and concentration adjustment mechanism are introduced to improve the solution accuracy of ABC algorithm, and at the same time, the random perturbation allows the improved ABC algorithm to overcome the local optimum and strengthen the global optimization seeking ability.

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# ANALYSIS OF THE EFFICIENCY AND POTENTIAL OF CROSS-BORDER E-COMMERCE TRADE OF INDEPENDENT BRANDS BY APPLYING NONLINEAR PROGRAMMING

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## ABSTRACT

This paper firstly constructs the application of nonlinear programming in cross-border e-commerce trade, especially the nonlinear programming method based on the linear inequality constraint. Secondly, the efficiency of self-branded cross-border e-commerce and the potential of self-branded cross-border e-commerce trade are described. Finally, a nonlinear programming model is established, and the model is solved and simulated using data collection and analysis methods to obtain the optimal solution and conduct efficiency and potential analysis. The results show that the accuracy check results of the trade size potential prediction using the nonlinear programming model are  $P=0.92$  and  $c=0.35$ , which meet the requirements of trade potential prediction on accuracy. This paper helps to promote the development of self-owned brand cross-border e-commerce and improve the competitiveness and market share of self-owned brand cross-border e-commerce.

## KEYWORDS

Nonlinear programming; Cross-border e-commerce; Inequality constraint; Self-branding; Data collection; Trade potential

## 1. INTRODUCTION

With the continuous globalization process, cross-border e-commerce trade has gradually become an important part of the world economic development [1-2]. Self-branding is the key point of competition among enterprises in cross-border e-commerce trade [3]. And how to improve the efficiency and explore the potential of cross-border e-commerce trade of self-owned brands has become a hot research topic in the industry [4-5]. Nonlinear programming is an important method in operations research, which has the advantages of flexibility and efficiency in solving complex problems and optimizing decisions, and has been widely used in the analysis of efficiency and potential of cross-border e-commerce trade [6-7]. Relevant studies have shown that the application of nonlinear programming can effectively analyze the impact of factors such as product selection, marketing strategy, and logistics strategy on efficiency and potential in cross-border e-commerce trade, optimize sales patterns, and improve trade efficiency and potential [8-9]. In this paper, we first establish a nonlinear programming model for cross-border e-commerce trade of independent brands and choose a suitable solution method for model solving. In the process of model solving, the efficiency and potential of cross-border e-commerce trade of independent brands are analyzed according to the obtained optimal solutions.



## 2. APPLICATION OF NONLINEAR PROGRAMMING IN CROSS-BORDER E-COMMERCE TRADE

### 2.1. NONLINEAR PROGRAMMING METHODS BASED ON LINEAR INEQUALITY CONSTRAINTS

The main consideration in solving the method of nonlinear programming problem with mixed constraints is to solve the objective function by dimensionality reduction to find out a point as the initial point, and then operate with the method of filling function. In this paper, we use the dimensionality reduction method to find out the initial point, but some operations are also performed on the constraints, which has better coupling reduction for the use of the later improved sliding algorithm.

For the nonlinear programming with linear inequality constraint, as

$$\begin{aligned} \min f(x_1, x_2, \dots, x_n) \\ \text{s.t. } Ax_i \leq b_i \end{aligned} \quad (1)$$

where  $x_i \in R^n$ ,  $b_i = (b_1, b_2, \dots, b_m)^T$  are real constants,  $(m \geq n)$ ,  $b_i \in R^+$ ,  $A = (a_{ij})_{m \times n}$ .  $f$  is a general nonlinear multiobjective function, from the solution of the continuous derivable higher functions, the most important thing that can be thought of is to derive the desirable region of the extreme value point according to the constraints, which is defined as the acceptable domain.

The sliding algorithm is a method proposed by scholars to solve the global optimum of equation-constrained linear programming, in which it is considered that finding the minimum value is the fastest to get the minimum value only for a new point after gravity descent of a point in the region. So for the points that can gravity fall will be gravity fall in the region, so that the new point is obtained quickly.

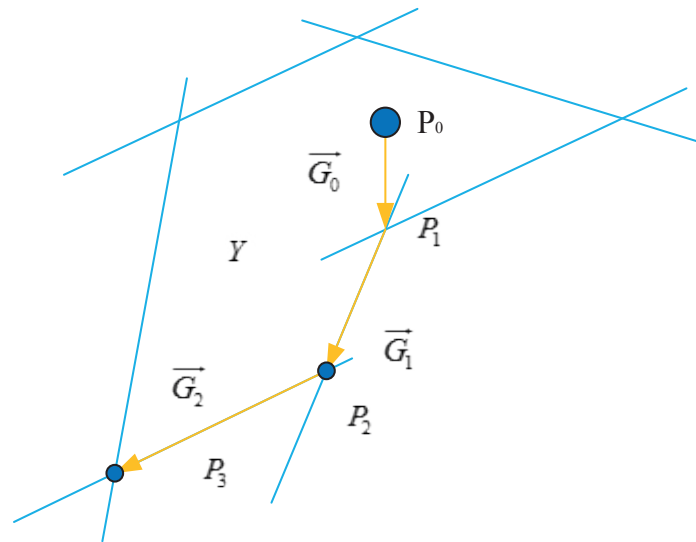
A vector sliding example diagram is shown in Figure 1, in two dimensions, where each line represents the individual facets and from which a vector is taken as the basic interpretation. Other vectors of course have a similar improvement process, here starting at a random  $P_0$  inside the feasible domain  $Y$ . Starting from  $P_0$ , it tries to descend in the direction of  $G_0$  to form an improvement vector, at this point the descent is gravity descent, and gravity descent is the projection equation as

$$d \downarrow \alpha = d - [(d, \tau) / (\tau, \tau)]\tau \quad (2)$$

When it encounters the blocking surface during its descent it descends to:

$$P_1 = P_0 + t_{G_0}^- \quad (3)$$

This is sliding in the direction of  $t_{G_0}^-$ , which is the intersection of the descent line and the facet.



**Figure 1.** An example of vector sliding

## **2.2. CROSS-BORDER E-COMMERCE TRADE EFFICIENCY AND POTENTIAL**

### **2.2.1. SELF-BRANDED CROSS-BORDER E-COMMERCE EFFICIENCY**

And the cross-border e-commerce efficiency of autonomous brands refers to the ratio between the sales generated by autonomous brands on the cross-border e-commerce platform and the resources invested. Through the analysis of cross-border e-commerce efficiency of independent brands, we can understand the operation status and profitability of independent brands on cross-border e-commerce platforms. Commonly used indicators of cross-border e-commerce efficiency of independent brands include sales/capita, sales/advertising input, sales/logistics cost, etc.

### **2.2.2. POTENTIAL OF CROSS-BORDER E-COMMERCE TRADE OF INDEPENDENT BRANDS**

The development trend of cross-border e-commerce trade mainly presents the following aspects:

(1) The continuous emergence of cross-border e-commerce trade platforms. With the expansion of cross-border e-commerce trade market, more and more e-commerce platforms have entered the market, such as Amazon, eBay, Alibaba, etc.

(2) Diversification of cross-border e-commerce trade. In addition to the traditional B2C and B2B models, more and more platforms are trying C2C and O2O models.

(3) The intelligence and digitalization of cross-border e-commerce trade. With the continuous development of technology, cross-border e-commerce trade platforms have started to use artificial intelligence, data collection, cloud computing and other technologies to improve transaction efficiency and user experience.

To sum up, the cross-border e-commerce trade market will continue to maintain high growth in the future, and the development trend will be more diversified, intelligent and digital.

## **3. ANALYSIS OF CHINA'S CROSS-BORDER E-COMMERCE TRANSACTION SCALE AND POTENTIAL FORECAST RESULTS**

There is also a certain degree of uncertainty in China's independent brand cross-border e-commerce exports, such as the influence of various policy and environmental factors, which just verifies the accuracy of nonlinear programming. Nonlinear programming model is a kind of prediction model with both locally known and locally unknown. Before developing a forecast,

data collection must be done cumulatively to generate new data and the resulting relationships between the data. Then a linear differential equation is constructed and the coefficients are obtained by the least squares method, and the corresponding forecasting model is further derived from this method to obtain the corresponding forecasting results. The following data on the scale of cross-border e-commerce export transactions of China's own brands from 2012 to 2021 are used as the base data for forecasting.

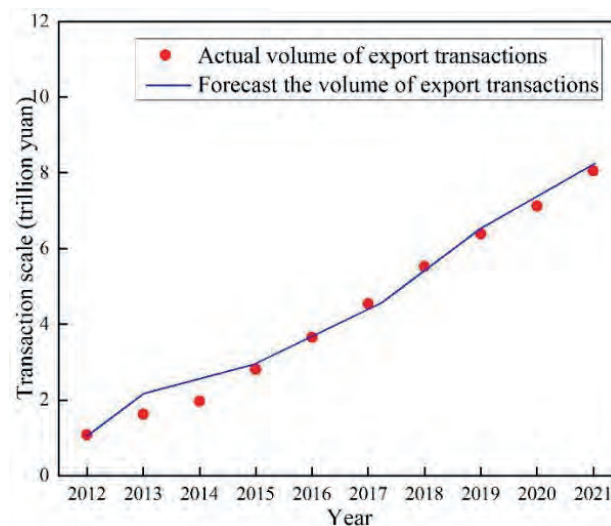
**Table 1.** Scale of China's cross-border e-commerce export transactions from 2012 to 2022

Year	Transaction scale (trillion yuan)	Year	Transaction scale (trillion yuan)
2012	1.11	2017	4.66
2013	1.56	2018	5.38
2014	1.83	2019	6.22
2015	2.12	2020	7.31
2016	3.53	2021	8.08

Using the above data of China's cross-border e-commerce export transaction scale from 2012 to 2021 as, the base data for this experiment, a GM(1,1) prediction model is established. The non-linear programming model for predicting the potential of cross-border e-commerce transaction size for autonomous brands is

$$\begin{aligned}
 x^{(0)} &= (x_{(1)}^{(0)}, x_{(2)}^{(0)}, \dots, x_{(n)}^{(0)}) \\
 &= (1.11, 1.56, 1.83, 2.12, 3.53, 4.66, 5.38, 6.22, 7.31, 8.08)
 \end{aligned}
 \tag{4}$$

The predicted data of cross-border e-commerce export transaction scale potential of independent brands are collected and imported into MATLAB program to get the prediction result of cross-border e-commerce export transaction scale, and the comparison of the predicted value and the real value of cross-border e-commerce export ease scale potential of independent brands in China from 2012 to 2021 is shown in Figure 2.



**Figure 2.** Potential prediction results of China's cross-border e-commerce export transaction scale

From the above figure, the predicted pre-real value of China's own brand cross-border e-commerce export transaction scale potential from 2012-2021 is compared with the results shown in Table 2.

**Table 2.** Comparison result between predicted value and true value of transaction size potential

Year	Transaction scale	Predicted value	Difference
2012	1.11	1.11	0
2013	1.56	1.63	-0.07
2014	1.83	1.96	-0.13
2015	2.12	2.10	0.02
2016	3.53	3.62	-0.09
2017	4.66	4.61	0.05
2018	5.38	5.25	0.13
2019	6.22	6.17	0.05
2020	7.31	7.41	-0.1
2021	8.08	8.05	0.03

It can be found that the accuracy check results of the prediction of China's autonomous cross-border e-commerce export transaction size potential obtained by using the nonlinear programming model are,  $p = 0.92$ ,  $c = 0.34$ , which meet the requirements of trade potential prediction on accuracy.

#### 4. CONCLUSION

This paper applies a nonlinear programming approach to analyze the efficiency and potential of cross-border e-commerce trade of independent brands. The research results show that the accuracy check results of the trade size potential prediction using nonlinear programming model are  $P=0.92$  and  $c=0.35$ , which meet the requirements of trade potential prediction for accuracy. By optimizing factors such as product selection, marketing strategy and logistics strategy, the efficiency and potential of cross-border e-commerce trade of independent brands can be improved.

The nonlinear programming model proposed in this paper has certain feasibility and effectiveness, and has achieved better results and outcomes in practical applications. The research results help to promote the development of cross-border e-commerce trade, improve the economic and social benefits of enterprises, and provide reference and decision support for enterprises.

#### FUNDING

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# AEEXPLORING THE TRANSFORMATION STRATEGY OF COLLEGE STUDENTS' IDEOLOGICAL AND POLITICAL EDUCATION IN THE ERA OF BIG DATA

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## ABSTRACT

The first part of this essay examines the three dimensions of policy-led, demand-driven, and technology-enabled evolution of the political and ideological studies of college students. Second, it demonstrates how variation in rebuilding the line is one of the primary ways in which the ideological and political education system has undergone a digital transition. To complete the digital transformation of college students' ideological and political education, a tailored suggestion of learning routes based on learner profiles is suggested. The development of a big data education platform, enhancement of participants' digital technology application skills, and innovation of the complete big data technology application mechanism are all required for its implementation strategy. This can better support the political and ideological studies of college students as it transitions to the digital age and offer top-notch technological skills for societal advancement.

## KEYWORDS

Ideological and political education; Digitalization; Application strategies; Learner profiling; Personalized recommendation

## 1. INTRODUCTION

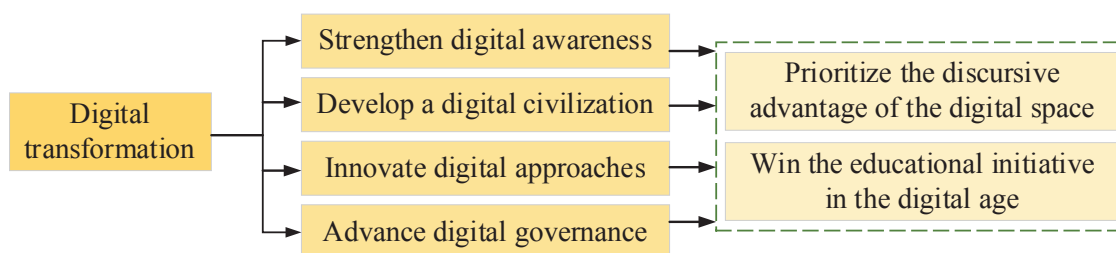
It is inevitable that ideological and political education will undergo a digital metamorphosis as a result of the big data era's emergence of digital technology, which is transforming social structures with its relentless and potent force [1-2]. As Chinese education enters a new stage of digital transition, new growth opportunities for ideological and political learning have emerged [3-4]. However, at the moment, when academics talk about the digital transformation of ideological and political education, they still veer off topic when discussing issues like its concept, value, and meaning and are unclear about structural issues like the process and transformation mechanism [5-6]. Determining "what to transform," "how to transform," "who to transform," and "where to transform" are therefore vitally needed. To implement the digital change of ideological and political education, action plans must be provided, along with an overall and systemic action framework, clarification of the practical questions of "what to transform," "how to transform," "who to transform," and "where to transform" [7-9].

## 2. GENERATIVE MOTIVES OF DIGITAL DEVELOPMENT OF IDEOLOGICAL AND POLITICAL EDUCATION

### 2.1. POLICY LEADERSHIP: DIGITAL TRANSFORMATION IS A STRATEGIC REQUIREMENT

Scientific grasp of digital development trends is a prerequisite for promoting the construction

of digital China and a guarantee for realizing digital civilization for the benefit of the people. Figure 1 illustrates how digital technology is transforming ideological and political education in a way that is empowering.

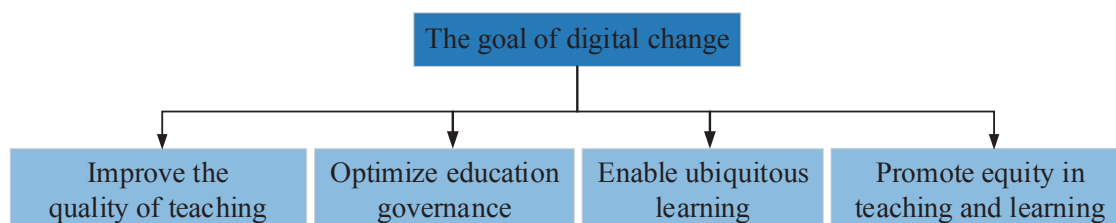


**Figure 1.** The enabling role of digital technology

Deeply pushing the digital evolution of education seeks to advance both the excellent standards in education and further improve the quality of education. Ideological and political instruction has demonstrated considerable development momentum in the context of the larger educational digital revolution under the multifaceted influences of policy-led, demand-driven, and technology-enabled variables.

## 2.2. DEMAND-DRIVEN: HIGH-QUALITY DEVELOPMENT IS THE GOAL OF CREATING CHANGE

“The digital transformation of education reflects a demand-driven tendency of digital education paradigm leap.” This demand is concentrated in multiple dimensions such as the development of information society, national digital construction, education transformation goals, student growth rules, and curriculum innovation opportunities, etc. The digital growth of political and ideological training is gaining traction for a variety of reasons. In addition to being a method of thinking and a strategy, digital transformation is also seen as a technology revolution and a reform objective. Figure 2 depicts the objective of bringing about change in the digital growth of ideological and political education.



**Figure 2.** The goal of digital change

Ideological and political education continues to be the "lifeline" of schooling in the process of comprehensively constructing a modern socialist nation and comprehensively advancing the great rejuvenation of the Chinese people, and ideological and political theory courses continue to be the key courses for carrying out the crucial task of developing moral character.

## 2.3. TECHNOLOGY EMPOWERMENT: DIGITAL TECHNOLOGY OPENS UP SPACE FOR CREATIVE CHANGE

A broad category of digital technologies, such as big data, cloud computing, the Internet of Things, blockchain, artificial intelligence, and others, are referred to as "digital technology." Digital resources are represented by big data technology, digital devices are represented by cloud computing, digital transmission is represented by the Internet of Things, digital information is represented by blockchain, and digital intelligence is represented by artificial intelligence technology. The integration of different technologies with each other will break the traditional connection and power mode, realize the logic of three-dimensional, folding and

interactive architecture, and significantly improve the operation efficiency. Technology is a significant element behind the advancement of education. Digital change is the opportunity, digital thinking is the concept, and digital technology is the guarantee in the process of bringing about modifications to the digital growth of ideological and political education. This is also an example of the dimensional autonomy of digital technology for the growth of philosophical and political education.

### 3. MAIN FEATURES OF THE DIGITAL TRANSFORMATION OF IDEOLOGICAL AND POLITICAL EDUCATION

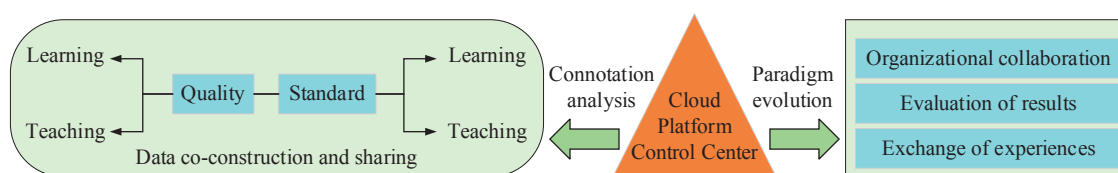
#### 3.1. DIVERSITY DRIVEN BY DIGITAL TECHNOLOGY

It is difficult to discuss the digital transformation of ideological and political education absent the thorough replacement, intervention, and integration of digital technology. The digital alteration of ideological and political education depends on technology. Technology will alter human beings' perceptions of themselves in a more profound way than just as a tool for them to influence the world and a force to further change of human social and economic structures. Technology's impact on ideological and political education will not only result in changes to the learning environment, but will also open up a wide range of teaching and learning opportunities that are not just restricted to human-to-human interactions. The use of technology to promote ideological and political education may be observed in all of the connections and procedures, from the digitalization of assets to the integration of data between divisions, from platform development to information sharing. Additionally, it completes the link between the physical and digital worlds in a variety of ways, and promotes the intelligent interaction between human → machine → object → environment.

#### 3.2. RECONFIGURABILITY OF THE COMBINATION OF ELEMENTS OF IDEOLOGICAL AND POLITICAL EDUCATION SYSTEM

In order to effectively use online resources for information in ideological and political education, system elements must be rebuilt in terms of goal logic, value logic, theoretical logic, and practical logic. This process is known as the digital evolution of ideological and political education. Numerous parts of political and ideological education are rebuilt as a result of digitization, particularly the flow and circulation of intellectual and political knowledge elements in educational activities, which can optimize the business logic, reconstruct the order of education, innovate the guided education scene, obtain the best education experience and achieve remarkable education results.

In order to fully reflect the cross-domain, cross-border, permeability, and connectivity of subject involvement and full collaboration in the course of the digital evolution of ideological and political education, it is necessary to effectively collaborate with a number of subjects. Figure 3 illustrates the interactive platform of several themes in the online evolution of political and ideological education.



**Figure 3.** Multi-subject interactive platform



## 4. THE APPLICATION STRATEGY OF BIG DATA TECHNOLOGY IN THE TRANSFORMATION OF IDEOLOGICAL AND POLITICAL EDUCATION

### 4.1. PERSONALIZED RECOMMENDATION OF LEARNING PATHS BASED ON LEARNER PORTRAITS

In philosophical and political digital learning structures and online learning environments, there are typically issues with personalized learning recommendations because instructional strategies and corresponding educational resources can hardly meet the needs of various student types and lack thorough processing of tense and uncertain information factors. This leads to low precision and poor efficacy of tailored suggestions. In this article, we propose a similarity calculation method that can effectively cater to the learning requirements of various student types and deal with temporal and uncertain information in a comprehensive manner. We also offer students personalized recommendation algorithms for efficient learning pathways and the best learning services in ideological and political education.

The PASCOLR algorithm's precise stages are as follows:

(1) Improvement of Pearson's similarity calculation method so that it can handle temporal information  $t$  and uncertainty information  $v$ . The improvement of the similarity calculation formula is

$$\beta = \delta \times P(\text{path}_i | (Eero\_Actu_{sti}, PATH_j)) \times \text{sim}(St\_char, Co\_char(\text{path}_i)) \quad (1)$$

where  $\delta = F(r, v, t)$  is a function of the combined treatment of confidence, reliability, and temporal information,  $P(\cdot)$  is a function of the probability of having the occurrence of adjustment  $\text{path}_i$  in the presence of problematic learning paths  $Eero\_Actu_{sti}$  as,  $\text{sim}(\cdot)$  is the similarity of the learner personality profile  $St\_char$  to the public learner profile  $Co\_char$  of the learning paths and associated learning services in the learning path network, i.e:

$$\text{sim}(x, y) = \frac{\sum x_i y_i - nxy}{(n-1)S_x S_y} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n \sum x_i^2 - (\sum x_i)^2} \sqrt{n \sum y_i^2 - (\sum y_i)^2}} \quad (2)$$

(2) Based on the learning path network  $E\_Net(KN_i)$ , learner characteristics data  $D_{cha}$ , problematic learning behaviors that affect learning quality  $Eero\_Actu_{sti}$ , learning environment  $Env_{sti}$  and learning resources  $Res_{sti}$ . The similarity between learner personality characteristics  $St\_char$  and public learner characteristics  $Co\_char$  of each learning path and related learning services in the learning path network is synthesized by applying the improved Pearson similarity calculation method.

(3) The calculation recommends personalized learning path  $\text{path}_{ind}$  and optimal learning service  $ser_{opt}$  for learners.

$$\text{path}_{ind} = \langle act_1 \rightarrow act_2 \rightarrow \dots \rightarrow act_n \rangle \quad (3)$$

$$ser_{opt} = \{pro(act_i)_1, pro(act_i)_2, \dots, pro(act_i)_n\} \quad (4)$$

## **4.2. ANALYSIS OF DIGITAL TRANSFORMATION STRATEGY OF IDEOLOGICAL AND POLITICAL EDUCATION IN THE ERA OF BIG DATA**

### **(1) Creating a big data platform for ideological and political education**

We develop a single platform for big data of ideological and political education that can gather, process, and analyze student information directly from the source. This platform includes both basic information on students and comprehensive information needed to get their consent. The basic situation and real-time trends of students can be grasped and guided in a timely manner, and the university's student big data research and management center can be established to further realize the excavation and use of data values.

### **(2) Improving the ability of ideological and political education participants to use big data**

The vital duty of developing top-notch talent falls on the shoulders of all teaching staff members on university campuses, including political and ideological education specialists in colleges and universities. The only method to encourage the utilization of big data technology by political and ideological education workers and subtly impact college students' big data awareness is to improve the big data understanding among ideological and politics education workers at colleges and universities.

### **(3) Innovation of comprehensive mechanism for the use of big data technology**

The key assurance for the utilization of big data in political and ideological education is a competent management system for big data. Control how data is used to control how each data collector and user behaves. A strong assurance for the use of big data in college students' ideological and political education is the development of big data monitoring mechanisms. Big data monitoring aims to successfully clean up the network environment and control how people utilize networks.

## **5. CONCLUSION**

This study examines the political and ideological learning guided by policy, fueled by demand, and facilitated by technology, starting with the generative reasons of the digital evolution of ideological and political education. A customized recommendation algorithm for learning routes of large data used to online political and ideological instruction is proposed after a discussion of the key components of digital ideological and political education. A big data system for ideological and political education has to be further developed, according to an analysis of the transformation strategy for ideological and political learning in the big data age. College students' ideological and political education will be transformed by employing a complete system for inventing the use of big data technology and the capacity of the participants to use big data.

## **FUNDING**

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# ANALYSIS OF THE INNOVATION PATH OF COLLEGE IDEOLOGICAL AND POLITICAL EDUCATION UNDER THE BACKGROUND OF BIG DATA

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## ABSTRACT

The peculiarities of ideological and political education in higher education institutions in the big data era are examined in this article along with the impact of big data on both of these academic disciplines. In order to address the problems of ideological and political education in higher education institutions, a quantitative analysis of the data is then conducted. This study takes into account participation, the expertise of the professors, and the methods of instruction. Last but not least, in order to further clarify the importance of big data in ideological and political education in higher education institutions, the Stacking integrated learning algorithm is chosen to create a prediction model of learner behavior and offer a creative approach for ideological and political education. Establishing a flawless network platform, fully integrating educational resources, enhancing instructors' abilities, and using an innovative educational model are all necessary for the advancement of ideological and political education in higher education institutions.

## KEYWORDS

Ideological and political education; Stacking integrated learning; Teaching vehicle; Innovative strategies; Learning behavior

## 1. INTRODUCTION

Since it is an essential practical experience for the development of college students themselves, the state and university systems have paid special attention to political and ideological learning in higher education institutions. Along with the rapid expansion of the big data age, ideological and political learning in higher education and colleges has also experienced major changes [1-3]. The value of big data as "the next natural resource of the human world" is incalculably great. Big data has rapidly grown around the world in recent years, and its extensive application has significantly changed how people create and live [4-6].

In order to deliver political and ideological learning for college students, complete ideological and political learning tasks, and achieve ideological and political learning goals, educators in higher education institutions must innovate. The big data era presents this opportunity [7-8]. Big data may successfully increase the amount of customization and informatization of education while also making it more scientific and efficient. This is especially true when used to ideological and political teaching techniques in higher education institutions [9-10].

## 2. THE CHARACTERISTICS AND INFLUENCE OF IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES IN THE ERA OF BIG DATA

## 2.1. CHARACTERISTICS OF IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES IN THE ERA OF BIG DATA

Big data may support instructors by enhancing the content of their lesson plans and by giving them access to more educational materials, according to the ideological and political learning activity being done in higher education institutions against the backdrop of the big data age. Figure 1 illustrates the fundamental elements of ideological and political learning for higher education in the age of big data.

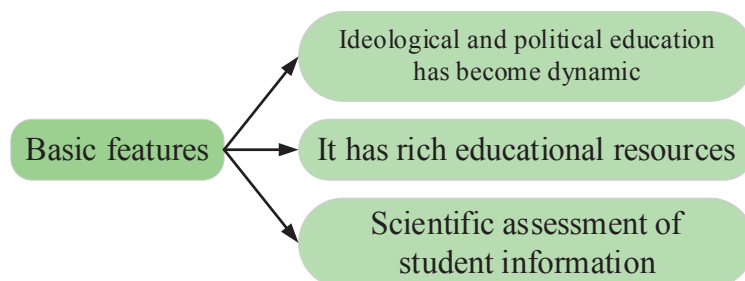


Figure 1. Basic features

Big data technology can also fully understand the philosophical dynamics and behavioral patterns of students while carrying out political and ideological learning activities at higher education institutions, providing a foundation for reference when developing lesson plans.

## 2.2. IMPACT OF BIG DATA ERA ON IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES

The big data age has had a favorable effect on political and ideological learning. The majority of judgments may now be made through data analysis, which has replaced the practice of relying on experience to guide judgment. As a result, decisions are now more precise and scientific. Big data analysis is a tool that higher education institutions may use to make decisions about education. Ideological and political learning may be converted into a quantitative presentation by creating a skilled and efficient data platform.

While the emergence of the big data age offers many advantages for the political and ideological learning of students, there are some negatives as well, with the impact on students' ideologies being the most important. The digital era is increasing the amount of information that children learn, and the collision of many different cultures and ideologies will make ideological and political teaching more difficult.

## 3. PROBLEMS OF IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES IN THE ERA OF BIG DATA

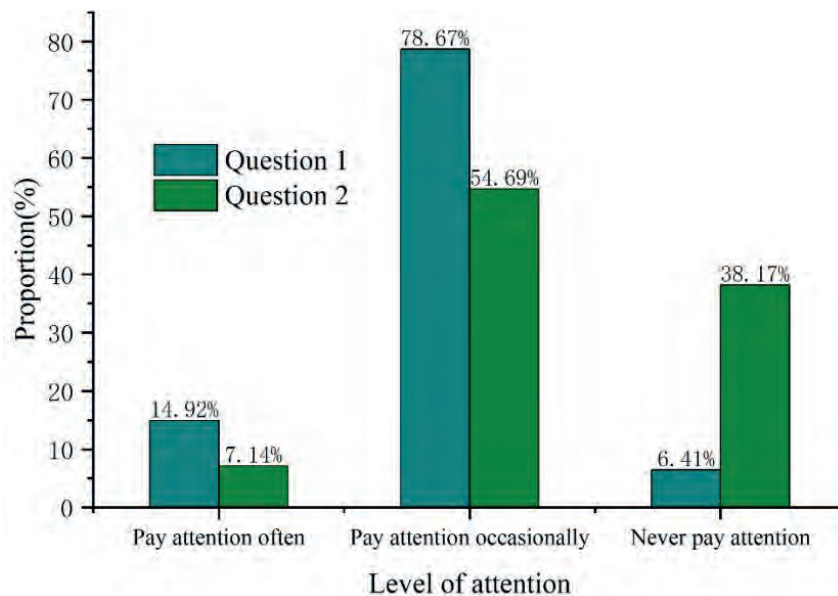
The questionnaire, which has 20 items, is the primary research method employed in this study. A total of 300 surveys were distributed via the questionnaire star; 280 have been collected; the recovery percentage is 93.33%. Among them, 275 are valid questionnaires, and the effective rate is nearly 91.67%.

### 3.1. LOW PARTICIPATION OF UNIVERSITY STUDENTS

In the first question, 14.92% of the students chose to follow and retweet the news or notices released on the campus website, 78.67% chose to follow occasionally, and 6.41% never followed. In the first question, 14.92% of the students chose to follow and retweet frequently, 78.67% of the students chose to follow occasionally and just look, 6.41% of the students never followed, and only 7.14% of the students chose to always participate in the second question.

According to the study findings, despite frequent Internet usage, college students seldom

engage with ideological or political information. College students' worldviews, perspectives on life, and values are very malleable since they are in the crucial stage of ideological development. Students will be readily used by criminal elements if teachers do not instruct and mentor them in a timely manner. Additionally, the Internet exhibits both openness and secrecy, and the abundance of knowledge there will contaminate students' traditional ideals. Students frequently use the Internet to look for harmful material or images, and they also frequently break the law, post improper remarks, and defame other people online.



**Figure 2.** Findings of attention and discussion

### 3.2. RELATIVE LACK OF TEACHERS WHO ARE PROFICIENT IN BIG DATA SKILLS

The majority of educators participated with this position lack the capacity to interpret and foresee big data, and their majors are primarily in education, management, psychology, ideological and political learning, etc. Counselors are typically the administrators of the everyday ideological and political learning in higher education institutions. They cannot be more influential in big data applications for ideological and political learning due to their professional backgrounds. Due to a dearth of specialists, it will be challenging to make use of the data created by the numerous digital footprints college students leave on networks using smart devices and important information cannot be extracted from them to assist the ideological and political education professionals. Counselors can examine students' purchasing patterns, buying preferences, and consumption quantities by having them use shopping apps like Jingdong, Taobao, and Jindo. In this way, we can infer students' consumption views, and counselors can guide students who have wrong consumption views in time so that they will not take a chance to make bad online loans.

### 3.3. THE CARRIER OF IDEOLOGICAL AND POLITICAL EDUCATION IS NOT CREATED WITH ENOUGH STRENGTH

More than 90% of college students believe that campus culture and new media technology can help to strengthen management and construction. This is in response to the question, "Suggestions on using new the media resources and tools for ideological and political learning at educational institutions in the era of big data." 84.28% of students choose to set up college student role models, 78.93% of students choose to actively build a branded WeChat public website. Table 1 displays the findings from the examination of college students' recommendations for the advancement of ideological and political learning.

**Table 1.** Suggestions for the development of ideological and political education

Options	Number	Proportion
A. Strengthen the construction of new media technology hardware facilities, and do a good job in maintenance and updating	268	95.71%
B. Strengthen the construction of excellent culture and the construction of a soft environment for new media on campus	261	93.21%
C. Actively cultivate outstanding college student network opinion leaders	236	84.28%
D. Actively build influential official and teachers' Weibo and WeChat platforms	221	78.93%
E. Miscellaneous	46	16.43%

The survey results show that although colleges and universities have opened official public numbers, their current software and hardware facilities do not effectively serve college students and cannot meet their actual needs, and they need specific channels to publish their views on hot topics of current affairs. For instance, on September 18 and the anniversary of the Nanjing Massacre, schools and institutions may utilize a variety of carriers to post articles that will instruct students and answer their concerns in a focused manner, assisting them in forming the right worldview, viewpoint on life, and values.

#### 4. INNOVATIVE APPLICATION OF BIG DATA TECHNOLOGY IN IDEOLOGICAL AND POLITICAL EDUCATION OF COLLEGES AND UNIVERSITIES

##### 4.1. STUDENT BEHAVIOR PREDICTION MODEL BASED ON STACKING INTEGRATED LEARNING

For students' online browsing, their data were divided into training and test sets. The training set was divided randomly and equally into 5 parts, i.e.  $E_1, E_2, E_3, E_4, E_5$ . Each base classifier was trained for 5 iterations, i.e:

$$W_i^k = N_i(E - E_1) \quad (1)$$

where  $i \in (0, 4), k \in (0, 4)$ ,  $W_i^k$  denote the prediction models generated by the  $i$  rd model algorithm in the  $k$  th cross-validation. The prediction of the training set  $E$  using the trained base classifier, i.e:

$$P_i^k = M_i^k(E^k) \quad (2)$$

The final model predictions obtained are:

$$(P_i)^T = ((P_i^0)^T, (P_i^1)^T, (P_i^2)^T) = (P_i^0, P_i^1, P_i^2) \quad (3)$$

where  $P_i$  indicates the prediction of the  $i$  nd base classifier for  $E_i$ .

Through the above methods, we can target the effective screening of students' Internet browsing data, and then obtain the basic situation of students, in order to comprehend how they were formed ideologically and aid colleges in more directly delivering ideological and political learning.

##### 4.2. INNOVATIVE STRATEGIES FOR IDEOLOGICAL AND POLITICAL EDUCATION IN UNIVERSITIES IN THE ERA OF BIG DATA

(1) Increase the amount of sharing by including different instructional resources.

In the era of big data, political and ideological learning at higher education institutions must concentrate on top-notch instructional resources. For internal resources of higher education institutions, deep integration may be achieved through the ease of the Internet. Schools and universities must also include network resources and regularly update ideological and political

education materials and contents on campus websites, libraries, and other platforms in order to enhance instructional content and stimulate students' interests in their studies.

(2) Make the most of the network platform for political and ideological learning at higher education institutions.

Higher education institutions need to actively design networking platforms that represent their current situation in order to develop a healthy teaching environment. On the wisdom management platform, you can join the group of college learners and collect their feedback to act as a reliable basis for the development of political and ideological learning programs.

(3) Assembling a team of information-based educators and redefining the educational process

Through personalized education, the political and ideological learning of undergraduates may be more in line with their cognitive norms and thinking states, which can therefore significantly boost the educational effectiveness.

## 5. CONCLUSION

This paper examines the characteristics and outcomes of current political and ideological learning at higher education institutions against the backdrop of the big data era. It also draws attention to several problems with the political and ideological learning provided by these organizations. Using the behavior prediction model to more fully evaluate students' learning behavior, big data technology is combined with a blended learning algorithm. Out of this, the innovation approach for university political and ideological learning for the big data era is proposed, which entails utilizing the network platform for school ideologies and politics to its fullest extent, incorporating various educational resources, and creating new pedagogical approaches.

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# RESEARCH ON CROSS BREEDING OF CLEMATIS AND ITS IN VITRO FAST BREEDING TECHNOLOGY

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## ABSTRACT

In this paper, we analyzed the botanical characteristics and floral classification of Clematis as the starting point, and designed cross breeding and in vitro fast breeding experiments of Clematis. In the cross breeding experiment, different species and relatives of Clematis were selected for comparison, and in the in vitro fast breeding experiment, “Wang Meng” was selected as the model. The results showed that the crosses of the same species and relatives were compared with each other. The results showed that the crosses of the same group had the highest fruiting rate, basically reaching 82% or more, and the germination and flowering rates were maintained at about 80%. The optimal growth hormone ration for clematis in the isolated fast breeding experiment was 2 mg/L 6-BA + 0.2 mg/L NAA medium.

## KEYWORDS

Clematis; Hybrid breeding; In vitro fast breeding; Flowering rate; Fruiting rate; Germination rate

## 1. INTRODUCTION

Clematis is a perennial vine of the buttercup family Clematis. It is as tough as iron wire, beautiful as the new lotus, enjoys the “Queen of the vine” reputation [1-2]. Its young leaves like eyebrows, pink flowers like cheeks, elegant, fresh and elegant, clematis flowers around the finger soft. According to statistics, there are about 355 species of clematis, with more than 140 species in China [3-5]. Clematis has a high ornamental and medicinal value, but the seeds of clematis have a long dormancy period and low natural reproduction efficiency. The large variation in the survival rate of cuttings propagation, coupled with the relative lag in domestic breeding research on clematis, has greatly limited the promotion and application of clematis [6-7]. Plant tissue culture technology is an effective means of rapid propagation, and the establishment of an efficient regeneration system is crucial for the factory nursery and application of clematis [8-9].

This paper firstly addresses the botanical characteristics and floral analysis of clematis, describing its floral composition and the flowering species to be pruned. Secondly, we designed a hybrid breeding experiment for clematis in the spring of 2020 and analyzed the fertility, germination and flowering rates of selected hybrid seeds. Finally, by selecting Clematis “Wang

Meng” as the subject of the in vitro fast breeding experiment, the proliferation coefficients were compared by different hormone ratios. The results showed that clematis with close relatives in the same group are more likely to set fruit and germinate and flower, and that the ratio of growth hormones needs to be emphasized when performing in vitro fast breeding. This study can provide a useful reference for large-scale factory breeding of clematis.

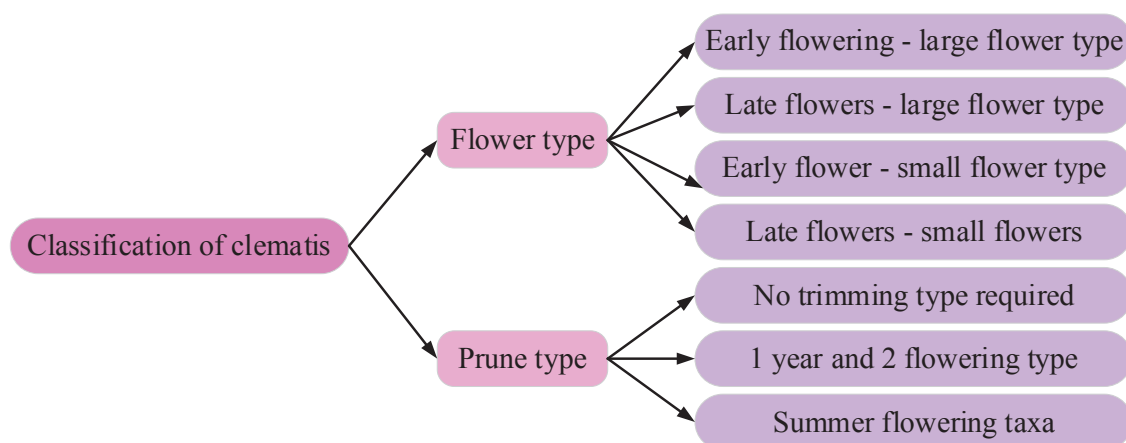
## 2. BOTANICAL CHARACTERISTICS AND CLASSIFICATION OF CLEMATIS

### 2.1. BOTANICAL CHARACTERISTICS OF CLEMATIS

Clematis is a perennial herb or subshrub of the buttercup family, clematis stems usually climbing dependent or erect state, herbaceous vines. Adult length up to 1 to 2m, the stem is purplish red or brown, commonly with six longitudinal lines, and the nodes often produce an inflated state. The epidermis has 1 layer of short and sparse tomentum, and shows a dichotomous and trifoliate state, with the leaf blade connecting the petiole reaching a length of about 9cm. The leaflet blade is usually narrowly ovate and lance-shaped, reaching a length of about 5 cm at maturity, with a more rounded tip and a broad cuneate shape, with sparsely divided margins and often with uneven hairiness on both sides. The inconspicuous vein pattern appears in the axils of the leaves after flowering and the pedicels are about 5 to 10 cm long and in a glabrous state. The bracts are triangular-oval in shape up to 4 cm long and have a distinct stalk at the base, and the unfolded flower leaves are about 4 cm in diameter.

### 2.2. HORTICULTURAL CLASSIFICATION OF CLEMATIS

Horticulturally, clematis are divided into “early-flowering-large-flowering”, “late-flowering-large-flowering”, and “early-flowering-small-flowering” “Late flowering - small flowering type”. The “large-flowered” type includes all cultivated large-flowered types with spreading sepals. The “early-flowering-large-flowering type” is planted on top of old vine stems and blooms in early spring without pruning before blooming. The “late flowering - large flowering type” peanut is grown on top of the current year's branches and requires heavy pruning in spring to promote new growth. The specific classification of each flower type is shown in Figure 1.



**Figure 1.** Horticultural classification of clematis

Clematis need to be pruned regularly during planting and cultivation to ensure an attractive plant shape and proper distribution of nutrients to promote flowering. The types of pruning for clematis can be divided into three categories. The first type of pruning is the no-pruning type, which is mostly the evergreen type and the deciduous type that grows on mature old vine stems. The second pruning type is for plants that flower twice a year, which generally bloom once in early spring and once in late summer. The third pruning type is the summer-flowering group of clematis, which require heavy pruning in early spring before growth.

### 3. CROSS BREEDING AND IN VITRO FAST BREEDING EXPERIMENTS AND ANALYSIS OF CLEMATIS

#### 3.1. HYBRID BREEDING OF CLEMATIS

All experimental materials were obtained from the germplasm resource nursery of the Genetic Breeding and Research Department of an agricultural and forestry university, and the hybrid parents were selected from the collected wild species, early flowering large-flowered group varieties, Florida group varieties, Texas group varieties, allopatric group varieties, and evergreen group varieties. In this study, the crosses were bred in the spring of 2020, and Table 1 shows the parental information for the cross experiment.

**Table 1.** Parental information for hybridization experiments

Number	Parental breed name	Constituencies
Group 1	Medengli	Early flowering large flower group
	Kanawa	Early flowering large flower group
Group 2	Green jade bud changes	Florida Group
	kingfisher	Early flowering large flower group
Group 3	Angel jewelry	Texas Group
	Cherry lips	Texas Group
Group 4	Angel dance dress	Texas Group
	Wang Meng	Texas Group
Group 5	Angel dance dress	Texas Group
	Sri	Early flowering large flower group
Group 6	painting	Texas Group
	Central China clematis	Wild species

The operational steps of hybrid breeding were as follows:

(1) Pollen collection, choose a sunny morning to collect the anthers of the target parent plants that have been in flower for 3-4 days, dry them in the oven at 28°C and store them in the refrigerator at 5°C for later use.

(2) Depollination, select the budding flowers of the target parent, carefully cut off the petal stamens with a scalpel and bag them. Estimate the blooming time of the flower and choose a cool morning or evening to gently apply the saved pollen to the stigma with a brush and repeat three times to ensure that the stigma is successfully coated with pollen. The bags were marked with the date and observed regularly.

(3) Harvesting seed pods, Clematis seeds usually mature in 90 days. Mature seeds are harvested, peeled off the outer seed coat and placed in a plastic bag with sterile water in a 5°C refrigerator for 0.5 to 1 month, followed by sowing.

The seed set, germination and flowering of the hybridized clematis in 2020 are shown in Table 2.

**Table 2.** Fruiting, germination and flowering of hybrid parents in spring 2020

Number	Number of normal seeds/seeds	Number of germinations / number of normal seeds	Number of flowers /total germination
Group 1	25/48	22/25	2/22
Group 2	13/55	4/13	0
Group 3	24/29	14/18	4/14
Group 4	36/42	21/25	18/21
Group 5	8/44	3/8	2/3
Group 6	0	0	0
Number	Seed normal rate	Germination rate	Flowering rate
Group 1	52.08%	88.00%	9.09%
Group 2	23.64%	30.77%	0.00%
Group 3	82.76%	77.78%	28.57%
Group 4	85.71%	84.00%	85.71%
Group 5	18.18%	37.50%	66.66%
Group 6	0	0	0

Combined with the hybridization experiment it can be clearly observed that the highest cross fertility rate of the same group of varieties, Angel Jewelry × Cherry Lips and Angel Dance Dress × King Dream, both groups of Texas parents produced normal seeds of more than 80%, and Medenri × Kanawha as two early flowering large flowering group of varieties with low normal seed rate of 52.08%.

The overall cross fertility of crosses and budded varieties was low, with only 18.18% normal seed rate for Sili × Angel Dance Dress and no hybrid seeds were harvested from any of the parents in the group of Danqing × Chinese clematis. The reason for the failure of cross pollination of Danqing × Chinese clematis may be that the parents are distantly related and the cross pollination is not affinity or the pollen activity of the parents is poor. 2020 hybrid seed germination and fruiting situation is similar to the same group of species hybrid germination rate can reach more than 84%, angel jewelry × cherry lip seed germination rate is lower than the average, only 77.78%. The normal rate and germination rate of seeds of Sili × Angel Dance Dress was the lowest.

### 3.2. IN VITRO FAST BREEDING OF CLEMATIS “WANG MENG”

In this experiment, young terminal stem segments of Clematis “Wang Meng” were cut as explants, and the leaves were removed and set aside. The explants were sterilized and divided into nine experimental groups named A1~A6. When the adventitious buds of the explants on the induction medium grew to 1~2 cm, they were transferred to the multiplication medium for cultivation, and the effect of different growth factors on the multiplication effect was measured. The effect results are shown in Table 3.

**Table 3.** Effects of different hormonal ratios on clematis rooting

Coding	Proliferative coefficient			Seedling growth
	I	II	III	
A1	3.67	3.42	3.78	Yellow-green, average growth
A2	3.23	3.24	3.46	The leaves are small, pale green, and weak
A3	2.98	2.69	2.83	The leaves are small and the seedlings are slender
A4	5.76	5.67	6.02	The leaves are stretched, the seedlings are thick and grow well
A5	3.31	3.16	3.43	Yellow-green, average growth
A6	2.64	2.55	2.76	The leaves are small, pale green, the seedlings are thin
A7	2.01	1.92	1.98	The buds are small and the seedlings are thin.
A8	1.76	1.66	1.86	The buds are small, the seedlings are malformed
A9	1.41	1.27	1.32	The buds are small, the seedlings are deformed, and the leaves are vitrified

In this experiment, the optimum hormone concentration ratio of the proliferation medium for Clematis “Multiblue” was 1 mg/L 6-BA + 0.1 mg/L NAA. In this experiment, the seedlings of Clematis “Wang Meng” grew fast, with spreading leaves, sturdy seedlings, good growth, more effective shoots, and the highest proliferation coefficient of 5.76-6.02 on medium containing 2 mg/L 6-BA and 0.2 mg/L NAA, while on medium containing 1 mg/L 6-BA and 0.1 mg/L NAA, the leaves were yellowish green, with average growth and lower proliferation coefficient. This may be the difference between the two varieties themselves, and “Wang Meng” has a greater demand for 6-BA. It can be seen from A4I, A5I and A6I treatments that when the concentration of 6-BA is certain, the proliferation coefficient of seedlings decreases continuously with the increase of NAA concentration, from 5.76 to 2.64. It can be seen from A1I, A4I and A7I treatments that when the concentration of NAA is certain, too high concentration of 6-BA will inhibit the growth of seedlings, and when the concentration of 6-BA is too low, the growth rate decreases and the proliferation coefficient decreases. In further experiments, the concentrations of 6-BA and NAA can be fine-tuned to find a more accurate hormone concentration ratio.

#### 4. CONCLUSION

In this paper, starting from the botanical characteristics of Clematis, two experiments were set up for the analysis of cross breeding and in vitro fast breeding of Clematis, and the following conclusions were drawn:

(1) In the cross breeding process, clematis crosses with the same group of species had the highest fruiting rate, basically reaching more than 80%, while crosses across groups and crosses with budded varieties had an overall low fruiting rate, basically below 20%. This indicates that in the process of cross breeding clematis, it is necessary to select varieties that are closely related to each other for cross breeding.

(2) In the in vitro fast breeding experiment of Clematis “Wang Meng”, the optimal growth hormone ratio was 2 mg/L 6-BA + 0.2 mg/L NAA, and the proliferation coefficient of “Wang Meng” decreased as the concentration of 6-BA increased. The proliferation coefficient of “Wang Meng” decreases as the concentration of 6-BA increases. This indicates that the correct growth hormone ratios should be used in the in vitro fast breeding culture of Clematis to ensure proper rooting and germination of Clematis and to promote large-scale factory breeding of Clematis.

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# A VISUALIZATION STUDY OF INTERIOR INTERACTION DESIGN COMBINED WITH VIRTUAL REALITY TECHNOLOGY

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## **ABSTRACT**

This paper analyzes the characteristics and application issues of virtual reality technology, including the characteristics of interior design using virtual reality technology. To further illustrate the role of virtual reality technology for interior interactive design, 50 subjects were selected to evaluate the effect of satisfaction with the 3D model of virtual space built based on Unity3D technology. The results show that the average satisfaction of users in the virtual space is 84.28%. Among them, the satisfaction for the continuity of virtual space and free switching scene decoration reached 93.41% and 96.54% respectively. This shows that VR technology can effectively promote the satisfaction of interior space design, and further strengthen the user's sense of participation and interactive experience in interior space design.

## **KEYWORDS**

Virtual reality technology; Interior interactive design; Unity3D; 3D model; Interactive experience

## **1. INTRODUCTION**

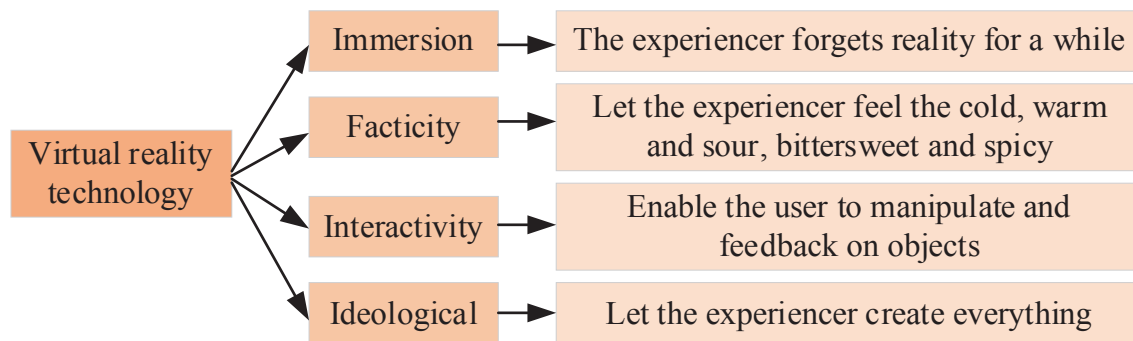
In recent years, with the continuous innovation, maturity and development of science and technology, more emerging technologies have been tried to be applied in various design fields, largely promoting the development of each design field [1-3]. From VR technology converting static advertisement to dynamic advertisement in visual communication design, to VR technology bringing immersive experience to designers and clients of interior space design, outdoor architecture, landscape design and other people [5-6]. VR technology solves the shortcoming of traditional design methods that make it difficult to display design effects in a realistic and intuitive way. It solves the dilemma that designers cannot immerse themselves in the design process to feel the actual effect of the design. The birth of virtual reality technology undoubtedly makes up for the deficiencies and defects in the traditional design methods effectively [7-8].

This paper firstly analyzes the characteristics of virtual reality technology, and then leads to the characteristics of using virtual reality technology in interior design and the problems in interior design applications. Secondly, a 3D model of virtual space is constructed based on Unity3D technology, and a density function is introduced to refine the slicing of the model. Finally, in order to verify the effectiveness of the virtual space 3D model, quantitative analysis of the data was carried out using the actual user experience satisfaction as the evaluation index. The results show that VR technology can effectively promote the user's interactive experience of virtual space design and further strengthen the user's sense of participation in interior design.

## 2. THE CHARACTERISTICS AND APPLICATION PROBLEMS OF VIRTUAL REALITY TECHNOLOGY

### 2.1. CHARACTERISTICS OF VIRTUAL REALITY TECHNOLOGY

Virtual reality has four main characteristics, namely immersion, realism, interactivity and conceptualization, which are the precise embodiment of the connotation of virtual reality technology. After entering the virtual space, the experiencer has the same real experience as in reality, and can also interact with the surrounding environment and use the perception of the environment to form spatial information. The characteristics of virtual reality technology are shown in Figure 1.



**Figure 1.** Features of virtual reality technology

For interior space design, the introduction of virtual reality technology greatly enhances the overall artistry of design and eliminates the problem of lack of authenticity that exists in traditional work to achieve better design effects and a higher degree of meeting the living needs of people in the new era.

### 2.2. CHARACTERISTICS OF INTERIOR DESIGN USING VIRTUAL REALITY TECHNOLOGY

#### (1) Using virtual reality technology to enhance artistic personality

Because the owners cannot understand the drawings, they can only compare their own design plans. Also, because the owners lack design experience, the ideas generated do not match the overall style, so most designers do not include the owners' ideas, resulting in the difference between the actual effect and the owners' expectations. With virtual reality technology, when the owner makes a request, it can be made into a 3D model for the owner to view. This can effectively show the owner's design ideas, but also make reasonable adjustments to them to achieve the joint participation of the owner and the designer, making the design style more artistic.

#### (2) Multi-level information exchange

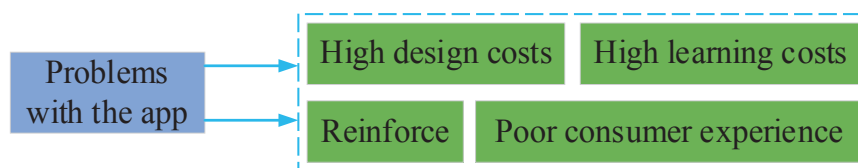
Through virtual reality technology, users can view scenes anytime and anywhere, and can calculate material costs more accurately. Through virtual reality technology, designers can show the design effect to a great extent and make changes to the design easily. For the owner, the design plan can be immediately previewed for effectiveness and the use of materials will be more transparent. So the use of virtual reality technology can achieve a win-win situation for both parties and avoid unnecessary conflicts.

### 2.3. PROBLEMS IN THE APPLICATION OF VR TECHNOLOGY IN INTERIOR DESIGN

In the past, when VR technology was not widely used, most interior design practitioners used traditional floor plans and renderings to present interior design content for clients, thereby conveying the designer's design ideas and design concepts for the interior. However, because



construction drawings are highly specialized, it is difficult for many consumers to feel the home environment outlined by the designer through construction drawings. In the process of applying VR technology to interior design, there are also some problems, as shown in Figure 2.



**Figure 2.** Problems with VR technology in interior design applications

The software required by designers from design conception to drafting to rendering models is quite complex and independent of each other, which causes designers to pay too much learning cost. And if the draft is repeatedly revised, it will make the designer's workload increase and duplicate work.

### 3. ANALYSIS OF THE APPLICATION OF VIRTUAL REALITY TECHNOLOGY IN INTERIOR DESIGN

#### 3.1. MODELING SYSTEM DESIGN OF VR TECHNOLOGY IN INTERIOR DESIGN

In theory, the designer can default the thickness of the wall by inputting the data of the designed room, so that the 3D space model of the designed room can be built more easily and quickly, and eventually combined with VR technology to let consumers fully feel the virtual 3D space. Consumers can also verify whether the design meets their expectations by improving the interactivity between the design solution and the designer, and communicate with the designer in a timely manner to reduce design deficiencies. However, it is not easy to use VR technology to solve the current problem of fast modeling and high realistic real-time rendering in the interior design process. This paper builds an application model of interior design based on Unity3D technology.

In order to ensure the high precision requirements of virtual 3D space design, in the modeling of each component, the different components should be sliced to divide as many thin slices as possible according to the actual workpiece body model requirements, the specific formula is:

$$f_0(x) = \begin{cases} \frac{1}{x_{\max} - x_{\min}}, & x \in [x_{\min}, x_{\max}] \\ 0, & \text{other} \end{cases} \quad (1)$$

where is the slice decision behavior,  $f_0(x)$  is the density function of the decision behavior, according to different parameter ranges, which indicates the difference of the most value of each part slice in the indoor space, to complete the model processing with different grading accuracy.

#### 3.2. SPECIFIC APPLICATIONS OF VR TECHNOLOGY IN INTERIOR DESIGN

##### (1) On-site data collection

During traditional data information collection, relevant personnel often obtain data information through measurement and then use storage, import, and edit a picture before proceeding to the next data measurement. With the promotion of VR technology in architectural interior design work, the collectors are able to simplify the process of data collection in a shorter period of time by using reasonable interactive methods to store and keep screenshots of relevant data information through advanced cameras and other equipment.

Compared with traditional data collection methods, it ensures that the measurement work can be fully dovetailed with the recording session, solving the real-life on-site data collection problem.

(2) Project scheme design

When the designer communicates with the client in words, it cannot fully reflect the rationality of the design scheme, nor can it more truly reflect the three-dimensional effect of the design drawings. And further application of the appropriate amount of 3D and other processing software, whether on paper or screen, are static, failing to fully reflect the real environment. In response to this phenomenon, VR technology should be fully utilized to comprehensively show the entire interior design space from multiple angles of realism and a sense of place, to ensure that the design effect can meet the requirements of customers on the basis of comprehensive communication between designers and customers.

(3) Project implementation phase

For the implementation of the interior design of the entire building structure, the grassroots construction operator will generally combine the specific content of the construction design plan for construction operations. In this regard, the designer should conduct a comprehensive technical communication with the construction operator to explain the design concept and ideas comprehensively. And with the application of VR technology, workers can make uniform arrangements for positioning nodes of different building structures by using cell phone smart devices. With the cell phone screen as the interactive interface, a three-dimensional virtual simulation image of this node is displayed to ensure that the construction building work can achieve the corresponding design effect.

### 3.3. EVALUATION OF THE APPLICATION EFFECT OF VIRTUAL REALITY TECHNOLOGY IN INTERIOR DESIGN

In order to analyze more intuitively for the application of virtual reality technology in interior design, this chapter selects 50 users for VR effect experience based on the 3D model of interior space constructed by Unity3D technology in the previous paper. Satisfaction tests were conducted for the corresponding items in the experience, and the satisfaction results were obtained as shown in Table 1.

**Table 1.** App performance satisfaction evaluation

project	Three-dimensional effects	Spatial continuity	An immersive experience	Realistic video and audio
Satisfaction	85.67%	93.41%	92.13%	66.82%
project	Switching of decorative elements	Tactile action interaction	Freshness	Operability
Satisfaction	96.54%	91.86%	72.35%	75.48%

VR technology, users wear VR glasses, hand grip, through the experience of data collection, collation and comparative analysis, users are still satisfied with the display of VR, the average satisfaction of the eight evaluation angle is 84.28%. Compared to 72.35% of freshness, users are more satisfied with the ability to visit freely in a continuous space, realistic TV and sound, creating a sense of immersion, and their satisfaction is 93.41% and 92.13% respectively. This shows that users are very satisfied with the elements in the switching scenes, and they think that changing the items in the scenes is good for participating in the design of the program and selecting the decorations they are satisfied with. With regard to the interaction of the touchable interior, 91.86% of the users thought that the operation “felt like real”. Therefore, VR technology greatly meets the needs of users, improves user participation, and is “people-oriented” in interior design, starting from the needs and feelings of people.

#### 4. CONCLUSION

This paper analyzes the design of modeling system of VR technology in interior design, starting from the characteristics and application problems of virtual reality technology, and the 3D model of interior space constructed by using Unity3D technology. In order to verify the effectiveness of virtual reality technology in interior space design, user satisfaction evaluation analysis was conducted. For the virtual space constructed by virtual reality technology, the average user satisfaction was 84.28%, and 96.54% of the users thought that the switching of virtual space elements could effectively enhance the freedom of interior design. This indicates that the virtual reality technology can effectively promote the interactive interior design and further enhance the user satisfaction for the interior space design.

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## **ABSTRACT**

This paper firstly addresses the factors affecting the security of information technology in computer networks, which include hacker and virus attacks, system vulnerabilities and risks. Secondly, a chaotic mapping from a one-dimensional segmentation is selected, and then a chaotic mapped random sequence of image encryption is obtained. Finally, an example analysis is conducted in order to verify the effectiveness of the algorithm in computer network information transmission. The results show that the sensitivity of the algorithm is between 49% and 50% for ciphertext and plaintext in the transmission of digital image information in computer networks. This shows that the use of the improved chaos mapping digital image encryption algorithm can effectively improve the security of information transmission in computer networks.

## **KEYWORDS**

Computer networks; Information technology; Secure transmission; Chaotic mapping; Image encryption; Random sequences

## **1. INTRODUCTION**

With the continuous development of social science and technology, computer network information technology has been closely connected with people's production and life, changing people's production and life style, achieving better application effects in various industries, and receiving wide attention [1-3]. Although computer network information technology provides people with convenience, there are also certain security loopholes, and people's personal privacy and confidential information of enterprises are easily leaked [4-5]. In this case, how to improve the security of computer network information technology has become an important topic of current research by various experts and scholars, and must be given great attention [6-7]. In order to give full play to the role of computer network information technology, solve the problem of information leakage, and improve the security of network information in the new era, effective computer network information technology security measures should be implemented to create a safer network operation environment for people [8-9].

This paper analyzes the factors affecting the security of computer network information technology, which include hacker virus attacks, system vulnerabilities, and system risks. Based on this, an improvement of digital image encryption algorithm with chaotic mapping is proposed, which can efficiently realize the encrypted transmission of computer network information, and then meet the security of computer network information. In order to verify the effectiveness of this algorithm ciphertext and plaintext sensitivity analysis is conducted, and the results show that this algorithm can effectively ensure the security of computer network information transmission and improve the decryption difficulty.

## 2. FACTORS AFFECTING THE SECURITY OF COMPUTER NETWORK INFORMATION TECHNOLOGY

### 2.1. HACKER AND VIRUS ATTACKS

Malicious attacks by hackers and various computer virus infections are the most common security risks when managing computer network information. Some hackers rely on excellent computer technology to illegally log into servers and steal personal information from other people's computer networks, which interferes with the normal use of computer network information by others, while seriously threatening the confidentiality and security of personal privacy. So the danger of computer network viruses cannot be underestimated, and if a computer is infected with a virus, it will seriously affect the security management of computer network information technology. Some viruses have the ability to automatically start by hiding in important computer files, which may damage the computer's core data programs. And some viruses will use computer programs to control the computer and affect the computer's data transmission, thus implementing the illegal act of stealing computer network information.

### 2.2. THE VULNERABILITY OF THE COMPUTER NETWORK SYSTEM ITSELF

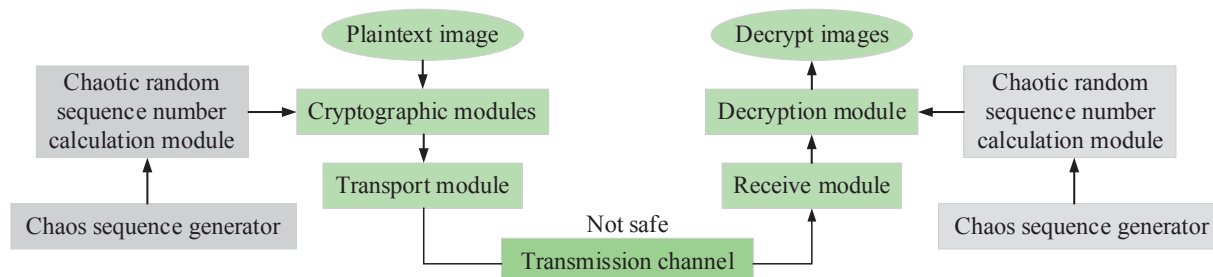
As we all know, the computer network information system has a strong openness and can absorb data information from all aspects of the Internet. But it is the openness of this computer network information system that leads to a low threshold of access to the Internet and the existence of technical shortcomings in the network information system itself, which leads to hidden dangers in the security of computer network information. And the security level of the network protocol used to operate the Internet information is very low, which may lead to loopholes in the operation of the computer network information technology system, further deepening the security risks of the computer network information system.

### 2.3. RISKS OF COMPUTER OPERATING SYSTEMS

At present, computer network information is open to computer users all over the country, and the penetration rate of computers in the country has been significantly increased. However, there are many old people, teenagers or people with low education level among computer users, who are totally unfamiliar with the operation of computers and even have no awareness of defending against computer viruses and poor recognition of computer network traps, so they are unable to distinguish malicious codes from normal data when using computers, resulting in the computers used being heavily invaded by malicious computer viruses.

## 3. IMPROVEMENT OF DIGITAL IMAGE ENCRYPTION ALGORITHM BASED ON CHAOTIC MAPPING

According to the previous description of the security problem of computer network information technology, this chapter proposes an improvement of digital image encryption algorithm with chaotic mapping, which can efficiently realize the encrypted transmission of computer network information, and then meet the security of computer network information. The given digital image encryption architecture is shown in Figure 1.



**Figure 1.** Digital image encryption algorithm based on chaotic mapping

### 3.1. GENERATION OF CHAOTIC MAPPED RANDOM SEQUENCES

The generation of a good random sequence requires a choice from a chaotic mapping of one-dimensional segmentality, which is defined as shown below:

$$Q(f, p) = \begin{cases} p / f & p \in (0, f) \\ (p - f) / (\frac{1}{2} - f) & p \in (f, \frac{1}{2}) \\ Q(f, 1 - p) & p \in (1/2, 1) \end{cases} \quad (1)$$

where  $f$  is the parameter of the control,  $f \in (0, \frac{1}{2})$ , and the region of the chaotic mapping is  $(0, 1)$ . and has some statistical advantages in this region:

(1) When the exponent is greater than zero, the whole system is in a chaotic state and the output signal can satisfy the characteristics of mixture and determinism. (2) There is an invariant distributed density function  $Z(x) = 1$ . (3) The trajectory of the signal output is approximately autocorrelated  $\alpha(n) = \phi(n)$ . Based on the above advantages, the random sequence that needs to be encrypted for the image can be selected from the chaotic mapping of one-dimensional segmentation  $x_0, x_1, \dots, x_n$ .

### 3.2. STEPS OF THE IMPROVED ENCRYPTION ALGORITHM

The improvement of digital image encryption algorithm using chaotic mapping-based encryption algorithm requires the decomposition of the image into modules and the encryption of sub-images with different key parameters. Thus, the security of the output key sequence and the cyclic nature of the cycle are improved, and the improvement of its encryption algorithm is divided into the following steps:

(1) The original image file is input, which can be represented in the form of a matrix  $W_{n \times n}$  as well as an encrypted number  $t$ . (2) The initial condition  $(x_0, m)$  is input, and a random sequence  $x_0, x_1, \dots, x_n$  of  $n \times n$  is generated by the chaotic mapping, and this is processed appropriately to obtain a chaotic sequence of natural numbers. (3) The image is encrypted using the function of diffusion. (4) The input parameters are improved by the encryption algorithm of the chaotic mapping and the parameters are obtained again. (5) Repeat step 2 and step 4 until the  $t$ th time, thus resulting in the output encrypted image file.

## 4. CIPHERTEXT AND PLAINTEXT SENSITIVITY ANALYSIS IN COMPUTER NETWORK INFORMATION SECURITY

Based on the previous description of the digital image encryption algorithm improved by chaos mapping, this chapter explores the application of digital image encryption algorithm in computer network information technology security by conducting sensitivity analysis of ciphertext and plaintext for image transmission in computer network information security.

This algorithm not only utilizes the randomness of the sequence number obtained from the logistic chaos mapping in the process of image pixel diffusion processing, but also performs the group encryption process using the preorder pixels in the process. By adding the construction of correlation between image pixels to the traditional chaotic encryption algorithm, the algorithm is more sensitive to both ciphertext and plaintext. That is, a very small modification to the ciphertext will result in an avalanche benefit to the decrypted plaintext

obtained with exactly the right key. Taking a  $512 \times 512$  Lena plaintext image as an example, the encryption and decryption keys are (4.01, 0.552, 0.354), and the results obtained by varying the number of pixel color values for the ciphertext are shown in Table 1.

**Table 1.** Cipher sensitivity test results

<b>The number of pixels changed</b>	1	20	60	120
<b>Decryption result pixel change rate (%)</b>	49.762	49.683	49.921	49.637
<b>The number of pixels changed</b>	300	600	800	1200
<b>Decryption result pixel change rate (%)</b>	49.825	49.653	49.827	49.924

From Table 1, we can see that after changing the pixel color value in the ciphertext, nearly 49% to 50% of the pixels in the plaintext after decryption are changed, and an avalanche effect occurs. Also the pixel change rate in the decryption result has no relationship with the number of pixels changed in the ciphertext, and the ciphertext sensitivity is very high. This indicates that after the group diffusion processing based on the preorder pixels added in this algorithm, the algorithm appears ciphertext sensitivity compared with the traditional chaotic image encryption method, and the avalanche effect occurs after changing a small number of encryption results in the ciphertext.

The same method is used to verify the plaintext sensitivity, with the same choice of encryption key and image as in Table 1, and the pixel change rate of the encrypted ciphertext obtained after changing the plaintext pixels is examined, and the results obtained are shown in Table 2.

**Table 2.** Expressly sensitivity test results

<b>The number of pixels changed</b>	1	20	60	120
<b>Decryption result pixel change rate (%)</b>	49.758	49.669	49.903	49.681
<b>The number of pixels changed</b>	300	600	800	1200
<b>Decryption result pixel change rate (%)</b>	49.826	49.679	49.824	49.906

As can be seen from Table 2, the sensitivity of the digital image encryption scheme proposed in this paper is also very high for the plaintext, which is not much different from the ciphertext, with 49% to 50% of pixels changed in both. This indicates that the encrypted ciphertext will have an avalanche utility after the change to the plaintext pixels.

In summary, in the specific work, the pseudo-random sequence number is created by setting up a logistic chaos mapping with correlation, and it is applied to the image diffusion and dislocation processing. In the diffusion process, the pseudo-random sequence number and the original image pixel color are computed as an anomaly, and in the disorder operation, the uniformization of the chaotic sequence number is used. The pixel positions of the image are replaced directly, eliminating the complex operation of sequencing. This can effectively guarantee the secure transmission of computer network information and promote the security of computer network information technology.

## 5. CONCLUSION

In this paper, the digital image encryption algorithm is improved by introducing chaotic mapping random sequences from the factors affecting the security of computer network information technology. In order to verify the effectiveness of the improved algorithm, the sensitivity of ciphertext and plaintext of digital images in computer network information security is analyzed. The results show that the sensitivity of the digital image encryption scheme proposed in this paper is between 49% and 50% for both ciphertext and plaintext, which indicates that the digital image encryption algorithm by chaos mapping can effectively improve

the security of information transmission in computer networks.

## FUNDING

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# THE EFFECT OF CELL PHONE ADDICTION ON THE QUALITY OF INTERPERSONAL RELATIONSHIPS AMONG COLLEGE STUDENTS BASED ON BIG DATA ANALYSIS: A STUDY OF THE MEDIATING AND MODERATING EFFECTS

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## ABSTRACT

This paper proposes an EM clustering algorithm for mobile app big data by incorporating Gaussian distribution for the basic maximum expectation algorithm. The distribution of college students' cell phone APP usage time is obtained through QuestMobile smart device hybrid data pool, and the correlation between college students' cell phone addiction and interpersonal relationship is analyzed in this way. Finally, the three variables of cell phone addiction tendency, loneliness and interpersonal relationship were analyzed according to the mediating effect test. The correlation coefficient between the total score of cell phone addiction tendency and the total score of interpersonal relationship reached 0.35. The higher the degree of cell phone addiction tendency of college students, the greater the degree of interpersonal relationship behavior distress.

## KEYWORDS

EM clustering algorithm; Correlation analysis; Mediating effect; Cell phone addiction; Interpersonal relationship

## 1. INTRODUCTION

With the popularity of smartphones, college students commonly hold smartphones, and they are often seen playing with their phones with their heads down on college campuses. Smartphones have changed the way college students live, study and socialize, enhancing their learning and living efficiency and expanding their interpersonal interaction [1-3]. At the same time, because college students are free from the high-pressure learning environment of high school, they often lack self-control in college and tend to overuse cell phones [4-5]. They are addicted to online activities such as online games, videos, and online social networking, and even have the tendency to become addicted to cell phones [6-7].

The literature [8] suggested that sleep quality, but not sleep duration, partially mediated the association between cell phone addiction and daily cognitive impairment. The literature [9] tested the mediating role of rumination and the moderating role of solitary ability in the relationship between cell phone addiction and psychological distress, noting that machine addiction was significantly and positively associated with psychological distress. The literature [10] concluded from an investigation and analysis that narrative disorders can directly or indirectly predict cell phone addiction through patterns of recreational and transactional use. The literature [11] similarly studied that narrative disorders had a significant positive predictive effect on cell phone addiction, with cell phone depression, anxiety, and stress as positive

predictors. The literature [12] compared the cell phone addiction patterns of Tibetan and Han Chinese adolescents and concluded through the analysis of the Mobile Phone Addiction Scale that it was more severe in Tibetan students compared to Han Chinese students.

## 2. MOBILE APP BIG DATA ANALYSIS BASED ON EM ALGORITHM

### 2.1. EM ALGORITHM UNDER BIG DATA

The maximum expectation (EM) algorithm is an iterative algorithm. Each iteration cycle of the EM algorithm generally consists of E and M steps. Where the E step calculates the mathematical expectation and the M step is called the maximization step.

#### 2.1.1. GENERAL MODEL OF EM ALGORITHM

Assuming that  $X$  is the existing data and  $Y$  is the missing data, the complete data  $Z = (X, Y)$ . The posterior distribution density function of parameter  $\theta$  with respect to the existing observed data is expressed as  $P(\theta | X)$ . The posterior distribution density function for the complete data is denoted as  $P(\theta | X, Y)$ . To calculate  $P(\theta | X, Y)$ , the EM algorithm can be used.

Letting  $\theta^i$  be the posterior plurality estimate at the beginning of the  $i+1$ nd iteration, the steps of the  $i+1$ rd iteration are

Step E: The expectation of the conditional distribution of  $P(\theta | X, Y)$  with respect to  $Y$  is found, i.e:

$$Q(\theta | \theta^i, X) = E_Z \left[ \frac{\log P(\theta | X, Y)}{\theta^i}, X \right] = \int \log [P(\theta | X, Y) P(Y | \theta^i, X)] dy \quad (1)$$

Step M: Maximize the  $P(\theta | X, Y)$  obtained after integration and find the point  $\theta^{i+1}$  such that:

$$Q(\theta^{i+1} | \theta^i, X) = \max Q(\theta | \theta^i, X) \quad (2)$$

Iterate E and M steps repeatedly until  $\|\theta^{i+1} - \theta^i\|$  is sufficiently small to stop.

#### 2.1.2. COMBINATION OF EM ALGORITHM AND GAUSSIAN DISTRIBUTION

In order to facilitate the processing and study of the data, the incomplete data can be assumed to obey the Gaussian distribution. Let the observed data be array  $X = (L_1, L_2, \dots, L_{n-1})$  and the unobserved data be  $Y = (L_n)$ . Both sets of data obey Gaussian distribution, and the probability density function of Gaussian distribution is

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} \left[ -\frac{(x-\mu)^2}{2\sigma^2} \right] \quad (3)$$

Then the likelihood density function of the fully observed data is

$$P(\theta | X, Y) = \left( \sqrt{2\pi}\sigma \right)^{-n} e^{-\frac{(L_1-\mu)^2}{2\sigma^2}} e^{-\frac{(L_2-\mu)^2}{2\sigma^2}} \dots e^{-\frac{(L_n-\mu)^2}{2\sigma^2}} \quad (4)$$

The conditional distribution probability function for the unobserved data  $Y$  based on the observed data is

$$P(Y|\theta^i, X) = (\sqrt{2\pi}\sigma_i)^{-1} e^{-\frac{(L_n - \mu_i)^2}{2\sigma_i^2}} \quad (5)$$

where,  $\mu_i, \sigma_i$  is the parameter valuation obtained after the  $i$  nd iteration.

## 2.2. RESEARCH ON THE DISTRIBUTION OF CELL PHONE USAGE TIME BASED ON EM ALGORITHM

### 2.2.1. SMARTPHONE DATA OF COLLEGE STUDENTS

The data in this paper comes from QuestMobile’s smart device hybrid data pool, involving APP usage information data of college students’ Android users over a 90-day period. The daily App behavior monitoring table is extracted, and the usage hours of each type of APP per person per day are aggregated by user ID and the tagged APP category as the unique identification. Mark the APPs that do not belong to the APP sorting table as ELSE category. Using the obtained aggregated data, the user IDs are connected according to their various types of APP usage time, and then the matrix of APP usage per person per day per category is obtained. Each row in this matrix represents a user, each column represents an APP, and the data in each loci represents the time that the user used that APP on that day.

### 2.2.2. FITTING OF MOBILE APP USAGE TIME DISTRIBUTION

The EM algorithm estimates the two mixed normal distributions to obtain the distribution fit of the average daily usage time of APP. The EM algorithm calculates the maximum likelihood function value from the posterior distribution of the hidden variables in the E step, and then solves the M step to obtain the parameter estimate, and uses this parameter estimate to further obtain the new posterior distribution, and then continues with the E step. The EM algorithm ensures that the maximum likelihood function is improved after each iteration. The parameter estimates of the mixed-normal distribution for the 10 classes of APPs obtained using the EM algorithm are shown in Table 1. The results of most APPs in both categories taken by the EM algorithm are as expected, i.e., the mean and standard deviation of one category are very close to 0, and the mean of the other category is significantly greater than 0. However, individual APPs do not match the expectations of this paper because the EM algorithm itself is an unsupervised method and there is no way to control the location of the centroids of each category.

**Table 1.** Estimation of mixed normal distribution parameters of APP

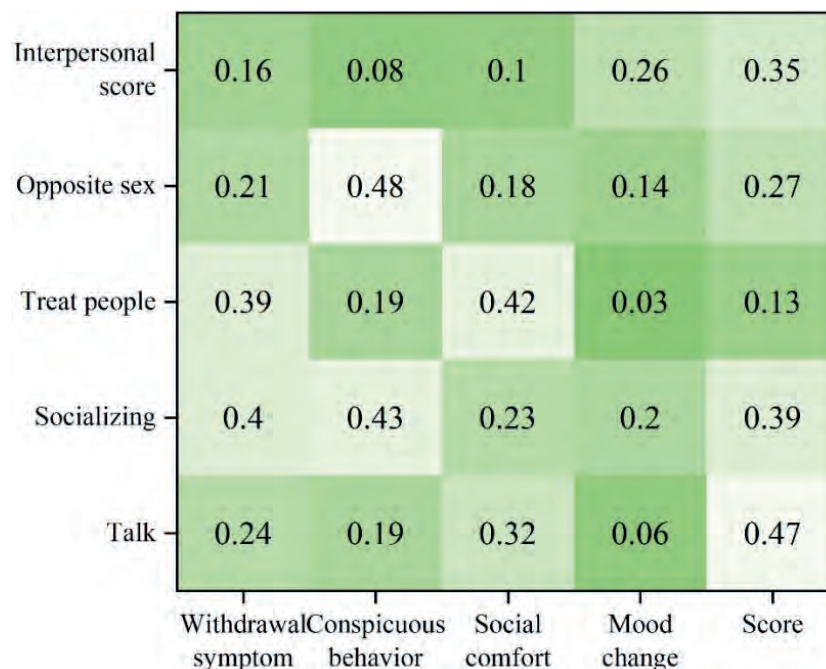
Category	p	a	b	Category	p	a	b
Online shopping	0.25	0.00	0.00	Network music	0.73	0.21	1.21
Local life	0.45	0.26	0.00	Practical tool	0.62	0.00	2.36
Network video	0.21	0.00	0.21	Digital reading	0.58	0.00	0.86
Communication chat	0.36	0.00	0.36	Social networking	0.64	0.49	0.00
News information	0.57	0.84	0.00	game	0.39	1.02	0.65

## 3. THE IMPACT OF CELL PHONE ADDICTION ON INTERPERSONAL RELATIONSHIPS AMONG COLLEGE STUDENTS

### 3.1. CORRELATION ANALYSIS OF CELL PHONE ADDICTION AND INTERPERSONAL RELATIONSHIP AMONG COLLEGE STUDENTS

After completing the processing and analysis of the big data of college students’ cell phone use based on EM algorithm, this paper investigates the influence of cell phone addiction on interpersonal relationship quality through further correlation analysis. The results of the correlation analysis between cell phone addiction and interpersonal relationships are shown in

Figure 1, where the measurement of interpersonal relationship quality was obtained through the interpersonal relationship scale. There was a significant positive correlation between the total score of cell phone addiction tendency and each dimension score and the total score of interpersonal relationship and each dimension score, so the higher the degree of cell phone addiction tendency among college students, the greater the degree of interpersonal relationship behavior distress. The correlation coefficient between the total score of cell phone addiction tendency and the total score of interpersonal relationship reached 0.35.



**Figure 1.** Correlation analysis between mobile phone and interpersonal relationship

### 3.2. TESTING THE MEDIATING ROLE OF CELL PHONE ADDICTION AND INTERPERSONAL RELATIONSHIPS

The three variables of cell phone addiction tendency, loneliness and interpersonal relationship were analyzed according to the mediating effect test. The results of the mediating effect test are shown in Table 2. In the first step, it can be seen that  $a, b, c$  is significant, which indicates that both the tendency of mobile phone addiction and loneliness have a good predictive effect on interpersonal relationships. However, when considering the predictive effect of cell phone addiction tendency and loneliness on interpersonal relationships at the same time, the effect of cell phone addiction tendency on interpersonal relationships was significantly reduced due to the intervention of loneliness, and the coefficient decreased from 0.28 to 0.18. The third step showed that loneliness played a partial mediating role between cell phone addiction tendency and interpersonal relationships.

**Table 2.** Results of mediation tests

Step	Standardized regression equation	Regression coefficient test
1	$y=0.28x$	$t=8.25$
2	$m=0.18x$	$t=5.26$
3	$y=0.18x+0.50m$	$t=6.21$

### 4. CONCLUSION

In this paper, we conducted a correlation analysis and mediated utility test between cell phone addiction and the quality of interpersonal relationships based on the EM algorithm to cluster the big data of college students' cell phones, combined with the data obtained from the

interpersonal relationship scale. The higher the degree of cell phone addiction tendency of college students, the worse the interpersonal relationships. College students spend relatively more time and energy on cell phones and have a higher tendency of cell phone addiction, while the virtual interpersonal relationships established through cell phones are very unstable, resulting in unreliable interpersonal networks of college students. It can be said that there is a significant correlation between college students' tendency of cell phone addiction and interpersonal relationships.

## FUNDING

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# A STUDY ON THE INTEGRATION STRATEGY OF COLLEGE PIANO TEACHING AND TRADITIONAL MUSIC CULTURE COMBINED WITH ARTIFICIAL INTELLIGENCE ALGORITHM

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## ABSTRACT

At a time when the soft power of culture is constantly emphasized, the integration of traditional music culture in piano teaching is of significant significance. In this paper, for music performance based on MIDI standard, we extracted the piano tonal characteristics and rhythmic characteristics, proposed the performance effect evaluation based on bidirectional LSTM network, and completed the construction of classification labels for music evaluation prediction. With the incorporation of traditional music elements, the performance evaluation of piano performance improved by 12.41% in pitch, 8.65% in modulation, and 10.32% in rhythm. This study helps to promote the inheritance of excellent traditional music culture and the development of piano performance teaching innovation.

## KEYWORDS

MIDI standard; Bidirectional LSTM network; Piano teaching; Traditional music culture; Rhythmic characteristics; Tonal characteristics

## 1. INTRODUCTION

At the present stage, music teaching in colleges and universities has become one of the main contents of quality education [1-2]. In college music teaching, piano teaching is an important teaching content, which is crucial to improve students' artistic cultivation and also inherits traditional Chinese music culture to a certain extent [3-4]. Rickels, D. A et al. compared the motivation and influence of music students interested in music teaching careers with those who were not, and suggested that career choices in music teaching are multidimensional [5]. Powell et al. explored Celeste's particular music teaching, arguing that she established a shared world of music that contained empathy outside of the monotonous world of music teaching [6]. Botstein et al. explored the history of music teaching, examining the situation of traditional music culture in modern times based on an analysis of popular classical music popularity in the Trump era [7]. Ng, H. H used three Singapore school teachers' popular music teaching materials to explore the factors influencing the effectiveness and quality of popular music teaching in public schools [8]. Kuebel, C. R examined the career development, choices and goals of elementary general music teachers identified as instrumental music majors during their undergraduate degree programs based on survey interviews [9].

In this paper, a two-way LSTM-based performance evaluation system for piano teaching is constructed in order to explore the integration of traditional music culture in college piano teaching. Based on the MIDI standard, the player's operation of the instrument is converted into MIDI signals, and the rhythm and beat of the current bar are extracted with features based

on the localization of the playing time. The resulting digitized signal of the performance is input into a bidirectional LSTM network, and the evaluation results are obtained by the attention mechanism layer and Softmax function classification, and the output.

## 2. NEURAL NETWORK-BASED PIANO PERFORMANCE EVALUATION

### 2.1. FEATURE EXTRACTION OF PIANO PERFORMANCE MUSIC

#### 2.1.1. MUSIC PERFORMANCE BASED ON MIDI STANDARDS

When a performer plays music on a MIDI instrument, the MIDI instrument converts the player's manipulation of the instrument into MIDI signals, which are transmitted via cable to the sequencer. In fact, a sequencer is a piece of software that stores, edits and forwards MIDI signals. The MIDI signal stored by the sequencer is the MIDI file, which can be edited and finally output to the sound source.

The MIDI signal is transmitted over a cable, using a serial asynchronous method, at a rate of 31.25 Kbaud, which consists of one start bit, eight data bits and one end, with the eight data bits forming a byte. It is divided into a status code and a data code. The status code is followed by a series of data codes, and the length of the data code is determined by the status code. Due to the serial transmission, the data codes take the form of multiple codes, and different MIDI codes constitute different MIDI messages.

#### 2.1.2. EXTRACTION OF PIANO TONE FEATURES

The effect of the note played by the performer is directly related to the correctness of the key presses, their strength and duration. The extraction of tone characteristics is essentially a matter of determining the strength, duration, and correctness of key presses. In this paper, a standard MIDI volume value is obtained to determine the student's ability to play a single note with a certain amount of force, i.e., the difference between the volume value of the MIDI signal and the standard value.

#### 2.1.3. EXTRACTION OF RHYTHMIC FEATURES

The rhythmic features are extracted for each bar of the music score. Based on the division of the score into musical measures, each measure of the performed piece can be accurately located. The rhythm and beat of the current measure can be extracted by locating the time of performance. The rhythm is the relationship between the length of a certain note interval, that is, to extract the point of articulation and the length of articulation of each note in the current bar, and to synthesize the degree of the player's grasp of the rhythm of this bar. The difference between the articulation point of each note and the standard value is extracted and multiplied by the weight of the note to obtain the degree of good or bad grasp of the rhythm of the current bar:

$$f(x) = \sum |(S_i - B_i)|Q_i + \|E_i - D_i\|Q_i \quad (1)$$

where  $i$  is the number of the note in the measure,  $S$  is the time when the player presses the key, and  $B$  is the standard time.  $E$  is the time when the player releases the key,  $D$  is the standard release time, and  $Q$  is the corresponding weight for the different notes.

### 2.2. MIDI PIANO PERFORMANCE EVALUATION BASED ON BIDIRECTIONAL LSTM NETWORKS

In order to implement the function of evaluating multiple piano music, multiple sub-network models are designed, each sub-network model needs to be trained separately, and multiple sub-network models are evaluated for specific piano music.



### 2.2.1. TWO-WAY LSTM LAYER

By studying the MIDI format, we can know that the music feature sequence can be regarded as a longer time sequence. LSTM, as an improved version of RNN, effectively improves the gradient disappearance and gradient explosion problems by adding three special gate components. However, LSTM and RNN can only process data along one direction in the time series problem, and often ignore the future information. While the bidirectional LSTM network can propagate not only forward but also backward, this way of combining past information with future information is similar to human enjoying music, and more reliable parameters are obtained when the model is trained.

### 2.2.2. ATTENTION MECHANISM LAYER

The Attention mechanism was first used in the image domain and its main idea is to design a pattern recognition by identifying the core content. The attention mechanism algorithm is shown in the following equation:

$$\alpha = \frac{\exp(e_{t,i})}{\sum_{j=1}^N \alpha_{t,i} h_i} \quad (2)$$

$$c = \sum_{j=1}^N \alpha_{t,i} h_i \quad (3)$$

where  $e_{t,j}$  denotes the network output of the bidirectional LSTM.

### 2.2.3. SOFTMAX CLASSIFICATION

The Softmax function is a nonlinear function that maps the output of multiple neurons to a vector of real numbers in the interval 1 and the sum of all elements in the vector of real numbers is (0,1). The Softmax function expression is:

$$S(x_j) = \frac{e^{x_j}}{\sum_{k=1}^K e^{x_k}}, j = 1, 2, \dots, K \quad (4)$$

where  $S(x_j)$  denotes the value of the  $i$  nd dimension of the feature vector and  $k$  denotes the number of categories.

Then, the categorical labels for MIDI music evaluation prediction are calculated as

$$\hat{m} = \arg \max S(x_j) \quad (5)$$

## 3. THE INTEGRATION OF PIANO PERFORMANCE EVALUATION TEACHING AND TRADITIONAL MUSIC CULTURE

### 3.1. EVALUATION OF THE INTEGRATION OF TRADITIONAL MUSIC CULTURE IN PIANO PERFORMANCE

In this paper, we construct a quantitative evaluation method for piano performance based on artificial intelligence techniques. In this subsection, we will use this method to analyze the integration of traditional music culture in piano performance teaching. The evaluation of traditional music elements in piano performance before and after teaching is shown in Figure 1. With the integration of traditional music elements, the evaluation of piano performance in terms of meter increased by 12.41%, the evaluation of prosody increased by 8.65%, and the evaluation of rhythm increased by 10.32%. In the process of teaching piano performance, it can cultivate students' traditional music culture for a long time and has strong teaching

effectiveness.

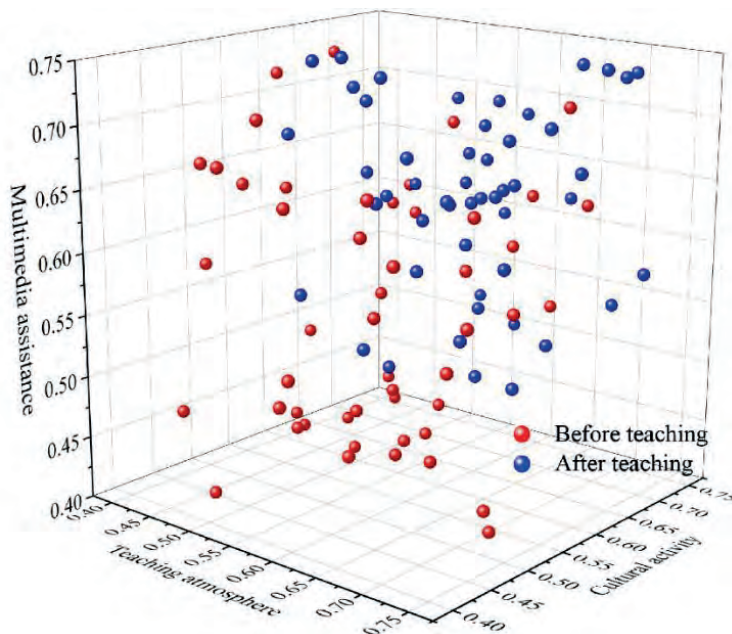
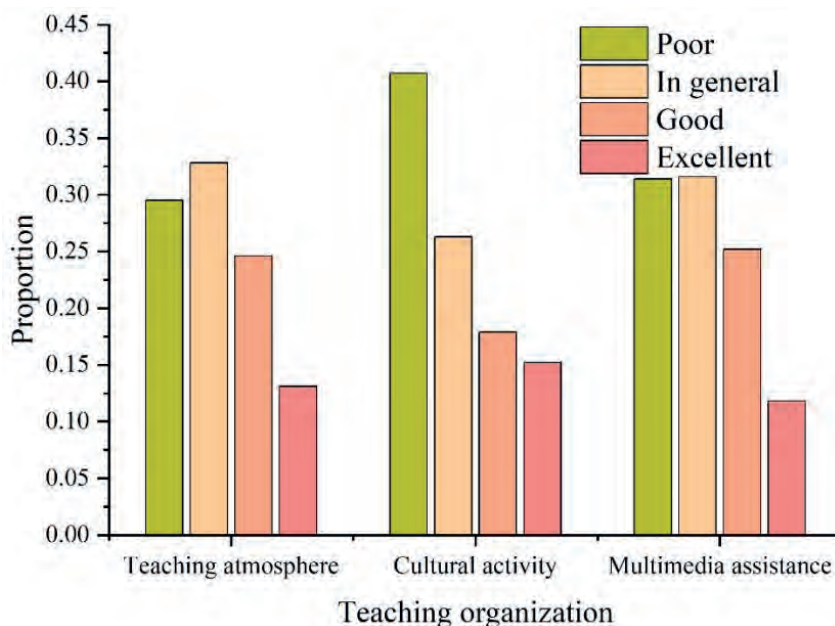


Figure 1. Evaluation of traditional music elements in piano performance

### 3.2. INTERPRETATION OF THE INTEGRATION OF TRADITIONAL MUSIC CULTURE IN PIANO TEACHING IN HIGHER EDUCATION

The integration of traditional music culture in college piano teaching needs to be organized through a certain teaching organization. The organization of integration of traditional music culture in piano teaching is shown in Figure 2. Only 13.1% of the teaching atmosphere is evaluated as excellent, only 15.2% of the traditional music culture is rich in activities, and only 11.8% of the teaching atmosphere can make full use of multimedia teaching. The good or bad teaching atmosphere is very critical to students' learning efficiency, and music teaching in colleges and universities must create a good teaching atmosphere and create a traditional cultural teaching environment so that students can learn in a traditional music cultural environment. In order to better let students inherit traditional music culture in piano teaching, colleges and universities should regularly hold campus music culture activities, such as piano performance competitions.



## Figure 2. The integration organization of traditional music culture in piano teaching

### 4. CONCLUSION

Based on artificial intelligence algorithm, this paper constructs a music performance evaluation method applied to piano teaching, and explores the organization of traditional music culture integration in college piano teaching by exploring the evaluation effect of traditional culture integration into piano performance teaching. In the music teaching in colleges and universities, piano teaching and traditional music culture are one and the same. Therefore, colleges and universities must pay attention to piano teaching, and through improving piano teaching level, and then achieve the purpose of inheriting and promoting traditional music culture.

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# RESEARCH ON HOLE SYNERGY PROCESS DESIGN AND CONTROL TECHNOLOGY OF STAINLESS STEEL CLADDING ANGLE

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## ABSTRACT

In this paper, based on the finite element calculation of the elastic-plastic strain tensor, strain and displacement of steel bars, a finite element model is established for the hole-rolling process of stainless steel cladding angles under the assumption that the conditions are valid. The minimum wall thickness of group A is 0.793 mm and the maximum wall thickness is 1.274 mm, the difference between the maximum and minimum wall thickness of group B is 0.481 mm. The minimum wall thickness value is 0.731 mm and the maximum wall thickness value is 1.248 mm, with a maximum difference of 0.517 mm from the minimum wall thickness.

## KEYWORDS

Stainless steel cladding; Hole type system; Finite element simulation; Contact stress; Strain tensor; Strain versus displacement

## 1. INTRODUCTION

Stainless steel cladding rebar has better corrosion resistance than ordinary carbon steel rebar, and its outer layer of stainless steel can well prevent the infiltration of chloride ions, reduce the corrosion of the rebar in normal use, and prolong the service life of the rebar [1-3]. In addition, compared to solid stainless steel bars, stainless steel cladding bars can effectively save stainless steel under the premise of achieving the same corrosion resistance. The production of stainless steel cladding bars using the rolling method is different from the

production of traditional mild steel bars, the rolling process there is a relative shear movement deformation of stainless steel and mild steel, the relative sliding between the two metals directly constrains the occurrence of the composite [4-5]. As the deformation of the two metals and the composite are occurring in the process of rolling through the rolling rod, so the impact of the hole system on the composite condition of carbon steel and stainless steel is the most direct and important [6-7]. How to use the hole pattern to reasonably distribute the amount of metal deformation in each pass, so that stainless steel and mild steel through several passes of rolling to achieve a good metallurgical bond, as well as the impact of different hole pattern systems on the rolled composite condition is relatively little research [8-9]. Therefore, it is important to study the effect of different hole-type systems on the composite condition of stainless steel cladding bars.

## 2. FINITE ELEMENT SIMULATION OF STAINLESS STEEL CLADDING ROLLING

### 2.1. FINITE ELEMENT CALCULATION OF ELASTICITY OF REINFORCING STEEL

#### 2.1.1. STRAIN TENSOR

The change of distance between the masses in an object is the basic sign of the deformation of the object. Since the rigid motion of the object does not produce deformation, the change of distance between the masses can be used to describe the deformation. In the three-dimensional space right-angle coordinate system, the distance between two adjacent masses  $P(X_i)$  and  $Q(X_j + dX_j)$  at the initial moment is

$$(dL_0)^2 = (dX_1)^2 + (dX_2)^2 + (dX_3)^2 = \delta_{ij} dX_i dX_j \quad (1)$$

At the end moment, the two masses reach new positions  $P'(X_i)$  and  $Q'(X_j + dX_j)$  at a distance of

$$(dL)^2 = (dx_1)^2 + (dx_2)^2 + (dx_3)^2 = \delta_{ij} dx_i dx_j \quad (2)$$

The amount of change in the square of the distance between two points is

$$(dL)^2 - (dL_0)^2 = \left( \delta_{\alpha\beta} \frac{\partial x_\alpha}{\partial X_i} \frac{\partial x_\beta}{\partial X_j} - \delta_{ij} \right) dX_i dX_j \quad (3)$$

Then  $(dL)^2 - (dL_0)^2 = 2E_{ij} dX_i dX_j$ , the left side of the equation is a tensor, and  $dX_i dX_j$  is a second-order tensor. It is known that  $E_{ij}$  is a second-order tensor and  $E_{ij} = E_{ji}$ , then  $E_{ij}$  is a second-order symmetric tensor, called the Green's strain tensor.

#### 2.1.2. STRAIN AND DISPLACEMENT

Let the coordinates of the mass point with initial coordinates  $X_i$  be  $x_i$  at the last moment position and its displacement component be  $u_i$ . Then we have

$$\frac{\partial x_\alpha}{\partial X_i} = \frac{\partial u_\alpha}{\partial X_i} + \delta_{\alpha i}, \quad \frac{\partial x_\alpha}{\partial x_i} = \delta_{\alpha i} - \frac{\partial u_\alpha}{\partial x_i} \quad (4)$$

Substitution yields:

$$E_{ij} = \frac{1}{2} \left[ \delta_{\alpha\beta} \left( \frac{\partial u_\alpha}{\partial X_i} + \delta_{\alpha i} \right) \left( \frac{\partial u_\beta}{\partial X_j} + \delta_{\beta j} \right) - \delta_{ij} \right] \quad (5)$$

$$e_{ij} = \frac{1}{2} \left[ \delta_{ii} - \delta_{\alpha\beta} \left( \frac{\partial u_{\alpha}}{\partial x_i} + \delta_{\alpha i} \right) \left( \frac{\partial u_{\beta}}{\partial x_j} + \delta_{\beta j} \right) \right] \quad (6)$$

Thus, the relationship between strain and displacement is obtained as

$$E_{ij} = \frac{1}{2} \left( \frac{\partial u_i}{\partial X_j} + \frac{\partial u_j}{\partial X_i} + \frac{\partial u_k}{\partial X_i} \frac{\partial u_k}{\partial X_j} \right) \quad (7)$$

$$e_{ij} = \frac{1}{2} \left( \frac{\partial u_i}{\partial e_j} + \frac{\partial u_j}{\partial e_i} + \frac{\partial u_k}{\partial x_i} \frac{\partial u_k}{\partial x_j} \right) \quad (8)$$

## 2.2. ESTABLISHMENT OF FINITE ELEMENT MODEL

### 2.2.1. HYPOTHETICAL CONDITIONS

Finite element simulation is an approximate calculation, and there is still some difference between it and the actual situation. When modeling, try to consider a variety of factors in order to get a more realistic description of the rolling process. In order to facilitate finite element analysis calculations, reduce computing time, without changing the nature of the research problem, the simulation process to make the following assumptions:

(1) As the rolling is carried out at high temperatures, the impact of the deformation of the rolling series on the deformation of the rolled parts is very small, so ignore the elastic deformation of the rolling series, the rolling series is defined as a rigid body.

(2) The contact heat transfer between the roll and the roll stick, the roll plastic deformation work heat, the impact of convective heat transfer on the free surface of the roll to be considered.

(3) Plastic zone metal deformation obeys Plante-Ruiz flow law.

(4) The material obeys the Mises yield criterion.

### 2.2.2. FINITE ELEMENT GEOMETRY MODEL

Due to the symmetry of rolling, a quarter of the rolled part is taken to build the model, and the section nodes are taken to be symmetrically constrained. The unit is an eight-node hexahedral unit, and the length of the rolled part is finally determined to be 140 mm after several simulations to facilitate comparison with later experiments. The core material is Ck15 with a diameter of 15 mm, and the section is divided into 42 units. The shell material is 304 stainless steel with a thickness of 2.2 mm, and the cross-section is divided into 25 units, and the cross-sectional cladding area accounts for 34% of the total cross-sectional area of the rolled part.

In this paper, the rolling temperature of the simulated hot-rolled composite process is 1150 °C. The mechanical properties of stainless steel and plain carbon steel at this temperature are shown in Table 1. The coordinate systems in Pro/E and MARC are completely overlapping, and the geometric model bodies are kept in their original relative positions after the files are transferred between the two software. The flat elliptical hole-shaped stick and round hole-shaped spokes were drawn in Pro/E with a diameter of 212 mm, and saved in IGS format.

**Table 1.** Mechanical properties of stainless steel and carbon steel

	Yield limit	Modulus of elasticity	Density	Bosson ratio
304 stainless steel	69	203	7950	0.35
Ck15	48	213	7850	0.35

### 2.3. BOUNDARY CONDITION SETTING

Boundary conditions are also called support conditions in structural mechanics, mainly including stress analysis boundary conditions and temperature boundary conditions. In this paper, the boundary conditions of the rolling model are mainly temperature boundary conditions, including contact heat transfer conditions and convective heat exchange conditions and radiation heat exchange conditions.

The surfaces of the two objects in contact are called thermal contact when mechanical loads are transferred and heat is generated and exchanged on the contact surface. Two objects in contact with the contact interface, contact heat transfer occurs, contact heat transfer by heat transfer can be expressed as follows:

$$q = h_c (T_{b1} - T_{b2}) \quad (9)$$

where  $q$  is the heat transferred through the boundary in  $\text{kW/m}^2$ .  $T_{b1}$  and  $T_{b2}$  are the temperatures of the two contact surfaces in  $\text{K}$ , respectively.  $h_c$  is the contact heat transfer coefficient at the contact interface in  $\text{kW}/(\text{m}^2 \cdot \text{K})$ .

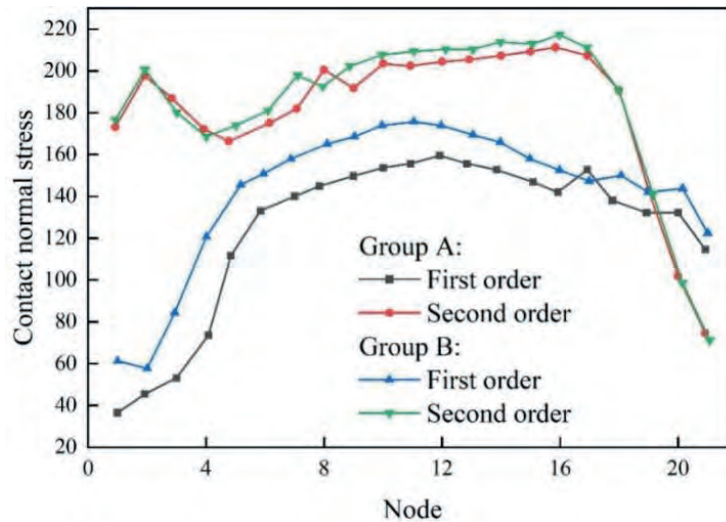
### 3. COMPARATIVE ANALYSIS OF DIFFERENT HOLE TYPE SYSTEMS FOR ROLLING CLADDING REINFORCEMENT

In order to compare the effect of different extension coefficients on the rolling of overlay reinforcement, two sets of diamond-rinse hole type systems are designed. The preassumed extension coefficients are shown in Table 2, respectively.

**Table 2.** Presuppose the coefficient of elongation

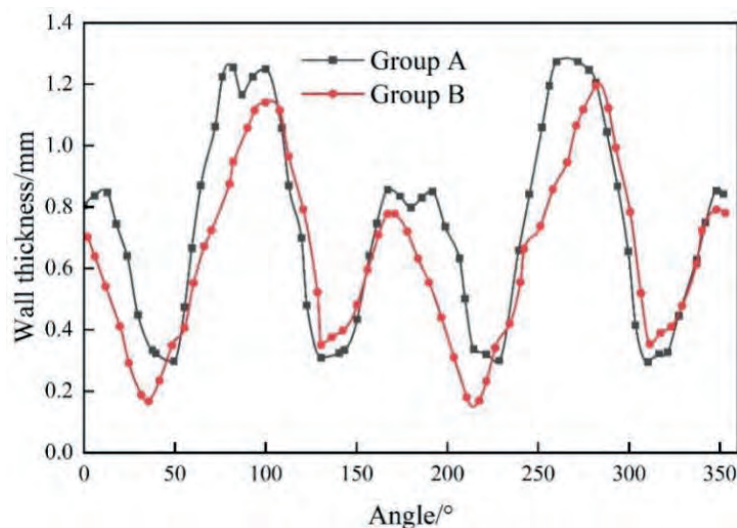
	$\mu_{\Sigma 2}$	$\mu_{\Sigma 4}$	$\mu_{\Sigma 6}$
Group A	1.610	1.542	1.343
Group B	1.622	1.55	1.352

Now, the two groups of rhombus-rhombus type rolling processes with different extension coefficients are compared, and firstly, the positive contact stresses between the two metals are extracted during the first two passes of rolling for groups A and B to ensure the metallurgical bonding of the two metals. The relevant node data extraction is shown in Figure 1. Except for some nodes on the wide spreading side, the contact normal stress between stainless steel and carbon steel in the rest of the nodes can basically reach 145 MPa, and the bonding area between the two metals is relatively reliable. The second pass of rolling, the wide spreading side into the depressed side, due to the first pass of rolling forming, the wide spreading side after the second pass, the amount of depression is very large. From the figure can also be seen that the force between the two metals increased a lot compared to the first pass, and the bonding area of the last pass in the second pass rolling, the contact stress between stainless steel and carbon steel is more than 205 MPa, further consolidating the bonding state of the two metals. After two passes of rolling, the two metals have basically achieved metallurgical bonding.



**Figure 1.** Related node data extraction

After the above analysis, the use of A and B two groups of diamond - diamond hole type system to roll the cladding steel are feasible. After six passes of rolling, the comparison of stainless steel wall thickness distribution along the circumferential direction is shown in Figure 2. The minimum wall thickness of group A is 0.793 mm and the maximum wall thickness value is 1.274 mm, the difference between the maximum and minimum wall thickness is 0.481 mm, and the wall thickness distribution is not uniform. The minimum wall thickness of group B is 0.731 mm and the maximum wall thickness was 1.248 mm, with a difference of 0.517 mm between the maximum and minimum wall thicknesses, and the wall thickness distribution was not uniform. Comparing the two hole type systems, the improvement effect on the wall thickness is not very big. The first and second pass extension coefficients are close to each other, which has a certain effect of improving the uniform wall thickness distribution.



**Figure 2.** The distribution of stainless steel wall thickness along the circumference

#### 4. CONCLUSION

In this paper, based on the hypothetical conditions, a finite element simulation model of hole rolling of stainless steel clad angle is established, and the design method of its synergistic process is studied through the comparative analysis of different hole systems for rolling clad steel bars. In the simulation process, excluding some nodes on the wide spreading side, the contact normal stress between stainless steel and carbon steel in the rest of the nodes can basically reach 145 MPa, and the bonding area between the two metals is relatively reliable.



After multiple passes of rolling, the stainless steel cladding reinforcement has an inner square or irregular shape of the stainless steel inner layer, and this different shape is the result of the uneven accumulation of deformation of the rolled piece as it passes through the different hole patterns. In the index of the uniformity of stainless steel thickness and thickness, the diamond - diamond hole type system has certain advantages.

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# ANALYSIS OF THE EFFECT OF OXYTROPIS GLABRA DC POISONING ON ANIMAL REPRODUCTIVE FUNCTION BY COMBINING PRINCIPAL COMPONENT ANALYSIS METHODS

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## ABSTRACT

In this paper, based on the basic framework of principal component analysis, the sparse principal component method based on the maximum variance method was proposed for the problem that the dimensionality reduction of general principal component analysis data was not obvious enough, and the variation of the original sample points was retained. Then, a test for poisoning of male rabbits with *Oxytropis glabra* was designed, and the data obtained from the experiment were analyzed based on sparse principal components, as a way to investigate the effect of *O. glabra* poisoning on the reproductive function of the animals. Compared with the control group, the haploid apoptosis rate was significantly higher ( $p < 0.05$ ) in the test group than in the control rabbits at day 15, but only the spermatogenic apoptosis rate was significantly higher ( $p < 0.05$ ) in the test 3 group.

## KEYWORDS

Principal component analysis; *Oxytropis glabra* DC poisoning; Maximum variance method; Apoptosis rate; Reproductive function

## 1. INTRODUCTION

*Oxytropis glabra* DC is the most widely distributed and harmful toxic plant in the southern Xinjiang region [1-2]. According to incomplete statistics, nearly 15% of the natural pastures in South Xinjiang have been widely clumped with *O. glabra* DC, and its cover is all around 50%,

and the serious cover can reach more than 95% [3-4]. The main symptoms of poisoned livestock are reproductive and neurological damage, and the main symptoms are pathological changes such as cellular vacuolar degeneration and nuclear atrophy in the testes, ovaries, brain tissue and other substantive organs [5-6]. It has been shown that the main toxic component of *O. glabra* DC, bitter madderin, can cause cell nuclear condensation and DNA fragmentation by affecting the expression of p16, p 53, caspases-3, caspases-9, Bcl-2 and Bax, which eventually leads to apoptosis [7-9].

In this paper, in a poisoning experiment, 54 male rabbits were divided equally into a control group and three experimental groups and kept in separate cages. The control group was fed only green alfalfa hay, while the three experimental groups were fed a mixture of hay with 15%, 30% and 45% of *O. glabra* DC, respectively, and the experimental period was set at 65 days. The experimental data were combined with a modified VM-based sparse principal component analysis to investigate the effect on the reproductive function of the animals.

## 2. SPARSE PRINCIPAL COMPONENT ANALYSIS METHOD

### 2.1. PRINCIPAL COMPONENT ANALYSIS METHOD

#### 2.1.1. BASIC FRAMEWORK OF PRINCIPAL COMPONENT ANALYSIS

Assuming that the number of study data including samples and variables are  $n$  and  $p$ , respectively, and  $p$  variables are represented sequentially as  $X_1, X_2, \dots, X_p$ . The random vector consisting of these  $p$  variables can be represented as  $X = (X_1, X_2, \dots, X_p)$ .  $\mu$  represents the mean of  $X$  and  $\Sigma$  represents the covariance matrix of  $X$ .  $Y$  denotes the extracted principal components, then the principal components are linearly represented by the original variables as follows:

$$\begin{cases} Y_1 = c_{11}X_1 + c_{21}X_2 + \dots + c_{p1}X_p = \mathbf{c}_1^T X \\ Y_2 = c_{12}X_1 + c_{22}X_2 + \dots + c_{p2}X_p = \mathbf{c}_2^T X \\ \vdots \\ Y_p = c_{1p}X_1 + c_{2p}X_2 + \dots + c_{pp}X_p = \mathbf{c}_p^T X \end{cases} \quad (1)$$

Arbitrary original variables can be transformed by equation (1), and the statistical properties of the different principal components obtained differ. The solved principal components lose less information of the original variables under the premise that the variance of  $Y_i = \mathbf{c}_i^T X$  is as large as possible and each  $Y_i$  is independent of each other. The variance of  $Y_i$  can be expressed as

$$\text{var}(Y_i) = \text{var}(\mathbf{c}_i^T X) = \mathbf{c}_i^T \Sigma \mathbf{c}_i \quad (2)$$

For any constant  $a$ , there is  $\text{var}(a\mathbf{c}_i^T X) = a^2 \mathbf{c}_i^T \Sigma \mathbf{c}_i$ . It is necessary to restrict the value of  $\mathbf{c}_i$  so that  $\text{var}(Y_i)$  cannot increase arbitrarily, so certain constraints must be satisfied when performing the linear transformation.

#### 2.1.2. SOLUTION OF COVARIANCE MATRIX BASED ON SINGULAR VALUE DECOMPOSITION

SVD decomposition is a classical method of decomposing a matrix and can decompose any matrix. Suppose there is matrix  $A$ , the steps to decompose this matrix using SVD are as follows:

(1) Find the eigenvalues of matrix  $AA^T$  and their corresponding eigenvectors, and combine these unitized eigenvectors into matrix  $U$ .

(2) Find the eigenvalues of matrix  $A^T A$  and their corresponding eigenvectors, and combine these unitized eigenvectors into matrix  $V$ .

(3) Solve for the square root of the eigenvalues of matrix  $AA^T$  or  $A^T A$  and combine them into matrix  $D$ .

When SVD decomposes the covariance matrix to solve for the principal components, the original analysis variables are first selected according to the actual problem. Then the covariance matrix of the sample is calculated and SVD decomposed to solve for the eigenvalues of the covariance matrix and its corresponding standard orthogonal eigenvectors. Thus, the expressions of the first  $k$  principal components are obtained, the number of principal components is determined, and the appropriate principal components are selected. Finally, the actual data are studied in depth according to the solved principal components.

## 2.2. VM-BASED SPARSE PRINCIPAL COMPONENT ANALYSIS

The main idea of the maximum variance method is to preserve as much variation as possible in the original sample points when projecting the data points into a low-dimensional space. The variance of the maximized first principal component can be equivalently expressed as

$$\max_{v_1} (v_1^T X^T X v_1) \quad s.t. \quad v_1^T v_1 = 1 \quad (3)$$

The addition of the  $L_1$  penalty function to the objective function introduces a sparse PCA framework:

$$\max_{v_1} (v_1^T X^T X v_1 - \lambda_1 \|v_1\|_1) \quad s.t. \quad v_1^T v_1 = 1 \quad (4)$$

where  $\lambda_1 \geq 0$  is the regularization parameter that controls the amount of shrinkage on the first PC. It can be seen that the larger the value of  $\lambda_1$ , the larger the shrinkage. Then, based on the first  $j-1$  PCs, the  $j$ th sparse PC can be solved by the following optimization problem:

$$\begin{aligned} \max_v \quad & v^T X^T X v - \lambda_j \|v\|_1 \\ s.t. \quad & v^T v = 1, v^T v_1 = 0, \dots, v^T v_{j-1} = 0 \end{aligned} \quad (5)$$

where  $\lambda_j \geq 0$  is the regularization parameter that controls the amount of shrinkage on the  $j$ nd PC.

Since the principal components are required to be orthogonal,  $j-1$  constraint is added to solve the  $j$ nd PC, which makes the problem difficult to solve. The basic idea of the algorithm proposed in this paper is to reduce the problem to a series of optimizations in the two-dimensional plane under the constraint of unit parametrization. This boils down to the maximization of a series of features on the unit circle. This is only a univariate maximization problem and can be solved by grid search.

## 3. OXYTROPIS GLABRA DC POISONING TEST

### 3.1. TEST MATERIALS

Small-flowered echinocereus was taken from the above-ground part, and the samples were

air-dried. Detection reagents included total SOD assay kit, SOD typing kit. Rabbit SOD primary antibody, SABC immunohistochemistry kit, DAB color development kit. Total RNA extraction kit, Real - time q PCR kit, 5810R high-speed frozen centrifuge, 5331 PCR instrument, Realplex2 real-time fluorescence quantitative PCR instrument, CX31 biological microscope, DSC microtome, HI1220 temperature-controlled baking table.

### 3.2. TEST METHODOLOGY

Fifty-four male rabbits were divided equally into control and three experimental groups and kept in separate cages. The control group was fed only green alfalfa hay, while the three experimental groups were fed a mixture of hay with 15%, 30% and 45% of *O. glabra* DC, respectively, for 65 days. The testes and epididymis of five rabbits were dissected on days 15, 30 and 65, and some tissues were homogenized and tested for SOD activity, some tissues were fixed in Bouin's solution and stained for immunohistochemistry, and some tissues were used for Real-time PCR and Western Blot.

The primers were designed using Beacon Designer software with reference to the sequences of rabbit T- SOD, Cu/Zn - SOD, Mn - SOD and  $\beta$ -actin genes published in GenBank, and the primer information is shown in Table 1. Total RNA was extracted from rabbit testis and epididymal cells using the kit, followed by reverse transcription. 1.0  $\mu$ L of RT Primer Mix and 10.0  $\mu$ L of RNA extraction solution were used. Reaction conditions were 15 min at 37°C.

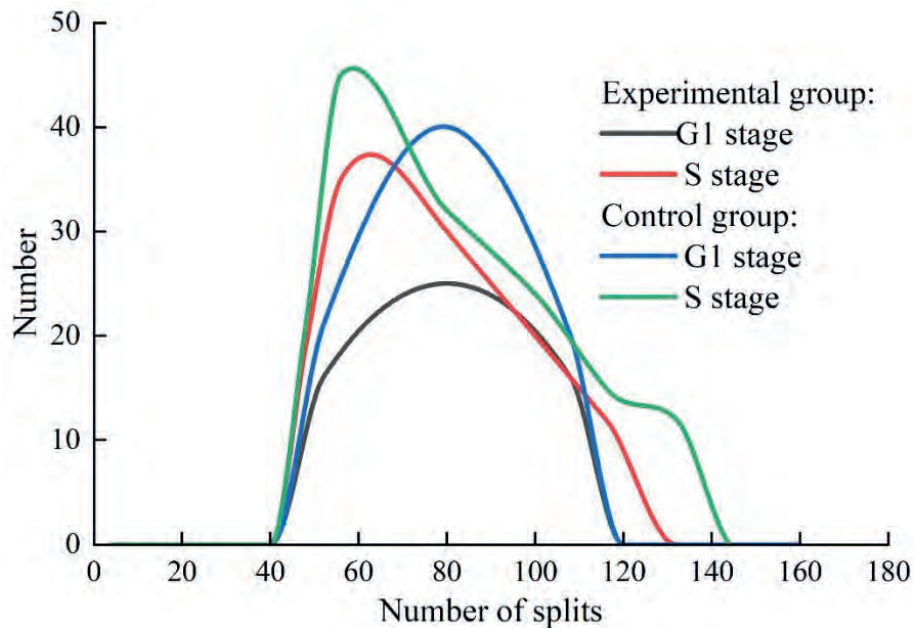
**Table 1.** Test all primer information

Item	Primer and probe sequence	Size of product
T-SOD	AATGCCCGCCAAAGCAGTT	498
Cu/Zn - SOD	GAGCCTTTCCCCGAGTCAT	153
Mn - SOD	GTGGGCCGCTCTAGGCACCA	246
$\beta$ -actin	ATTAACGCGCAGATCATGCAG	482

## 4. SPARSE PC-BASED EXPERIMENTAL DATA ANALYSIS

### 4.1. EFFECT OF OXYTROPIS GLABRA DC POISONING ON THE SPERMATOGENIC CELL CYCLE OF RABBIT TESTIS

The spermatogenic cell cycle of the experimental and control rabbits was examined as shown in Figure 1, and the number of stage  $G_0 / G_1$  cells gradually increased and the number of stage  $S$  cells gradually decreased in testicular spermatogenic cells of *O. glabra* DC-intoxicated rabbits compared with the control rabbits. There was a significant negative correlation between the number of stage  $G_1$  and stage  $S$  cells. The changes were obvious in the high-dose *Echinocereus floresiensis* poisoned rabbits. The testicular spermatogenic cells of rabbits were mainly divided into haploid cells, diploid cells and tetraploid cells. Compared with the control group, the apoptosis rate of haploid cells in the test group was significantly higher than that of the control rabbits at day 15 ( $p < 0.05$ ), but only the apoptosis rate of spermatogonia in the test 3 group was significantly higher than that of the control rabbits ( $p < 0.05$ ). The apoptosis rates of haploid cells and spermatogonia in the test groups were significantly higher than those in the control rabbits at day 30 ( $p < 0.01$ ), but the apoptosis rates of diploid cells were significantly higher than those in the control rabbits.



**Figure 1.** Comparison of spermatogenic cell cycle detection in rabbits

#### 4.2. EFFECTS OF OXYTROPIS GLABRA DC POISONING ON REPRODUCTIVE CELLS OF MALE ANIMALS

The effects of *P. minor* poisoning on the reproductive system of livestock were significant, with males exhibiting low libido and no mating ability. The main toxic component of *O. glabra* DC caused a significant decrease in the proportion of male spermatogonia transformed into primary spermatocytes, and further tests revealed that the number of stage  $G_0 / G_1$  cells in the reproductive organs of poisoned males increased significantly and the number of stage *S* cells decreased sharply. The toxic effects of *O. glabra* DC significantly inhibited the DNA synthesis of reproductive cells in stage *S* and significantly affected the entry of reproductive cells from stage *S* to stage  $G_2 / M$ . However, it had a facilitating effect on the entry of reproductive cells into stage  $G_1$ . The DNA content, intracellular  $Ca^{2+}$  concentration and mitochondrial membrane potential of the reproductive cells of male livestock poisoned with *O. glabra* DC were measured by flow cytometry, and it was found that bitter madderin significantly increased the apoptosis rate of spermatogonia and secondary spermatocytes, but did not significantly affect the apoptosis rate of primary spermatocytes, the reproductive cells in the division and proliferation stage were more sensitive to the main toxic components of *O. glabra* DC.

#### 5. CONCLUSION

*O. glabra* DC poisoning significantly affected the activity and expression of SOD enzymes in testis and epididymis tissues of rabbits. After 30 days of attack, the T-SOD, Cu/Zn-SOD and Mn-SOD activities in testis, and epididymis tissues of rabbits poisoned with *O. glabra* DC were extremely significantly lower than the control. T-SOD, Cu/Zn-SOD and Mn-SOD mRNA expressions and protein expressions were highly significant lower than the control. *O. glabra* DC poisoning caused a decrease in the antioxidant capacity of testes and epididymis in rabbits, which led to impairment of their reproductive function.

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# **ANALYSIS OF THE IMPACT OF CROSS-BORDER E-COMMERCE PLATFORM EMPOWERMENT ON THE EXPORT EFFICIENCY OF MANUFACTURING ENTERPRISES**

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## **ABSTRACT**

The development of cross-border e-commerce has brought significant changes to the export benefits of manufacturing firms. This paper constructs a structural equation model oriented to cross-border e-commerce and firms' export competitiveness, establishing the variables of cross-border e-commerce from internal and external dimensions, and the variables of firms' export competitiveness from two dimensions: explicit competitiveness and potential competitiveness. Controlling other factors constant, the coefficients of export cross-border e-commerce treat are all significantly negative, and the competitiveness score of cross-border e-commerce is significantly lower than that of e-commerce exporters by 0.09. In the context of cross-border e-commerce, this study can help manufacturing enterprises to improve their export effectiveness.

## **KEYWORDS**

Cross-border e-commerce; Export efficiency; Structural equation modeling; Export competitiveness; Manufacturing firms

## **1. INTRODUCTION**

Cross-border e-commerce has become the theme of the times in recent years, and the market scale is growing rapidly [1]. The State Council and the General Administration of Customs have recently issued intensive documents to encourage cross-border e-commerce, boosting it to become an industry hotspot, and cross-border e-commerce will maintain its rapid development in the coming years [2-3]. With its own unique advantages of the Internet, cross-border e-commerce cleverly circumvents the drawbacks of long time, large capital and high cost in traditional trade, and creates a geographical and time unlimited transaction environment [4]. Cross-border e-commerce greatly facilitates buyers from all over the world and accelerates the global circulation of various goods [5-6].

Yu, W et al. conducted an in-depth study on the impact of cross-border e-commerce on international trade [7]. Chen, N et al. and other scholars proposed and verified that cross-border e-commerce as an important part of enterprise innovation, its business model innovation not only expands the connotation of electronic on the basis of the above-mentioned studies, commerce, and brings more new business opportunities for enterprises [8]. Giuffrida, M et al. conducted a study for Chinese online exporters and third-party freight logistics service providers, and used structural equation modeling analysis to assess firms' export risk management strategies [9]. Qi, X et al. used transaction cost theory as a basis to explain the motivational choice of cross-border e-commerce entry modes [10]. In the context of considering cross-border e-commerce supply chains, Liu, Z et al. proposed a series of



models based on blockchain technology, aiming to provide a new solution for cross-border e-commerce supply chain management [11]. Ma, S et al. studied the impact of applying different risk mitigation strategies on international online suppliers for cross-border e-commerce, and pointed out that customers would suffer less default losses in the context of increased frequency of post-event investigations [12].

## 2. INFLUENCE ANALYSIS MODELING

### 2.1. STRUCTURAL EQUATION MODEL

Based on the covariance matrix of variables, structural equation modeling (SEM) is an important method for impact factor studies. In it, the measurable variables are called observed variables and the non-measurable variables are called latent variables.

The equation of the measurement model is as follows:

$$y = \Lambda_y \eta + \varepsilon \quad (1)$$

$$x = \Lambda_x \xi + \delta \quad (2)$$

The structural model is calculated as follows:

$$\eta = B\eta + \Gamma \xi + \zeta \quad (3)$$

The fit is the central part of the structural equation model evaluation analysis, which represents the degree of fit of the variables and thus determines whether the model is scientifically valid.

### 2.2. VARIABLE STRUCTURE

#### 2.2.1. RESEARCH DIMENSIONS OF CROSS-BORDER E-COMMERCE

This paper identifies the research dimensions of cross-border e-commerce applications from both internal and external enterprise perspectives. The internal dimensions of enterprises include human resources, organizational structure and capital management. The external dimensions include laws and regulations and technological environment. The variable dimensions of cross-border e-commerce are shown in Table 1.

**Table 1.** Variable dimension of cross-border e-commerce

Environment	Dimension	Characteristic
Internal dimension	Human resources	The rapid transmission of information
	Organizational structure	Flatness
	Fund management	Efficiency of fund use
External dimension	Laws and regulations	Important safeguard function
	Technical environment	Play the role of carrier

#### 2.2.2. RESEARCH DIMENSIONS OF ENTERPRISE EXPORT COMPETITIVENESS

In this paper, we measure the competitiveness of companies in terms of both apparent and potential competitiveness. The variable dimensions of the export competitiveness of enterprises are shown in Table 2. The development of global Internet technology, the improvement of logistics level, the improvement of financial system and the improvement of economic level provide intrinsic and extrinsic conditions for the expansion of cross-border e-commerce market demand.

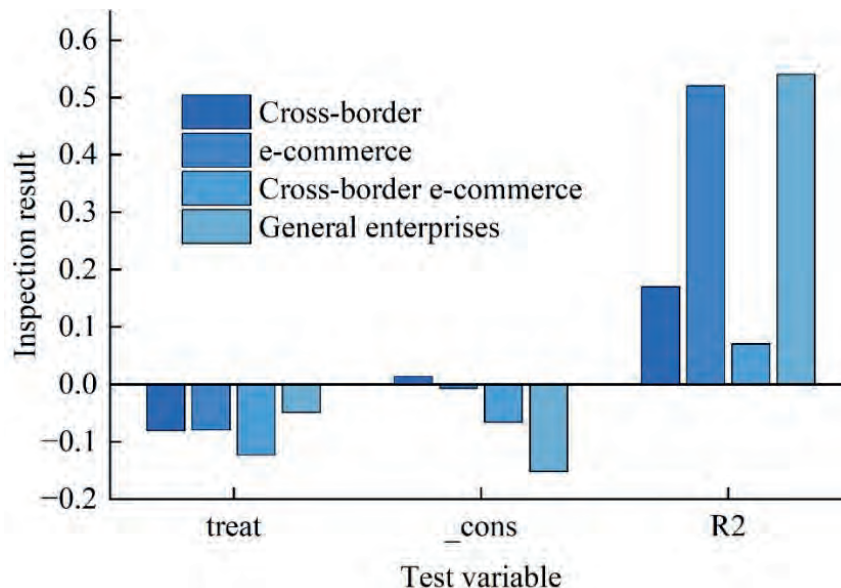
**Table 2.** The variable dimension of export competitiveness of enterprises

Environment	Dimension	Characteristic
Apparent competitiveness	Market demand	Expansion of demand
	Process cost	Determine the profitability of the enterprise
	Fund efficiency	Velocity of payment for goods
Potential competitiveness	Information sharing	Optimal allocation of resources
	Service level	E-commerce operation status
	Customer satisfaction	The business prospect of the enterprise

### 3. EMPIRICAL ANALYSIS OF CROSS-BORDER E-COMMERCE AND EXPORT EFFICIENCY OF ENTERPRISES

#### 3.1. ANALYSIS OF THE IMPACT OF EXPORT COMPETITIVENESS

The results of the empirical test of the competitiveness profile of exporting firms are shown in Figure 1. Controlling for other factors, the coefficients of export cross-border e-commerce treat are all significantly negative, and the competitiveness score of cross-border e-commerce is significantly lower than that of e-commerce exporters by 0.09. This indicates that the average firm competitiveness of export cross-border e-commerce is lower than that of other firms from 2015 to 2019. Since this finding is contrary to the theory, it implies that in analyzing the five-year sample interval from 2015 to 2019, there may be cross-sectional differences between the samples due to time-series effects, and inappropriate results may be obtained. Further study finds that the competitiveness of cross-border e-commerce export enterprises decreases significantly in 2019, which is significant at the 0.01 level in 2019, and its marginal effect shows an incremental increase. It indicates that the effect of reducing the competitiveness of enterprises in the experimental group in 2019 is larger than that in 2018, probably because the United States is the official start of the larger amount of Chinese goods tax in June, and the degree of impact on the competitiveness of enterprises in the first six months is not significant.



**Figure 1.** The empirical test results of the competitiveness of export enterprises

#### 3.2. THE IMPACT OF ENTERPRISE EXPORT EFFICIENCY

Compared with traditional trade transactions, both sides of the business in cross-border e-commerce mode can easily obtain the required information from the constructed platform or diversified ways. For small and medium-sized enterprises, they can avoid spending more time

and money on human search, and can directly obtain a lot of useful information related to the market, on the basis of which they can make their own business strategies more scientifically and effectively.

The development of the Internet platform makes it possible for both sides to communicate instantly through the Internet, so that they no longer need to face the distance and language barriers and negotiate face-to-face, as in the traditional trade model. At the same time, due to the dual limitations of time and space, the traditional business faction can usually only talk to one side of the import or export enterprises, and cannot reach the optimal choice with the least cost of time and space. In the waste of human resources, but also will face a greater risk of loss. In the cross-border e-commerce model, the “de-intermediation” of the e-commerce platform not only removes the link of trade intermediaries, but also simplifies the complexity of time and space, and overcomes the distance and language differences. On the basis of the breakthrough of time and space restrictions, it expands the range of choice of customers for enterprises.

#### **4. CONCLUSION**

Compared with the traditional trade model, cross-border e-commerce model has a great role in reducing the cost of SMEs' participation in the international market, thus improving the export efficiency of enterprises, and cross-border e-commerce has advantages for enterprises. However, it is also evident that there are many problems behind the immature e-commerce background. The study makes the following recommendations:

(1) Develop cross-border e-commerce-related laws and regulations, including standardization of transaction process, payment, and logistics.

(2) Promote the transformation and upgrading of enterprises, especially increase the integration of SMEs into the international market, lower the threshold of internationalization for SMEs, and encourage and support SMEs to strengthen infrastructure construction. Facilitate the construction and participation in the international market.

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# OBSERVATION OF THE EFFECT OF PSYCHOLOGICAL INTERVENTION OF MEDICAL NURSING IN THE CONTEXT OF DEEP LEARNING ON THE PREVENTION COMPLIANCE OF HIGH-RISK PATIENTS WITH ORTHOPEDIC STRESS INJURY

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## ABSTRACT

This paper firstly discusses the medical principles and care protocols of orthopedic stress injuries and proposes a psychological intervention for their compliance problems. Then, a comparative experiment was used to study the differences in the time effect, between-group effect and interaction effect between the two groups to analyze the correlation between medical care and the effect of psychological intervention on compliance, and to analyze the reasons for the differences in the results. The difference in scores between the intervention and non-intervention groups was statistically significant at  $P < 0.05$ , and the adherence scores were higher in the intervention patients than in the non-intervention patients. This study provides a new idea and reference for the field of medical care and provides a basis and reference for psychological interventions to prevent adherence.

## KEYWORDS

Medical care; Stress injury; Adherence; Psychological intervention; Interaction effect; Correlation analysis

## 1. INTRODUCTION

Psychological intervention is usually a new therapeutic approach to intervene and guide the human body to a normal life when it encounters psychological frustrations and crises by taking a third party to intervene and share the treatment [1-2]. Human physiological and psychological activities are closely interrelated and influence each other psychological activities have an important regulatory role in the functioning of the human body systems and can have a large impact on human daily life, disease processes, etc. [3]. A healthy psychological state is an element of maintaining and improving physical health, which has both a preventive and antidisease effect, as well as a positive transformative effect on the process of disease treatment and recovery [4-5].

Clinical care workers should give psychological care interventions along with clinical medical care to patients Patients also develop new experiences of health in the process of receiving psychological care interventions [6-7]. Through emergency interventions, patients can reduce the purpose of the emergence of risk, on the other hand, can alleviate the patient's inner panic, insecurity, anxiety and other emotions, helping the patient's heart to health more conducive to the recovery of social functions [8-9].

Turner J et al. explored the therapeutic effects of fear interventions and relaxation methods

for cancer survivors and identified their potential mediators and moderators [10]. Hecht L M et al. analyzed the initial treatment effects of psychological interventions provided in primary care for patients suffering from chronic pain [11]. Kabadayi M et al. examined the effectiveness of psychological interventions for different groups with posttraumatic stress disorders and compared the effectiveness of psychological interventions in different groups [12].

## **2. MEDICAL CARE OF ORTHOPAEDIC STRESS INJURIES**

### **2.1. ORTHOPAEDIC STRESS INJURIES**

Pressure injuries originate either vertically or in the horizontal position, and pressure injuries are rarely mentioned clinically. Orthopedic stress injuries, such as spinal compression fractures. When the spine is fallen, the thoracolumbar spine is compressed during the fall due to vertical compressive stresses on the vertebrae and a vertebral compression fracture occurs.

Mostly seen in falls with osteoporosis, the bones may be compressed and flattened, and this is the time to have bone cement. Younger people may be a little more violent and have compression fractures when they fall from a height, and they need to be fixed with nails.

Compression fractures in other parts of the body, the heel bone also has a heel compressive stress when the heel falls from a height, resulting in a compressive comminuted fracture of the heel bone.

The knee joint is also the location of the tibial plateau, and if compressive stress is applied to this plateau, the medial plateau or lateral plateau will collapse, and these are common compression fractures in clinical practice. Less commonly, compression fractures can occur when the foot is crushed by a wheel. This kind is usually accompanied by severe soft tissue or skin compression injuries in addition to the bone being compressed.

### **2.2. PSYCHOLOGICAL INTERVENTIONS FOR ORTHOPAEDIC STRESS INJURIES**

Stress injury prevention includes two aspects. The first is to prevent it from occurring in people at risk. The second is to take measures to prevent it from worsening in patients who have already had it. For the preventive care of stress injury, psychological interventions can be taken.

Should actively give understanding and sympathy to their negative or unreasonable attitude, should remain tolerant calm, fully understand the patient's desperation, fear and bleaching inner pain, with love to ease, persuade the patient, so that they cheer up the courage to live, recognize the value of survival, avoid pessimistic loss stress injury patients often feel pain because of the delay in the course of the disease, prone to anxiety, pessimism, despair and other negative inferiority complex, to the disease The treatment of the loss of confidence, family members or caregivers should be patient and comfort, active guidance, and promote the early recovery of the patient's body.

## **3. CORRELATION ANALYSIS OF THE EFFECT OF PSYCHOLOGICAL INTERVENTIONS ON MEDICAL CARE AND ADHERENCE**

In this paper, high-risk patients with pressure injuries who were hospitalized in an orthopedic center of a tertiary care hospital in city A from June to November 2020 were selected to study the correlation between medical care and the effect of psychological interventions on adherence. The experiment was divided into an experimental group and a control group of 60 patients each, and the experimental group was given medical care while the control group was not given additional medical care.

There was no statistically significant difference between the adherence scores of the two groups before the intervention  $P > 0.05$ . Table 1 shows the comparison of the adherence of the

two groups before the intervention.

**Table 1.** Comparison of compliance between the two groups before intervention

Dimensions.	Experimental group (n=60)	Control group (n=60)	t	P
compliance	5.34±1.29	5.32±1.08	0.334	0.723

Table 2 shows the comparison of the adherence of the patients in the test and control groups before and after their own. The adherence scores of patients in the test and control groups increased after the intervention compared with those before the intervention, and the difference was statistically significant  $P < 0.05$ .

**Table 2.** Comparison of patients' compliance before and after the two groups

group	pre-intervention	post-intervention	t	P
Experimental group	5.32±1.21	7.92±10.32	-15.245	0.000
Control group	5.31±1.02	7.46±0.52	-14.234	0.000

Table 3 shows the comparison of patient compliance between the experimental and control groups after the intervention. The difference between the scores of the two groups after the intervention was statistically significant  $P < 0.05$ , and the adherence scores of patients in the test group were higher than those in the control group.

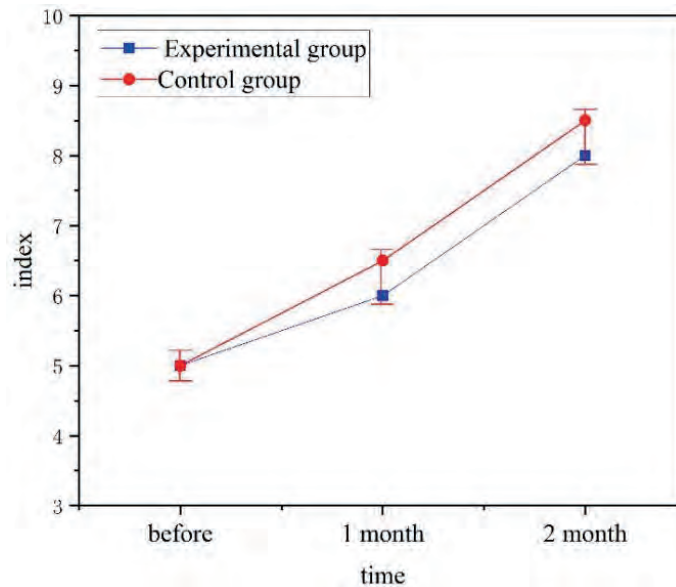
**Table 3.** Comparison of compliance between the two groups after intervention

dimension	Experimental group (n=60)	Control group (n=60)	t	P
compliance	7.93±10.56	7.47±0.56	5.025	0.000

Table 4 shows the adherence scores of the patients in the two groups at different time points. There was no statistically significant difference between the adherence scores of the patients in the test and control groups before the intervention  $P > 0.05$ , and the scores of the test group were higher than those of the control group 1 month and 2 months after the intervention  $P < 0.05$ . Figure 1 shows the trend of the adherence scores of the patients in the two groups at different time points. The adherence scores of the test group and the control group showed an increasing trend.

**Table 4.** Compliance scores of the two groups at different time points

group	Number of people	pre-intervention	1 month after intervention	2 months after intervention	F	P
Experimental group	60	5.36±1.22	6.83±0.83	7.93±10.34	123.611	0.000
Control group	60	5.30±1.04	6.44±0.83	7.44±0.43	98.782	0.000
t		0.345	2.635	5.022		
p		0.743	0.004	0.000		



**Figure 1.** Compliance score trends of the two groups at different time points

The results of the study showed that before the intervention, the adherence scores of the test and control groups were comparable  $P > 0.05$ , and with the extension of time, both the test and control groups showed an increase in the level of adherence, but the adherence scores of the test group were higher than those of the control group  $P < 0.05$ . By repeated measures ANOVA, the results showed statistically significant differences in the time effect, between-group effect and interaction effect of the two intervention groups  $P < 0.05$ , indicating that medical care was effective in enhancing the level of compliance in patients with orthopedic stress injuries.

The analysis may be due to the fact that positive emotions were promoted through positive psychological interventions, and in positive psychological group interventions, patients shared with each other and exchanged their experiences, especially when patients with longer years of illness used their personal experiences to tell their patients the importance of perseverance, which effectively enhanced the compliance of orthopedic stress injury patients. The patients' experience of positive emotion was enhanced, and they faced life with a positive attitude, which enhanced their confidence in disease treatment, thus improving their level of compliance.

#### 4. CONCLUSION

This paper first explored the medical care modalities of orthopedic stress injury, and then investigated the effect of psychological interventions of medical care on prevention compliance in high-risk patients with orthopedic stress injury through a comparative experiment. The following conclusions are drawn:

The scores of the experimental group 1 month after the intervention and 2 months after the intervention were higher than those of the control group  $P < 0.05$ . This indicates that the psychological intervention of medical care on the prevention of compliance in patients at high risk of orthopedic stress injury is effective, and the effect of the intervention is better with the increase of time.

Before the intervention, the adherence scores of the test and control groups were comparable  $P > 0.05$ . With the extension of time, the adherence levels of both the test and control groups showed an increasing trend, but the adherence scores of the test group were higher than those of the control group  $P < 0.05$ . This indicates that medical care can effectively improve the adherence levels of patients with orthopedic stress injury.



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# RESEARCH ON THE INTEGRATION PATH OF CIVIL CONSTRUCTION MAJORS AND INNOVATION AND ENTREPRENEURSHIP EDUCATION IN UNDERGRADUATE INSTITUTIONS IN THE CONTEXT OF INFORMATION TECHNOLOGY

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## ABSTRACT

This paper firstly uses scale statistics to analyze the influencing factors of the integration of civil construction professional and innovation and entrepreneurship education, uses hierarchical analysis to establish an evaluation model to evaluate the importance degree of the factors affecting the integration, and distills the factors affecting the integration of civil construction innovation and entrepreneurship education and professional education at the university level, and calculates the influence weights of each factor through the model indexes, finally, some targeted countermeasures are proposed. The factors affecting the integration influence are curriculum system, practice platform, innovation and entrepreneurship atmosphere, faculty team, innovation and entrepreneurship education concept, professional talent training program, policy support, integration mode, teaching management system and evaluation index system, and their weights are 0.3378, 0.2055, 0.1454, 0.0886, 0.0645, 0.0593, 0.0232, 0.0194, 0.0116, 0.0049.

## KEYWORDS

Civil construction profession; Innovation and entrepreneurship education; Hierarchical analysis; Talent training; Influence weight; Integration path

## 1. INTRODUCTION

In today's rapidly developing world of science and technology, society demands a higher level of quality of human resources, and teaching, research and service to society are the three recognized functions of universities [1-2]. The service to society function is becoming more and more important today, and in the knowledge society, universities are seen as a powerful direct driver for future socio-economic growth, and the economic value brought by knowledge is infinitely estimated [3-4].

With the rapid development of science and technology in today's world, challenges and opportunities coexist, society needs more talents who can adapt to the changes of the times, and universities undoubtedly need to shoulder the task of talent training reform [5-6]. In the field of higher education in China, education related to the advancement of entrepreneurship for students has become a crucial strategic initiative [7]. Chinese universities are deeply aware of the need to combine with professional education [8]. At present, although the two have made certain achievements in the process of development, they still have not achieved the expected results, and need to further vigorously promote a deeper integration of the two [9].

Wang C proposed the use of fuzzy fault tree analysis to evaluate the quality of relevant education and the reliability of mechatronics classroom teaching for university teachers and

students [10]. Georgescu P et al. pointed out that the university should improve the integration of study and research as well as practice to address the imbalance between the supply of talents in universities and the needs of industrial development [11]. Cascais E et al. explored the key factors that influence the self-efficacy of lifestyle entrepreneurs in innovation and entrepreneurship [12].

This paper uses scale statistics to explore the integration status of civil construction majors and innovation and entrepreneurship education, and uses hierarchical analysis to establish an evaluation model to assess the degree of importance of factors affecting integration. At the university level, this paper summarizes the key factors affecting the integration of civil construction majors and innovation and entrepreneurship education, and calculates the influence weight of each factor. In response to the ranking of the influencing factors, relevant countermeasures for the integration of civil construction majors and innovation and entrepreneurship education are proposed.

## 2. ANALYSIS OF FACTORS INFLUENCING THE INTEGRATION OF CIVIL ENGINEERING AND INNOVATION AND ENTREPRENEURSHIP EDUCATION

This paper uses scale statistics to study the factors influencing the integration of civil engineering and innovation and entrepreneurship education, and this paper mainly focuses on University A. A total of 350 and 100 questionnaires were collected from students and teachers respectively, and the final valid questionnaires were 293 and 85 respectively after strict screening. Hierarchical analysis was used to evaluate the importance of factors influencing the integration of innovation and entrepreneurship education and professional education in civil engineering. The importance ranking of factors influencing the integration of innovation and entrepreneurship education and professional education in civil engineering was obtained from the perspective of students and teachers respectively, and finally the main factors influencing the integration of innovation and entrepreneurship education and professional education in civil engineering were extracted by combining the ranking results of students and the ranking results of teachers.

### 2.1. STATISTICAL RESULTS OF THE SCALE

Tables 1 and 2 show the statistical results of the top 10 factors affecting the integration of innovation and entrepreneurship education and professional education in civil engineering according to students and teachers, respectively.

**Table 1.** Statistical results of 10 Factors affecting integration (Student)

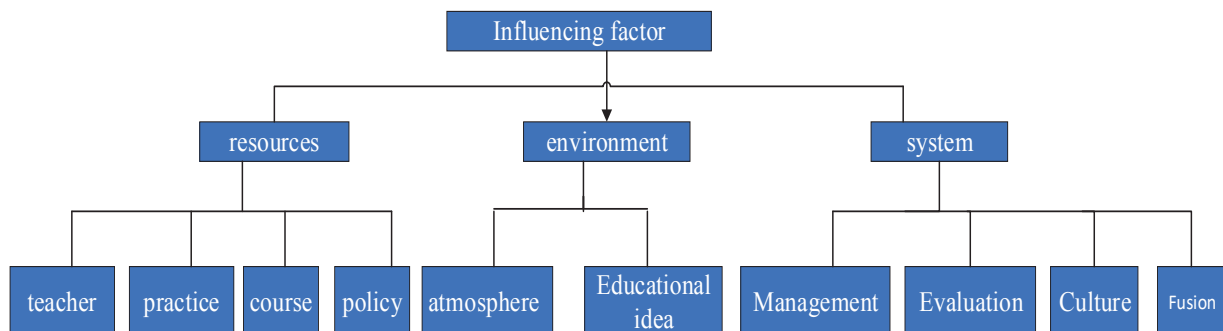
	Have no effect	General effect	Great influence	Great influence	Very large influence	total
Influencing factor	1 points	2 points	3 points	4 points	5 points	
Teaching staff	1.09%	7.54%	19.01%	23.33%	48.5%	4.10252
Practice platform	0.73%	3.95%	16.11%	24.72%	54.49%	4.27659
Curriculum system	1.8%	9.67%	26.85%	20.49%	41.22%	3.83685
Policy support	4.67%	42.68%	29.37%	11.46%	11.85%	2.95729
Climate for innovation and entrepreneurship	0.73%	2.16%	20.42%	25.83%	50.91%	4.34923
Innovation and entrepreneurship education concept	2.16%	2.52%	11.85%	51.96%	31.55%	4.15451
Teaching management mode	4.67%	29.4%	26.18%	24.72%	15.06%	3.26583
Evaluation index system	3.24%	29.40%	31.19%	30.84%	5.37%	3.051
Fusion mode	4.31%	13.86%	44.84%	27.95%	8.95%	3.33834
Professional personnel training program	1.7%	9.33%	30.49%	31.18%	27.25%	3.66379

**Table 2.** Statistical results of 10 factors affecting integration (Teachers)

	Have no effect	General effect	Great influence	Great influence	Very large influence	total
Influencing factor	1 points	2 points	3 points	4 points	5 points	
Teaching staff	2.63%	3.95%	27.65%	27.65%	21.04%	3.87309
Practice platform	1.32%	2.63%	26.5%	26.33%	40.78%	4.14679
Curriculum system	2.63%	3.95%	13.17%	13.15%	48.67%	3.20096
Policy support	10.53%	6.58%	46.04%	46.04%	11.86%	3.92218
Climate for innovation and entrepreneurship	5.26%	10.53%	17.12%	17.12%	44.74%	4.09893
Innovation and entrepreneurship education concept	3.95%	2.63%	21.07%	21.06%	51.34%	3.24703
Teaching management mode	6.58%	25.00%	31.56%	31.56%	9.24%	2.6067
Evaluation index system	9.21%	32.89%	42.15%	42.12%	6.56%	3.05806
Fusion mode	11.84%	14.47%	32.87%	32.88%	18.4%	3.5353
Professional personnel training program	3.95%	19.74%	17.1%	17.1%	27.61%	3.64544

## 2.2. MODELING OF HIERARCHICAL ANALYSIS

Figure 1 Hierarchical structure of the analysis of the factors of integration of innovation and entrepreneurship education and professional education in civil engineering derived from the hierarchical analysis method.



**Figure 1.** Hierarchical structure of fusion factor analysis

## 2.3. ANALYSIS OF MODEL METRICS

The importance ranking of factors affecting the integration of innovation and entrepreneurship education and professional education in civil engineering was derived from students' and teachers' perspectives, respectively, and the main factors affecting the integration of innovation and entrepreneurship education and professional education in civil engineering were extracted by combining the ranking results of students with those of teachers, and Table 3 shows the comparison of integration criteria. According to the size of the score difference of the importance of the two factors, the scale is determined and the judgment matrix of each level is established A. Finally, the respective weight values of the primary and secondary matrices are calculated by YaahpV12.4 software.

**Table 3.** Comparison of fusion criteria

	environment	resources	Management and regulations
environment	1	1/4	3
resources	4	1	7
Management and regulations	1/3	1/7	1

Obtain the first-level judgment matrix:

$$A_1 = \begin{bmatrix} 1 & 1/4 & 3 \\ 4 & 1 & 7 \\ 1/3 & 1/7 & 1 \end{bmatrix}, \quad w_1 = \begin{bmatrix} 0.2109 \\ 0.7049 \\ 0.0841 \end{bmatrix} \quad \lambda_{\max} = 3.0324 \quad (1)$$

Consistency indicators:

$$CI = \frac{\lambda - n}{n - 1} = \frac{3.0324 - 3}{3 - 1} = 0.0162 \quad (2)$$

Consistency ratio:

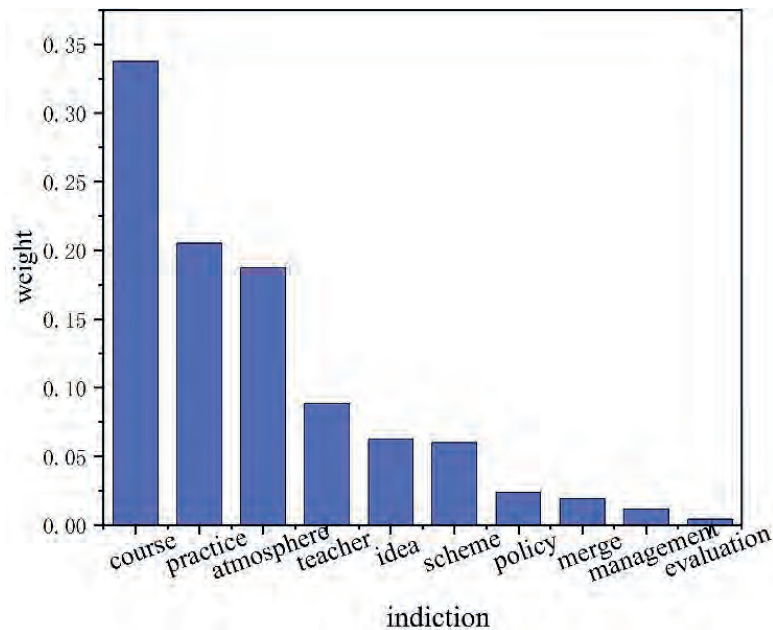
$$CR = \frac{CI}{RI} = \frac{0.0162}{0.515} = 0.03145 < 0.1 \quad (4)$$

By the consistency test, the feature vector  $w_1$  of  $A_1$  can be used as the weight vector at this time.

Therefore, the weight vector is:

$$w_1 = \begin{bmatrix} 0.2109 \\ 0.7049 \\ 0.0841 \end{bmatrix} \quad (5)$$

The weights of each factor were calculated. Figure 2 shows the importance ranking of each influencing factor. The importance ranking of factors affecting the integration of innovation and entrepreneurship education and professional education in civil engineering are curriculum system, practice platform, innovation and entrepreneurship atmosphere, faculty team, innovation and entrepreneurship education concept, professional talent training program, policy support, integration mode, teaching management system, and evaluation index system, and their weights are 0.3376, 0.2052, 0.1874, 0.0883, 0.0625, 0.0599, 0.0238, 0.0193, 0.0118, and 0.0043, respectively, 0.0625, 0.0599, 0.0238, 0.0193, 0.0118, 0.0043.



**Figure 2.** Importance ranking of each influencing factor

### **3. MEASURES FOR THE INTEGRATION OF CIVIL ENGINEERING AND INNOVATION AND ENTREPRENEURSHIP EDUCATION**

#### **3.1. DEEP COOPERATION BETWEEN SCHOOLS AND ENTERPRISES TO ESTABLISH PRACTICE BASES**

Higher vocational colleges and enterprises cooperate deeply, jointly establish innovative practice bases with reasonable layout, complete functions, matching equipment and sufficient quantity, guarantee the quality of talent cultivation in practice. Higher vocational colleges and universities can rely on enterprise resources and equipment, jointly agree on talent training programs, precisely analyze the qualities required by industry enterprises, formulate reasonable, systematic and complete curriculum teaching plans, provide sufficient guarantees for students' internship training and innovation and entrepreneurship practice, give teaching guidance in terms of professional development and innovation ability cultivation, and improve the school system of industry-education integration.

#### **3.2. CULTIVATE STUDENTS' CREATIVE CONSCIOUSNESS AND INNOVATION ABILITY**

Strengthen students' awareness of the subjective integration of professional learning and innovation and entrepreneurship education, strengthen the learning of cultural knowledge and connotation literacy, enrich their knowledge reserves, understand and think deeply about professional knowledge, pay attention to the exercise and cultivation of personal ability, and encourage students to actively and enthusiastically innovate.

#### **3.3. REFORM OF COURSE TEACHING METHODS AND EXAMINATION METHODS**

Integrating innovation and entrepreneurship education in civil construction not only in terms of teaching methods, the traditional indoctrination method is changed to transform the passive acceptance of students, so that more students can actively participate in teaching activities. Use the form of student discussion and teacher-student discussion to cultivate students' creative thinking.

### **4. CONCLUSION**

This paper studies the factors influencing the integration of civil construction majors and innovation and entrepreneurship education in undergraduate institutions, and constructs the

integration path of civil construction majors and innovation and entrepreneurship education. The following conclusions are drawn:

The importance ranking of factors influencing the integration of civil construction innovation and entrepreneurship education and professional education are curriculum system, practice platform, innovation and entrepreneurship atmosphere, faculty team, innovation and entrepreneurship education concept, professional talent training program, policy support, integration mode, teaching management system and evaluation index system, and their weights are 0.3378, 0.2055, 0.1454, 0.0886, 0.0645, 0.0593, 0.0232, 0.0194, 0.0116, 0.0049.

## ABOUT THE AUTHOR

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# ANALYSIS OF SUBJECTIVITY AND INTERSUBJECTIVITY IN THE TRANSLATION OF SAI PEARL'S WATER MARGIN IN THE PERSPECTIVE OF LEFEBVRE'S MANIPULATION THEORY BASED ON THE PRINCIPAL COMPONENT ANALYSIS METHOD

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## ABSTRACT

This paper first examines the definition and connotation of translator subjectivity. Then, starting from Sai Pearl's cultural identity and its influence, it explores her subjectivity in the selection of materials for translation, translation operation and the defense of the translation. Finally, we explore the university between author subjectivity, translator subjectivity and reader subjectivity, and analyze the intersubjectivity of the translation of Water Margin from the perspective of Sai Pearl's upbringing and translation process. The subjectivity is expressed in the translation method which reflects the translator's subjective will to the greatest extent, and Sai's translation reflects Sai Pearl's value identification with Chinese culture and respect for the differences between Chinese and Western cultures. Inter-subjectivity is mainly manifested in the fact that the translator's subjective behavior is constrained by other subjects such as readers, patrons and publishers, and Sai is constrained by other subjects in the translation of the book title. The study of this paper is important for the translation and study of Water Margin.

## KEYWORDS

Water Margin; Subjectivity; Intersubjectivity; Translation operation; Value identity; Cultural differences

## 1. INTRODUCTION

By subjectivity is meant the basic characteristics of the subject in the activity of the object [1]. Specifically, subjectivity is the externalization of the subject's basic abilities in the activity of the object and has the characteristic of actively transforming the object, influencing it, and controlling it as a way to serve it [2]. Subjectivity includes purposefulness, autonomy, initiative, creativity, etc. [3]. Therefore, subjectivity is a subjective initiative. The translator is the subject of translation, and the original work is the object of the translator's activity. In order to successfully complete the translation task and achieve the translation goal, the translator must give full play to his or her subjective initiative [4]. However, the exercise of subjective initiative may be restricted by various factors such as the language characteristics and habits of the original work and the translated work, the language and culture of the original work, and the time in which the translator lives [5]. Inter-subjectivity is also called interactive subjectivity. It is a property that is reflected in the relationship between people that is inherent in their interaction, communication, influence and exchange, and is a prerequisite for achieving mutual understanding between different subjects, their common validity and coexistence [6]. The literature [7] studied the subjectivity of translation in discourse, comparing the different manifestations of subjectivity in translation in different fields.



## **2. THE SUBJECTIVITY OF SAI PEARL'S TRANSLATION OF WATER MARGIN**

### **2.1. DEFINITION AND CONNOTATION OF TRANSLATOR SUBJECTIVITY**

The so-called translator's subjectivity refers to the subjective initiative or creativity that the translator, as the subject of translation, shows in the translation to realize the translation purpose under the premise of respecting the translation object. Translation is a special kind of reading and interpretation activity, which is not a simple restoration of the original work, but a constructive interpretation containing individual experience. The translator's subjectivity is reflected in the "production" rather than "reproduction" of the meaning of the original text, and the "gaps" and multiple meanings of the original text are not only a sharp weapon for the translator, but also a source of creativity. It is also a source of creativity. In order to give the reader the same sense of artistic beauty as the original, the translator must find a linguistic means to mobilize and stimulate the reader to make the same or similar associations in the translated language. In order to achieve this, the translator needs to read and study the original text with a fair amount of care, as well as to be bilingual and bicultural. In this way, the translator's work is not a simple copy of the original text, but another kind of creation. And by interweaving his or her current reading experience with the historical experience of the past, the translator goes beyond the meaning given by the static text.

### **2.2. ANALYSIS OF THE TRANSLATOR'S SUBJECTIVITY IN SAI'S TRANSLATION OF WATER MARGIN**

When translation is regarded as an act of "encroachment/transgression", the meaning of translator's subjectivity goes beyond the dichotomy of translation-output-translation-input set by traditional translation studies, and is more expressed in the spirit and courage of the translator's subject to challenge the power. The "encroachment" in the context of deconstructionism is to a large extent limited to crossing the boundaries set by the original language or the original language itself, but in postcolonial theory, "encroachment" is given a new connotation of resisting the cultural power of the translated language, and is given a new connotation of resisting the cultural power of the translated language. In postcolonial theory, "encroachment" is given a new connotation of resistance to the cultural power of the translated language, and becomes a subjective ethical consciousness of the translator to break the inequality of power. If contemporary translators and translation researchers in the post-colonial context, especially translators and translation theorists in the Third World, have a profound experience and understanding of cultural colonization and cultural hegemony, and consciously take an anti-colonial and anti-hegemonic stance and behavior in theory and practice, it is a reasonable choice. If it is a reasonable choice to take an anti-colonial and anti-hegemonic stance and behavior, then, as a strong cultural translator in the colonial era, Pearl Sai's recognition of the problem of cultural hegemony and her conscious "encroachment" on the strong translating language in the translation process show the rare subjective spirit of a "post-colonial" pioneer. His translation strategy was one of the few, though not unique, at that time, and thus the ethical significance and historical value of his subjective behavior make it an ideal case study of the subjectivity of translators in post-colonial translation theory, and an ethical model and methodological reference for Chinese and foreign translators in the post-colonial context. Based on the above considerations, this paper intends to explore the subjectivity of the translator in the selection of materials, translation operation and the defense of the translation, as well as the game and dialogue between the translator's subject and the target subject, and to reveal the influence and significance of the translator's subjectivity and the subjectivity in the translation process on the translation of Water Margin, starting from the cultural identity of Sai Pearl and its influence.

### **2.2.1. THE CULTURAL IDENTITY OF SAI PEARL AND ITS INFLUENCE**

The translator's subjective behavior originates from his or her translation motivation, which is inextricably linked to the cultural identity of the translator subject. Therefore, clarifying the issue of Sai Pearl's cultural identity is an important prerequisite for studying and interpreting his or her translation subjectivity. Zhang Jinyuan points out that "identity is not determined by descent, but is the result of society and culture. Race, class, gender, and geographical location influence the formation of 'identity,' and specific historical processes, specific social, cultural, and political contexts also play a decisive role." But the difficulty in defining Pearl's cultural identity lies mainly in the fact that, in terms of nationality, descent or race, she seems to be unquestionably an American who has lived in China for many years, while, in terms of cultural background, she grew up and lived in China for a long time, was deeply influenced by Chinese culture, and to a large extent is more like a Chinese person. These are only objective factors, but if we add the subject's own cultural identity, the problem will be even more complicated. Pearl's cultural identity has actually transcended the category of pure "Chinese" or "American", and presents a typical hybrid and "mixed" character.

Pearl's migration experience is perhaps better described and explained by the postcolonial theory of "ethnic dispersal" and the resulting "cultural mingling. Ethnic diaspora refers to "the dispersal of a race to different parts of the world, either by force of external forces or by self-choice". However, post-colonial theory is mainly concerned with the phenomenon of migration from the Third World to the First World and the cultural identity/identity of immigrants, while the reverse ethnic diaspora and the cultural hybridity and identity it brings do not seem to enter its theoretical agenda. However, there is no essential difference between third-world to first-world and reverse diaspora in terms of the subject's feelings and experiences in terms of self-fragmentation, sense of marginality, and identity/identity anxiety. Whitfield points out that Pearl's situation reverses the dominant paradigm of cultural hybridity research in two ways. First, the process of cultural change and assimilation is often from East to West, from societies of color to white societies; second, the pursuit of power is human nature. Therefore, a study of Sai Pearl's immigrant experience and the resulting cultural identity not only helps to explain the motives of her creative work, translation and social activities, but also complements the gaps in postcolonial theory in this regard.

### **2.2.2. SUBJECTIVITY IN THE TRANSLATION PROCESS**

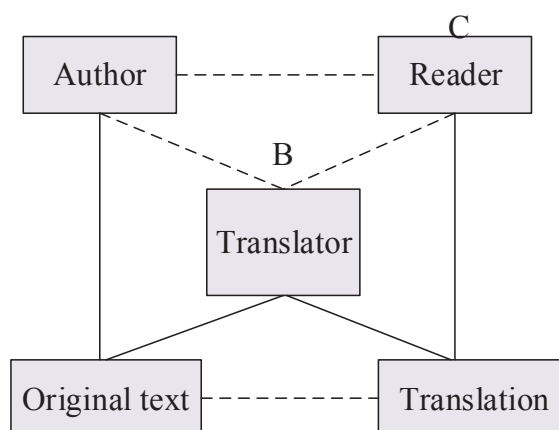
In terms of translation methods, text manipulation and cultural translation strategies, Sai Pearl can be said to have maximized the value of the translator's subjectivity, i.e., the resistance to the powerful culture. On the other hand, China's own internal and external problems and self-denial led to a "one-sided" situation in the field of cultural exchange, in which Western discourse became the fashion and mainstream, The young intellectuals were keen to criticize and deny their own language, culture, literature and other traditions.

Her choice of the translation of *Water Margin* and the 70-volume *Jin Pao* reflects her awareness and respect for the literary and artistic value and relevance of the original work. Sai's translation reflects Sai's recognition of the value of Chinese culture and her respect for the differences between Chinese and Western cultures, which should be recognized as significant in clarifying the identity and maintaining the uniqueness of Chinese culture in cultural exchange. If the translation method reflects the translator's subjective will to the greatest extent, then Sai Pearl's translation of the title reflects that the translator's subject has a passive side in addition to subjective initiative. The analysis of the translator's subjectivity in the selection of materials and translation process of Sai Pearl fully illustrates the complexity and multifaceted nature of the subject's motivation and behavior.

### 3. INTER-SUBJECTIVITY IN THE TRANSLATION OF SAI PEARL'S WATER MARGIN

Inter-subjectivity theory tries to grasp the relationship between subjects and subjects, and between individuals and society from a new perspective, advocating a relationship that is both one and the other, where you have me and I have you, and co-exist at the same time. It transcends the dichotomy of the subject-object mindset and has important guiding significance for translation. Figure 1 shows the relationship between subjects and between individuals and society.

Translation research draws on its ideas and moves from the subjectivity of translation subjects to intersubjectivity. The translator, as the subject of translation, also constitutes an intersubjective relationship with other translation subjects, the original author and the reader. Since the author and the reader of the translation are in different cultures, the translator should not only be familiar with two languages, but also understand two different cultures. However, there are inevitable contradictions and conflicts of language conversion in translation. In particular, the three subjects involved in literary translation activities, namely, the author, the translator and the reader, are not isolated subjects, but a kind of co-existing self premised on the existence of each other. It is very important to harmonize the relationship between the three, so that the co-existing selves can give full play to the harmonious creative role in translation. In a word, translation is the result of the mutual constraint of author subjectivity, translator subjectivity and reader subjectivity.



**Figure 1.** Diagram of the relationship between the three

In the process of translation, the “ideology” and “poetics” of the culture of the translated language will influence and restrict the translator at all times, which is also an important factor to ensure the readability and acceptability of the translated text. In many cases, the ideological and poetic norms of the translated language are internalized into the translator’s conscious behavior. Although Pearl Sai grew up in China and was deeply influenced by Chinese culture, her family education and church school life kept her in close contact with American culture, and her adult life in American universities deepened her understanding of American culture. Her unique upbringing enables her to take care of the needs of both the author and the reader in the translation process, so that her translation not only conveys the Chinese culture and linguistic characteristics to the greatest extent possible, but also conforms to the poetic norms of the target language. The translator’s interlinguistic strategies in the translation process are largely determined by the translator herself, but this does not mean that the translator enjoys absolute freedom of decision making in the process. The translator’s behavior may also be subject to the constraints of other subjects such as readers, sponsors and publishers. Although Sai Pearl enjoyed a great deal of freedom in the selection of the edition of *Water Margin* and the specific operation of translation, her translation of the title of the book was subject to the constraints of other subjects.

#### 4. CONCLUSION

This paper first studies the subjectivity of the translation of Sai's translation of *Water Margin*, explores the definition and connotation of subjectivity, and analyzes the subjectivity of the translation at the level of cultural identity and its influence, and the translation process. The inter-subjectivity of translation is then analyzed at the level of the contradiction and conflict of language conversion in translation. Sai Pearl's unique upbringing enables her to take care of the needs of both subjects, the author and the reader, in the process of translation, so that her translations can convey both Chinese culture and linguistic characteristics to the greatest extent. Although Sai Pearl enjoyed a great deal of freedom in the selection of the edition of *Water Margin* and the specific translation operation, her translation of the title was constrained by the other subjects.

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# AN ANALYSIS OF PRESCHOOL CURRICULUM AND TEACHER QUALITY IN THE ERA OF BIG DATA

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## ABSTRACT

This paper first investigates the curriculum framework of preschool education in the era of big data, and explores the training objectives, curriculum structure, and curriculum content of preschool education. Then the professional philosophy, professional knowledge, and professional competence level of preschool teachers were investigated through online and offline methods to assess the current quality of early childhood teachers. Finally, preschool education reform measures were proposed in response to the data analysis. The overall score of teachers' professional philosophy was 3.65, the average score of each item of professional knowledge only fluctuated between 3.4 and 3.6, and the overall score of teachers' professional competence and each item of their scores were above 3.6, indicating that the professional quality situation of early childhood teachers is at an intermediate level, and educational theoretical knowledge and scientific research ability still need to be improved. The study of this paper is important for improving the quality of preschool teachers and promoting the development of preschool education.

## KEYWORDS

Preschool education; Teacher quality; Training objectives; Curriculum structure; Educational competence

## 1. INTRODUCTION

As the foundation of the whole education system, preschool education is very important. The state and society are paying more and more attention to the status of preschool education, which also puts forward higher requirements for the training of early childhood teachers [1-2]. With the development and progress of society, the overall quality of people has improved, which has promoted the rapid development of the preschool education industry, but there is a lag in the construction of teachers due to the extreme lack of talents related to preschool education, resulting in the unbalanced and insufficient development of preschool education [3-4]. Social development has put forward higher requirements for the specialization of early childhood teachers, and kindergartens have higher standards for the educational requirements of teachers [5-6].

Bautista A The current state of arts education in a kindergarten in Singapore was examined through an analysis of extensive observational data from the kindergarten [7]. Dhawan et al. surveyed 65 pairs of urban parents' perceptions of preschool education and found that despite the perceived importance of early childhood education for their children's development, parents were less knowledgeable about play-based approaches and preferred traditional subject education [8]. Elbaum B et al. explored developmental outcomes of preschool special

education services for cohorts of participating children statewide [9]. Beets et al. provided key information for successful interventions in early childhood physical activity by examining the effects of preschool competencies, quality of prevention support systems, and teacher characteristics on the level of implementation of outdoor activities in kindergarten [10].

## **2. PRESCHOOL EDUCATION CURRICULUM IN THE ERA OF BIG DATA**

With the rapid development and popularity of information technology, preschool education curriculum in the era of big data is gradually going digital, informational and technological. In such a context, preschool education begins to focus on cultivating children's information literacy and technological innovation ability.

### **(1) Training Objectives**

The cultivation goal of preschool curriculum is to enhance children's intellectual, emotional, social and hands-on skills as the main purpose to help children develop comprehensively. And in the era of big data, in addition to the traditional cultivation goals, we should also focus on cultivating children's information literacy and technological innovation, so that children can master basic information technology and develop their innovative thinking and practical skills.

### **(2) Course Structure**

The curriculum structure of preschool education needs to include curriculum development, materials development, and instructional management for each kindergarten grade level. In the era of big data, the curriculum structure needs to be updated and improved, which includes:

#### **1. Increase in information technology courses**

Information technology courses should be an important part of preschool education. In addition to the traditional basic computer courses, innovative and interesting courses such as digital enlightenment, smart manufacturing and virtual reality should be added to allow children to master IT through exploration and innovation.

#### **2. Construction of science and technology education experience area**

Technology education experience area is an open space that allows children to master knowledge and skills through independent exploration and discovery. This area can be set up with different scenarios and equipment, such as VR glasses, robots, intelligent electronic blocks, etc., allowing children to improve their information literacy and innovation skills through exploration and innovation.

#### **3. Game-focused learning**

Games are one of children's favorite activities and a way to learn. In the era of Big Data, games can be seen as an educational tool that can help children acquire knowledge and skills while playing. Therefore, play as a core learning style should be added to the curriculum structure.

### **(3) Course content**

The curriculum content of preschool education should be closely focused on the developmental needs of children, so that children can master knowledge and skills through games and interactions. In the era of big data, the curriculum content should add information technology-related content to the original foundation, such as digital enlightenment, intelligent manufacturing, virtual reality, etc. Some innovative and interesting courses, such as robotics programming and 3D printing, can also be added so that children can develop innovative thinking and practical skills through exploration and practice. Some digital culture courses, such as digital art and digital music, can also be introduced so that children can better

understand the diversity and charm of the digital world and develop aesthetic and artistic skills. Some social courses, such as emotional intelligence education and teamwork, can also be included so that children can learn to communicate, cooperate and share in an interactive way, and develop all-round abilities in all aspects. In conclusion, the curriculum content of preschool education needs to be constantly updated and improved to meet the needs of the new era, so that children can grow up healthy and happy.

### 3. ANALYSIS OF PRESCHOOL TEACHERS' QUALITY IN THE ERA OF BIG DATA

In order to ensure the authenticity and comprehensiveness of the data of this research study, this paper interviewed 13 private kindergarten teachers through online and offline methods: A1, A2, A3 teachers in City A, B1, B2 teachers in City B, C1, C2 teachers in County C, D1, D2 teachers in County D, E1, E2 teachers in County E, and F1, F2 teachers in County F. The questionnaire for this study focused on the professional quality of kindergarten teachers. The questionnaires were brought to the field for distribution and collected on the spot after being completed by the respondents. 200 questionnaires were distributed and 180 were collected, with a recovery rate of 94.5%, of which 182 were valid, with an efficiency rate of 90%, which meets the requirements of the questionnaire recovery rate of the survey research and also indicates that the data of this survey are valid.

#### 3.1. QUESTIONNAIRE RELIABILITY AND VALIDITY ANALYSIS

The reliability of the questionnaire in this study was tested by using reliability analysis in SPSS 20.0 for the reliability of the questionnaire. Table 1 shows the reliability of the questionnaire on the current professionalism of kindergarten teachers. The overall Cronbach's  $\alpha$  coefficient of the questionnaire was 0.895. The Cronbach's  $\alpha$  coefficients of professional philosophy, professional knowledge and professional competence were 0.814, 0.743 and 0.825 in order. The questionnaire used in this study has good reliability coefficient and can be used with confidence. Factor analysis also revealed that the KMO value of the questionnaire was 0.898, corresponding to a probability value of  $P < 0.05$ , and the validity of the questionnaire was acceptable.

**Table 1.** Reliability of the questionnaire on the status quo of teachers' professional quality

dimension	Cronbach $\alpha$ index
General questionnaire	0.8958
Professional concept	0.814
Professional knowledge	0.743
Professional ability	0.825

#### 3.2. ANALYSIS OF TEACHERS' PROFESSIONAL PHILOSOPHY

Table 2 shows the teacher professional philosophy scores. The overall situation of the professional philosophy of kindergarten teachers was good. The scores of each item of professional philosophy are shown in the table. According to this study, the scores of the collected data were processed using a five-point Likert scale with a median score of 3. Thus, a higher score indicates that the teacher performs better in making judgments on this item consciously. The data obtained from the analysis showed that the overall score of teachers' professional philosophy was 3.65 and their mean scores for each item were above 3.0, which indicates that the kindergarten teacher team has a good professional philosophy and is a team of teachers who love early childhood education and care and love children. According to the scores, the items of professional philosophy were ranked as the concept of valuing children, professional belief of loving teaching, and positive and optimistic mindset.

**Table 2.** Scores of teachers' professional concepts

project	M	SD
Positive and optimistic attitude	3.45	1.068
Attach importance to the concept of young children	3.82	0.974
Faith in education and teaching	3.67	1.018

### 3.3. ANALYSIS OF TEACHERS' EDUCATIONAL EXPERTISE CAPABILITIES

Table 3 shows the teachers' professional knowledge competencies in early childhood education. The mean scores of each item of professional knowledge fluctuated only between 3.4 and 3.6, indicating that private kindergarten teachers have low self-evaluation in conducting the evaluation of professional knowledge mastery. Among them, knowledge of early childhood psychology scored the lowest at 3.56, and its degree of variation was large, indicating that kindergarten teachers' knowledge of early childhood psychology was poor. The mastery of 3.67 for early childhood pedagogy and 3.56 for early childhood psychology further indicates that kindergarten teachers are negligent in their knowledge of basic education theory.

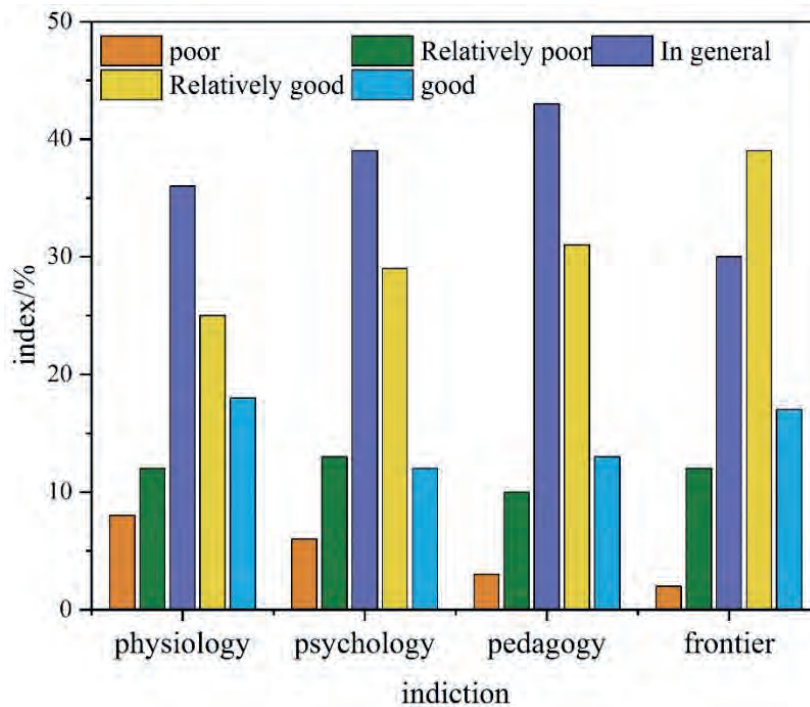
**Table 3.** Professional knowledge and ability of teachers in early childhood education

project	M	SD
Infant physiological knowledge	3.66	1.043
Knowledge of infant psychology	3.56	1.144
Preschool pedagogy knowledge	3.67	0.957
Advanced knowledge of preschool education	3.59	0.956

Teachers' knowledge of early childhood physiology. As shown in the figure, 8% of the kindergarten teachers self-rated their mastery of physiological knowledge of young children as very poor, 12% of the teachers self-rated it as worse than poor, 37 % of the teachers self-rated their mastery as fair, 25% of the teachers self-rated their mastery as relatively good, and only 18% of the teachers were very good. Cumulatively, 57% of the teachers self-rated their mastery of physiology as poor.

For the evaluation of the knowledge of early childhood psychology, a cumulative 58.2% of the teachers indicated that the mastery was very poor. As for the knowledge of early childhood pedagogy, 55.5% of the teachers indicated that their mastery was very poor. More than half of the respondents indicated that their knowledge of early childhood psychology and early childhood pedagogy was insufficient. Among the kindergarten teachers, the young teachers did not have enough knowledge and experience in early childhood education. Figure 1 shows the self-assessment of teachers' professional knowledge.





**Figure 1.** Self-evaluation of teachers' mastery of professional knowledge

### 3.4. ANALYSIS OF TEACHERS' PROFESSIONAL EDUCATIONAL COMPETENCE

The overall teacher professional competency scores and their individual scores are above 3.6, which means that kindergarten teachers have high professional competency overall. On its various items, early childhood education competency scores were the highest and the most stable, i.e., the least variation among teachers. In contrast, educational research competency scored the lowest and had the greatest variation among teachers. The overall indicates that early childhood education competency, as a basic quality necessary for kindergarten teachers, is generally valued in kindergartens, but with social and economic development and progress, kindergarten teachers are not only required to do well in early childhood education, but their educational research competency is also added to their overall competency assessment. Kindergarten teachers need to be further strengthened in their research ability. Table 4 shows the professional competency scores of teachers.

**Table 4.** Scores of teachers' professional competence

project	M	SD
Early childhood educational ability	3.88	0.759
Educational and scientific research ability	3.67	1.077
Total professional competence	3.85	0.724

## 4. CONCLUSION

This paper mainly studies the curriculum setting of preschool education in the context of big data, as well as analyzes the quality of preschool teachers in the era of big data in three dimensions: professional philosophy, professional knowledge, and professional competence. The following conclusions are drawn:

Preschool education curriculum in the era of big data is gradually going digital, informational and technological. Preschool education should focus on cultivating children's information literacy and technological innovation ability.

In terms of teachers' professional philosophy, the overall score of teachers' professional philosophy was 3.65, and their mean scores for all items were above 3.0, which indicated that

the professional philosophy of the kindergarten teacher team was good.

In terms of professional knowledge competence in early childhood education, the mean scores of each item of professional knowledge fluctuated only between 3.4 and 3.6, indicating that private kindergarten teachers have low self-evaluation in conducting the evaluation of mastery of professional knowledge. The mastery of 3.67 in early childhood pedagogy and 3.56 in early childhood psychology indicates that kindergarten teachers are negligent in paying attention to theoretical knowledge of basic education.

In terms of teachers' professional educational competence, the overall score of teachers' professional competence and all of their scores were above 3.6, which means that kindergarten teachers in general have high professional competence. Educational research ability scored the lowest and had the greatest variation among teachers. Kindergarten teachers need to be further strengthened in their research ability.

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# IMPROVED AOA ALGORITHM TO OPTIMIZE IMAGE RECOGNITION MODEL WITH IMAGE ENTROPY

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## ABSTRACT

In this paper, the implementation process of the AOA algorithm is firstly studied, and then the TDOA localization algorithm alone or the AOA localization algorithm is used in combination to improve the AOA algorithm. Then the definitions of entropy and image entropy are discussed, and an image recognition model based on the improved AOA algorithm with optimized image entropy is developed. Finally, the performance comparison and cross-validation methods are applied to analyze the model performance. The results show that the accuracy of checking the classification of corner points using SVM is 91.1% and 89.8%, while the image recognition with optimized model image entropy has an accuracy of 92.1%. It indicates that the image recognition model classification scheme of optimized image entropy in this paper works well. The research in this paper is important for the development of image recognition field.

## KEYWORDS

AOA algorithm; TDOA localization algorithm; Image entropy; Image recognition; Cross-validation; Performance comparison

## 1. INTRODUCTION

Image recognition is a computer vision technique that allows machines to recognize and classify objects in digital images or videos. The technique uses artificial intelligence and machine learning algorithms to learn patterns and features in images in order to recognize them accurately [1-2]. By recognizing and classifying objects in an image, it enables machines to interpret visual data as humans do [3].

The technology has a wide range of applications in various industries, including manufacturing, healthcare, retail, agriculture, and security [4]. Image recognition can be used to improve quality control in manufacturing, detect and diagnose medical conditions, enhance the customer experience in retail, optimize agricultural crop yields, and assist in surveillance and security measures. In addition, image recognition can help automate workflows and improve the efficiency of various business processes [5-6]. Sengupta A investigated the use of deep learning neural networks in the field of image recognition [7]. Chen M et al. proposed a solution to the problem of limited data set samples in low illumination image recognition tasks,

namely, cascaded feature matching network, which improves the performance of image recognition through feature matching blocks, multi-scale information and relational learning to improve the recognition performance of the meta-learner, and achieved effective results in several photo tasks with odds ratio learning experiments and multiple labels [8].

## 2. IMPROVE THE AOA ALGORITHM MODEL

### 2.1. AOA ALGORITHM

The AOA hybrid positioning algorithm is an algorithm that integrates various signal information and feature measurements to estimate the position of the MS. Compared with the TDOA positioning algorithm or AOA positioning algorithm alone, the combination of the two algorithm models can significantly improve the positioning accuracy and reduce the impact of measurement errors.

Assuming that M base station receivers are arranged in a two-dimensional plane, the distance equation can be listed according to the (T0A) measurement:

$$r_i = c\tau_i = \sqrt{(x_i - x)^2 + (y_i - y)^2} \quad (1)$$

Assuming that the distance difference is, denotes the distance difference between the mobile station to base station i ( $i \neq 1$ ) and to base station 1, i.e:

$$r_{i,1} = r_i - r_1 + n_{i,1} = \sqrt{(x_i - x)^2 + (y_i - y)^2} - \sqrt{(x_1 - x)^2 + (y_1 - y)^2} + n_{i,1}n \quad (2)$$

The equation can be established based on the AOA measurements a:

$$\tan \alpha = \frac{y - y_1}{x - x_1} + n_a \quad (3)$$

according to the above equation, we can obtain:

$$\Delta r = r - r_1 + n \quad (4)$$

Assuming that the measurements are independent of each other, the maximum likelihood estimate of the location of the mobile station is:

$$(x, y) = \operatorname{argmin} \left[ (\Delta r - r + r_1)^T (\Delta r - r + r_1) + \frac{\sigma^2}{\alpha^2} \left( \alpha - \arctan \left( \frac{y - y_1}{x - x_1} \right) \right)^2 \right] \quad (5)$$

Solving the nonlinear equation (5) by the general method is difficult to obtain the desired result, so the optimal solution of the coordinates is obtained after the optimization process with the IMPSO algorithm.

### 2.2. IMAGE RECOGNITION MODEL WITH OPTIMIZED IMAGE ENTROPY BY IMPROVED AOA ALGORITHM

#### 2.2.1. ENTROPY AND IMAGE ENTROPY

Taking the average of the self-information of the N possible outcomes of the random event:

$$H = -\sum p(i) / \log(p(i)) \quad (6)$$

Image entropy describes the average information content of the image source.

$$H = -\sum_{i,j} p(i) \log p(i) \quad (7)$$

## 2.2.2. IMAGE RECOGNITION MODEL BASED ON AOA ALGORITHM TO OPTIMIZE IMAGE ENTROPY

Image restoration is performed using the images acquired by the surrounding nodes. In order to make multiple images using pixels to do the synthesis operation, the disease targets in each image are rotated to the specified reference direction based on the original information acquired by each node, keeping the same orientation as much as possible. Then the rotated image is obtained from Equation (8):

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & -\cos \theta \end{bmatrix} \begin{bmatrix} u \\ v \end{bmatrix} \quad (8)$$

Where,  $(u,v)$  is the original image acquired by the neighboring node and  $(x,y)$  is the image coordinates after image conversion. Whether the target alignment direction of multiple images is consistent will directly affect the effect of the image restoration method, and the interrelationship number criterion is to ensure that the disease orientation of multiple images will be aligned. The target images acquired by neighboring nodes are slid through the window to find the best matching DA that matches region  $DA^{(s)} (s = 2, 3, \dots, K)$ :

$$DA^{(s)} = DA_{ij}^{(s)} = \max_{i,j} \left( \rho \left( DA^{(1)}, DA_{ij}^{(s)} \right) \right) \quad (9)$$

$$\rho(x, y) = \frac{\text{Cov}(x, y)}{\sqrt{\text{Var}(x) \times \text{Var}(y)}} \quad (10)$$

$$Q_{ij} = \max_{s=1,2,\dots,K} \left( DA^{(s)} \right)_{ij} \quad (11)$$

In this equation,  $\rho(x, y)$  is the number of interrelationships between diseased regions  $x$  and  $y$  of the same size,  $\text{Cov}(x, y)$  is their covariance, and  $\text{Var}(x)$  is the variance. Equation (11) represents the pixel value  $Q$  located at  $(i, j)$  in the target image  $Q$  after the image restoration operation. Further preprocessing is required for the multi-node restored image to eliminate the noise generated in the image restoration process that interferes with the extraction of image features.

## 3. IMAGE RECOGNITION MODEL PERFORMANCE ANALYSIS

### 3.1. COMPARATIVE ANALYSIS OF IMAGE CLASSIFICATION PERFORMANCE

In this paper, the performance of the model is compared with the image classification performance of the SVM model using this paper to analyze the performance of the model. Grid features and peripheral features are extracted for corner points, and 25 corner point samples of each of 52 classes are selected. Among them, 1000 are used as the number of input samples  $n$  for the model, and the remaining 300 corner points are used as the test set, whose corner point types are output data. The value of vector dimension  $m$  for each sample is 32 dimensions. From the set model network configuration parameters, the corner point sample feature vector is used as input and the classification corresponding to each corner point sample is used as output, and the minimum training error is achieved by continuously adjusting the threshold value. Table 1 shows the classification results of the statistical corner points.

**Table 1.** Classification results for corner points

Angle point type	A	D	Db	E	Eb	L	R	Rb	Average
P/%	87.6	88.9	92.8	87.6	89.5	98.2	94.3	81.4	90.8
R/%	89.4	90.6	88.1	90.4	71.8	92.8	91.6	89.5	92.1

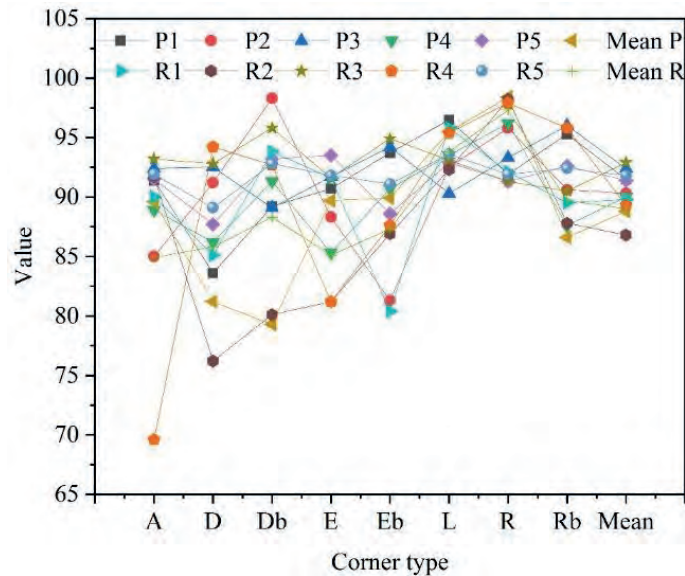
From the statistical results in the table, it is concluded that the accuracy rate of the classification of corner points using SVM is 91.1% and the completeness rate is 89.8%. The experimental results of the SVM corner point classification method and the image recognition method with optimized image entropy were compared and analyzed. The objects of both sets of experiments are the same data, and their purpose is to classify corner points into 52 classes. The SVM classifier is experimentally verified to select grid features and peripheral features, and the corner point classification results are better when  $m$  and  $n$  are taken as 8. That is to say, the classification accuracy is higher when the features of corner points in SVM classifier are 128-dimensional, reaching an accuracy of 90.8%. In contrast, when the image recognition model with optimized image entropy is used for classification, the input parameters are too many, which makes the neural network converge slowly and the training time is long. After the adjustment of the selected features, 32-dimensional features were selected as the input network data, and finally an accuracy of 92.1% was achieved. Relatively speaking, the optimized model image entropy has the least risk of image recognition structure, better generalization ability, global optimality, and good recognition advantage when the target sample is small, non-linear, and high feature dimension. Therefore, on the whole, for the classification of corner points in this paper, the image recognition model classification scheme with optimized image entropy works better.

### 3.2. CROSS-VALIDATION ANALYSIS

Dividing the training data into two parts, training set and test set, the prediction accuracy of the training set largely reflects the classification performance on the test set, and the improvement of the training process, i.e., cross-validation, which can reduce the overfitting to a certain extent.

For the optimization of the model parameters, this experiment chooses the network search optimization method, using the grid.py parameter tool in LIBSVM, which can automatically perform parameter search and finally get the best parameters  $c=3.5678$  and  $g=9.757967$ . The  $c$ ,  $g$  values obtained by using the parameter tool are modeled in the image recognition model to predict the corner point types. The experimental dataset was divided equally into 5 groups with 520 corner points per group. The detection of corner point types in the test set is carried out according to each training set, and the detection and accuracy rates and the average detection and accuracy values for each corner point type are calculated. The experiment uses cross-validation for the five sets of corner point data sets, and the experimental results are shown in Figure 1.

From the summary analysis of the experimental results, the results of the corner point classification of the test set are satisfactory, and the average value of the experimental results of the eight types of corner points in the five groups is 93.9% and 89.0%. It indicates that the image recognition performance of the model is good.



**Figure 1.** Cross-validated classification results

#### 4. CONCLUSION

In this paper, we first study the implementation process of AOA algorithm and optimize the algorithm teaching, and then explore the image recognition performance of the algorithm. The following conclusions are drawn:

In the performance comparison, the check accuracy rate of the classification of corner points using SVM is 91.1% and the check integrity rate is 89.8%. The image recognition with optimized model image entropy has 92.1% accuracy. The classification scheme of image recognition model with optimized image entropy is more effective.

In the cross-validation, the experimental results of 8 types of corner points are averaged to get a check accuracy rate of 93.9% and a check-complete rate of 89.0%. It indicates that the image recognition performance of the model is good.

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# CLINICAL APPLICATION OF COMPUTER-CONTROLLED LOCAL ANESTHESIA INSTRUMENT IN ENDODONTIC TREATMENT

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## ABSTRACT

The STA anesthesia system can be used in all treatment areas of dentistry that require local anesthesia and is more painless in endodontic treatment. This paper focuses on the analysis of the application of the second generation computer-controlled local anesthesia system. The STA anesthesia technique reduces the amount of anesthetic agent compared with the traditional anesthetic injection, but has a more precise range of action. Patients with acute pulpitis or acute attack of chronic pulpitis were selected and randomly divided into test and control groups, and the patients' anesthetic pain level and heart rate and blood pressure before and after injection were compared and analyzed. The *The Wand*<sup>TM</sup> system was superior to conventional conventional local anesthesia in terms of pain during injection and time for the anesthetic to take effect in dental treatment.

## KEYWORDS

STA anesthesia system; Acute pulpitis; Heart rate and blood pressure; Test group; Control group; Local anesthesia

## 1. INTRODUCTION

Endodontic diseases are a high incidence in clinical dentistry and are divided into different types such as pulpitis, pulp necrosis and dental caries. The pulp is in a hard and inelastic pulp chamber with four walls, and its blood circulation can only pass through the tiny apical foramen, lacking collateral circulation [1-2]. Once the pulp becomes inflamed, the inflammatory exudate is not easily drained and the pressure in the pulp cavity quickly increases, causing pressure on the nerves within the tooth, and the patient develops oral diseases such as severe tooth pain, bleeding and abscesses, which can then lead to masticatory dysfunction and reduce the patient's quality of life [3]. Literature [4-5] pointed out that in recent years, with the gradual

improvement and development of medical technology and dentistry, endodontic treatment has become the first choice for the treatment of endodontic diseases, and the level of endodontic treatment has improved significantly, especially the microscopic root canal is being used more and more widely in clinical practice. In the literature [6], root canal treatment is considered to be mainly a deep fusion of chemical and mechanical modalities to remove the irritant from the pulp chamber of the affected tooth and eliminate the source of infection in the root canal. The root canal is then tightly closed, which allows the apical lesion to gradually recede to prevent secondary infections, thus achieving a restorative and preventive effect on periapical disease. The literature [7-8] shows that both multiple root canal treatment and disposable root canal treatment are endodontic methods, and the use of disposable root canal treatment in clinical practice is gradually increasing with the improvement of root canal cleaning and disinfection. The literature [9] pointed out that nowadays, endodontic disease is mainly treated by root canal treatment, which is used to eliminate the infection of the affected tooth and restore the normal masticatory function of the patient.

## **2. STA ANESTHESIA SYSTEM AND ITS ANESTHESIA TECHNIQUE**

The second generation computer-controlled local anesthesia system, or STA anesthesia system, is also known as a painless anesthesia instrument. Compared with the traditional anesthesia injection method, it reduces the amount of anesthetic agent and does not anesthetize the adjacent tissues while acting on the dental tissues, making the scope of action more precise and eliminating the numbness of the occlusal and facial muscles. It can precisely control the injection speed and pressure of local anesthetics, and can also reduce discomfort during administration, helping dentists reduce complications from local anesthetic injections and giving patients a better injection experience.

### **2.1. STA ANESTHESIA SYSTEM**

The STA device's host interface consists of a series of LED indicators that, along with acoustic signals, provide information on the rate of administration, the amount of anesthetic, and the pressure of the needle position during anesthesia. The STA's unique handle design conforms to the dentist's operating habits, and the injection handle can take the form of a pencil grip, which not only makes it easy to find the pivot point, but also gives the operator a precise sense of touch. The handle is breakable and non-threatening. The grip handle adopts a rotating injection method, which avoids the deviation of injection position that occurs during traditional injection when blocking anesthesia and reduces the failure rate of anesthesia.

### **2.2. STA ANESTHESIA TECHNIQUE**

STA anesthesia system can be used in all treatment areas of dentistry that require local anesthesia. The STA anesthesia system can be used in all areas of dentistry that require local anesthesia, such as endodontics, periodontal therapy, alveolar surgery and implant surgery for children and adults, giving patients a new sense of injection experience. STA has a unique injection technique in addition to the common clinical use of supraperiosteal infiltration anesthesia, mandibular and maxillary nerve block anesthesia. The STA anesthesia system's unique STA dynamic pressure sensing technology provides real-time feedback to the system through a combination of visual and acoustic Drug delivery. The outlet pressure of the local anesthetic is monitored during all phases of the injection, indicating blockage or leakage of the injection needle. The system also features automatic suction back to avoid injecting anesthetics into the blood vessel. In clinical use, to improve injection comfort, most physicians endorse the pre-puncture technique when applying the STA anesthesia instrument. A small portion of the local anesthetic can enter the tissue before and during the puncture before the tip of the needle, and ativan, with its strong tissue penetration, enters the tissue before the tip

of the needle and creates an anesthetic channel.

### 3. CLINICAL APPLICATION OF STA ANESTHESIA SYSTEM IN ENDODONTIC TREATMENT

#### 3.1. OBSERVATION SUBJECTS AND TEST METHODS

In this paper, informed consenters with acute pulpitis or acute exacerbation of chronic pulpitis were selected as observation subjects. The *t* test was used for data analysis. The test group was anesthetized with the *The Wand*<sup>TM</sup> system of blocking, and the pulp was opened with a dental drill, followed by extraction with a pulp extraction needle. Immediately after completion, patients were asked to mark their own assessment on a pain chart, and they could withdraw from the test if they could not tolerate it. The control group also used BILAN anesthesia, but the difference was that a commercially available disposable hollow syringe was used for local anesthesia, and the pulp was also opened and extracted, and then the patients were asked to mark their own assessment.

#### 3.2. APPLICATION RESULTS

##### 3.2.1. BASELINE COMPARISON

There was no statistical difference between the two groups in terms of basic conditions such as number of cases, gender, age, type of pulpitis, different sites, etc., and preoperative pain level in the two groups.

##### 3.2.2. ANALGESIC EFFECT

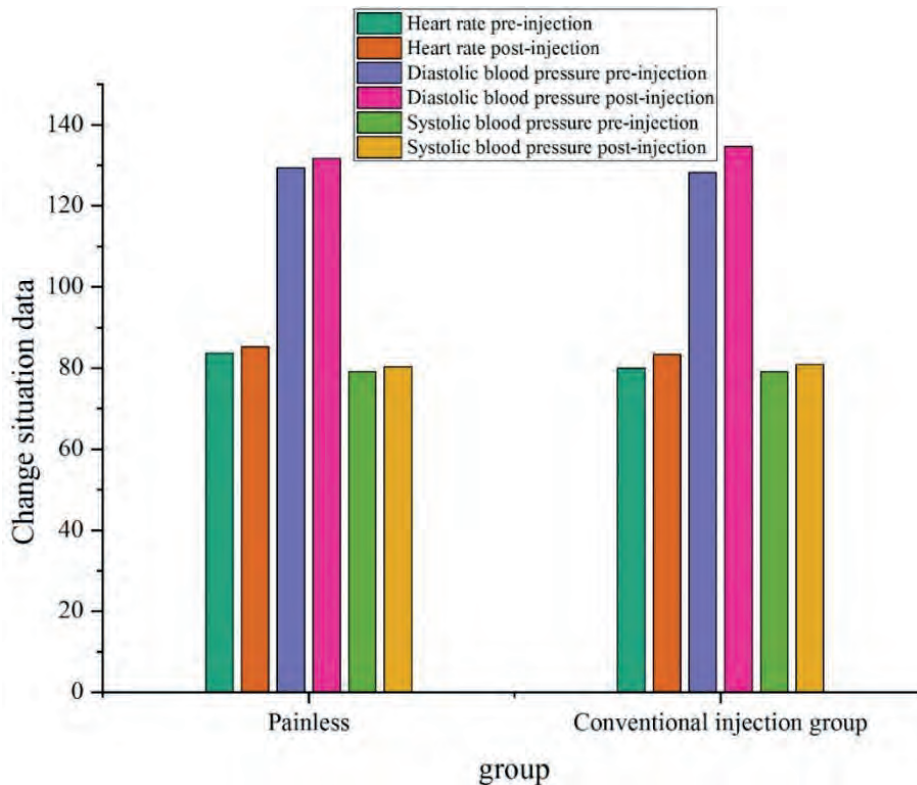
The analgesic effect is shown in Table 1. In the treatment of pulpitis, 15 cases of pulp opening analgesia, 8 cases of effective, 2 cases of improvement, and 100% of total effective rate were found in the experimental group. The pulp extraction analgesia was effective in 4 cases, effective in 6 cases, improved in 4 cases, and invalid in 1 case, with a total efficiency of 90.15%. In the control group, there were 7 cases of effective analgesia, 9 cases of effective analgesia and 1 case of improvement, with an effective rate of 94.21%. In the control group, there were 4 cases of open pulp analgesia, 4 cases of effective, 6 cases of improvement, and 1 case of ineffective, with an efficiency of 85.5%. In the process of pulp extraction, there was no significant difference in analgesia between the test group and the control group, i.e.  $P > 0.05$ .

**Table 1.** Analgesic effect in the treatment of pulp disease

	<i>The Wand</i> <sup>TM</sup>	Control group
Injection pain (graded)	2±0.3	4±0.5
Kaipai zhen (grading)	2±0.4	2±0.3
Pull-out analgesia (grading)	2±0.2	3±0.5
Anesthetic injection time (seconds)	93.2±0.01	111.02±0.02
Anesthetic effective time (seconds)	2.56±0.02	4.23±0.04

##### 3.2.3. CHANGES IN HEART RATE AND BLOOD PRESSURE

The results of blood pressure and heart rate before and after the injection in the 2 groups are shown in Figure 1. The differences in blood pressure and heart rate before and after injection in the painless injection group were not statistically significant. There was a statistically significant change in systolic blood pressure in the conventional injection group before and after injection, i.e.,  $t = -2.345$ ,  $P = 0.021$ . The differences in diastolic blood pressure and heart rate were not statistically significant. The changes in VAS values before and after injection in the painless injection group and the conventional injection group were  $1.44 \pm 0.153$  and  $3.73 \pm 0.173$ , respectively, with statistically significant differences, i.e.,  $t = -12.458$ ,  $P = 0.001$ .



**Figure 1.** Changes in blood pressure and heart rate before and after injection

#### 4. CONCLUSION

In this paper, the blood pressure and heart rate of patients before and after injection were stable in the painless injection group. The heart rate of patients before and after injection in the conventional injection group was stable, but the difference in blood pressure was statistically significant. Due to the painful discomfort accompanying the conventional injection, the patients were nervous, anxious, and even more fearful of the subsequent extraction operation. This adverse emotional reaction has an excitatory effect on cardiovascular, and sympathetic excitation and catecholamine release can lead to faster heart rate, increased myocardial contraction, and increased cardiac output, resulting in increased blood pressure. There is a statistically significant difference in pain during painless injections versus conventional injections in pediatric dental treatment. Applying painless oral local anesthesia injector to the elderly, a statistically significant difference in pain was found between painless injection and traditional injection.

#### FUNDING

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# ANALYSIS OF THE NEW MODE OF “DUAL-TEACHER” TEACHER TRAINING TEAM CONSTRUCTION IN HIGHER EDUCATION INSTITUTIONS BASED ON THE BACKGROUND OF DEEP LEARNING

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## **ABSTRACT**

This paper analyzes the “dual-teacher” teacher team in higher vocational institutions from two aspects: the development and characteristics of higher vocational education and the characteristics of “dual-teacher” teachers. Based on the current situation that the structure of “dual-teacher” teachers in higher vocational institutions is unreasonable, the evaluation system is not perfect and the training channels are not smooth, the scientific top-level design and in-depth learning construction of “dual-teacher” teachers, the construction of curriculum development and curriculum resource sharing platform, the establishment of a strict mechanism for vocational education teachers, and the establishment of the “dual-teacher” teachers. We propose a scientific top design and deep learning construction for “dual-teacher” teachers, construction of curriculum development and sharing of curriculum resources, improvement of vocational education teacher mechanism, and establishment of a strict vocational education assessment and appointment system to achieve coordinated development of the order.

## **KEYWORDS**

Higher vocational education; Dual-teacher faculty; Assessment system; Training channels; Deep learning

## **1. INTRODUCTION**

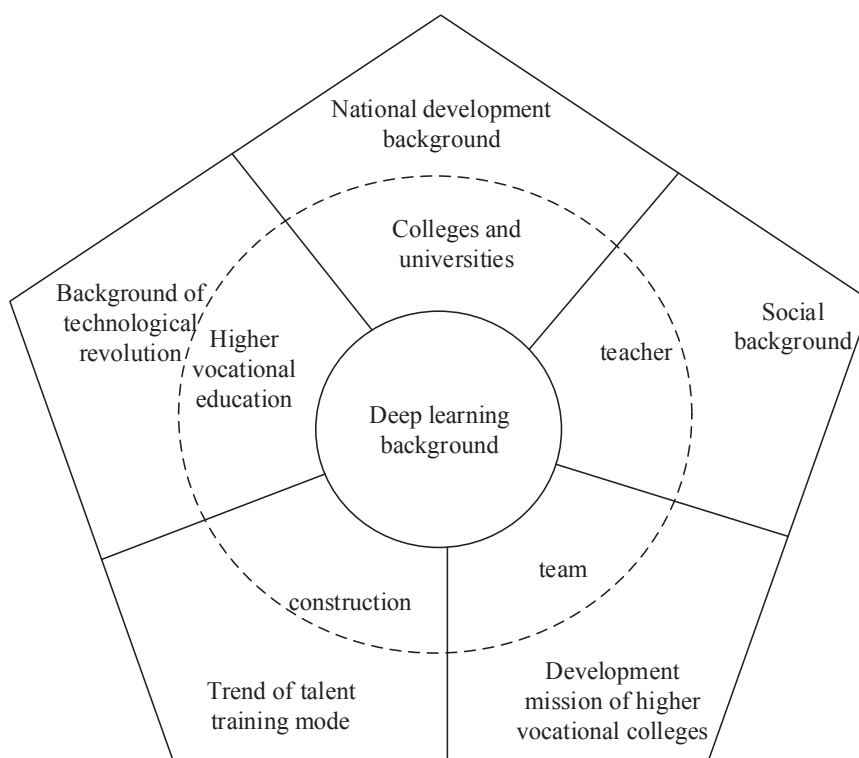
As an indispensable force of higher education, higher vocational colleges and universities cultivate millions of high-quality skilled talents for the country every year, supporting the development of manufacturing industry and being an important talent output and training base for industrial restructuring, transformation and upgrading. How vocational education can adapt to the current new situation of scientific and technological innovation development and cultivate a large number of high-quality skilled and practical talents for the society has become the focal issue of talent cultivation in higher education [1-3]. The key to solve this focal issue is to build a dual-teacher team. However, the construction of a dual-teacher team in vocational colleges and universities lags far behind the social development of vocational education. It has seriously affected the demand for high-quality skilled talents for industrial optimization and upgrading and technological progress of enterprises [4].

The literature [5] points out that the development of higher vocational institutions has achieved certain achievements and at the same time, there are bottlenecks that restrict the development. The curriculum system is not sound, the structure of teachers is single source, and the quality of “dual-teacher” teachers is low, which cannot adapt to the rapid development

of higher vocational education. According to literature [6], there are many problems in the construction of dual-teacher teachers in terms of ideological awareness, cultivation system, recognition criteria teacher structure, guarantee system mechanism and school-enterprise cooperation channels, which restrict the development of vocational colleges. The literature [7-8] argues that it is necessary to deeply analyze the outstanding problems and acute contradictions in the construction of dual-teacher teachers, sort out and summarize the existing research results, find the breakthrough of the problems, and put forward practical countermeasures and suggestions for strengthening the construction of dual-teacher teachers and improving the quality of talent training in vocational colleges.

## 2. FACULTY DEVELOPMENT IN HIGHER EDUCATION INSTITUTIONS IN THE CONTEXT OF DEEP LEARNING

Throughout the development of vocational education in the world, one of the common experiences of countries with successful vocational education lies in the ability to place the strategic planning of vocational education development in the context of the era in which it is located and achieve mosaic synchronous development. As an important part of the development of vocational education, only by recognizing and fully grasping the characteristics of the new era can we deliver a perfect answer based on a systemic perspective. Following the overall principle, the system elements of country, society, technology, talents and school can clearly outline the panoramic system model of the era background of teacher team construction in higher vocational colleges in the new era. The system of teacher team construction in higher vocational colleges and universities is shown in Figure 1. As an important project in the development of national vocational education, the teacher training team of higher vocational colleges in the new era is embedded in a coupled background system composed of five backgrounds: national strategy, social era, technological revolution, talent training mode direction and development mission of higher vocational colleges.



**Figure 1.** Background of teaching staff construction in higher vocational colleges

### **3. HIGHER VOCATIONAL “DUAL-TEACHER” TEACHER TEAM**

#### **3.1. THE DEVELOPMENT AND CHARACTERISTICS OF HIGHER VOCATIONAL EDUCATION**

Higher vocational education is the abbreviation of higher vocational education, and its development has been paid attention by all walks of life now. Unlike ordinary higher education, higher vocational education is more vocational and more practical. With the help of higher vocational education, the technical skill talents needed by the society can be cultivated effectively, and the employment rate of the whole society has been improved accordingly.

#### **3.2. CHARACTERISTICS OF “DUAL-TEACHER” TEACHERS**

A “dual-teacher” teacher is not only able to teach, but also to carry out practical teaching. They are not only teachers, but also engineers and technicians in a particular field. This is the original definition of a “dual-teacher” teacher. In short, teachers must have a teaching certificate and a skill certificate that enables them to work in the relevant industry, which is the primary criterion for determining whether a teacher is a “dual-teacher” and is the outward form of a “dual-teacher” teacher. However, this is not the most accurate interpretation of “dual-teacher”, because “dual-certification” only means that the teacher has the status of “dual-teacher”, but also requires the teacher to have the behavior of “dual-teacher”. A “dual-teacher” teacher must have the appropriate skills and professionalism to teach and educate students while completing their career guidance. Not only should they be able to teach professional courses, but they should also be able to adjust the teaching content, teaching standards and teaching methods in accordance with the needs of professional positions, so that the teaching is truly aligned with the market. They should also have a certain degree of economic literacy, understand the market, and be able to effectively teach general economic knowledge to cultivate students’ comprehensive quality. Have strong communication skills, communication skills, not only can effectively communicate with students, but also with enterprises to communicate effectively.

### **4. FEASIBILITY ANALYSIS OF THE NEW MODEL OF “DUAL-TEACHER” TEACHER TRAINING TEAM CONSTRUCTION IN HIGHER VOCATIONAL INSTITUTIONS**

The feasibility analysis of the new model of “double-teacher” teacher team construction in higher vocational institutions is based on the analysis of the current situation and problems of professional teacher team construction, reflecting the specific requirements and construction goals of “double-teacher” and improving the teaching level of the teacher team in higher vocational institutions.

#### **4.1. ANALYSIS OF THE CONSTRUCTION OF “DUAL-TEACHER” TEACHER TEAM IN HIGHER VOCATIONAL INSTITUTIONS**

In the analysis of the current situation of “dual-teacher” faculty construction in higher education institutions, it is found that there are low academic structure of teachers, single source and low level of teachers, unreasonable structure of “dual-teacher” faculty, lack of standardized management of part-time teachers, lack of specialized “dual-teacher” faculty training colleges and universities, insufficient scientific research system of “dual-teacher” faculty, and poor training channels. This paper focuses on the problems of “dual-teacher” teacher training institutions, the overall research level of the teacher team is not high, the evaluation system of “dual-teacher” teacher team is not perfect, and the training channels are not smooth. This paper mainly analyzes the structure of “dual-teacher” teachers, the evaluation system of “dual-teacher” teachers and the training channels.



#### 4.1.1. THE STRUCTURE OF “DUAL-TEACHER” FACULTY IS NOT REASONABLE

The structure of teachers' titles is shown in Figure 2. Among the full-time teachers, there are 1,675 “double-teacher” teachers, accounting for 30.32% of the full-time teachers. Among the part-time teachers, there are 352 “double-teacher” teachers, accounting for 52% of the part-time teachers. These two ratios are obviously lower than the requirement standard for “double-teacher” teachers in higher vocational education.

After some institutions of higher education were upgraded, the scale of students has increased by leaps and bounds, and the number of students in some schools has even doubled several times, while the construction of faculty has obviously lagged behind. The teacher-student ratio of some higher vocational colleges has been hovering around 18:1 for a long time. At the same time, most of the higher vocational colleges are transformed from secondary schools, and the teachers are mainly teachers of the original schools, and most of these teachers have not gone through systematic vocational education training. Therefore, there is a situation that many teachers have high theoretical level, but insufficient practical experience and poor hands-on ability. The disconnection between theory and practice of full-time teachers, the general lack of professional teachers with working experience in industry and enterprises, the influence of professional leaders in industry and enterprises seems to be minimal, the proportion of part-time teachers from the production line of middle and senior professional and technical personnel, social skilled craftsmen is low, and the proportion of teaching tasks undertaken by such teachers is not high, such a teaching team cannot adapt to the requirements of higher vocational education and cannot meet the requirements of technical and technical training. This kind of teaching staff cannot meet the requirements of higher vocational education, and cannot meet the requirements of cultivating skilled professionals, which seriously affects the teaching quality of higher vocational education.

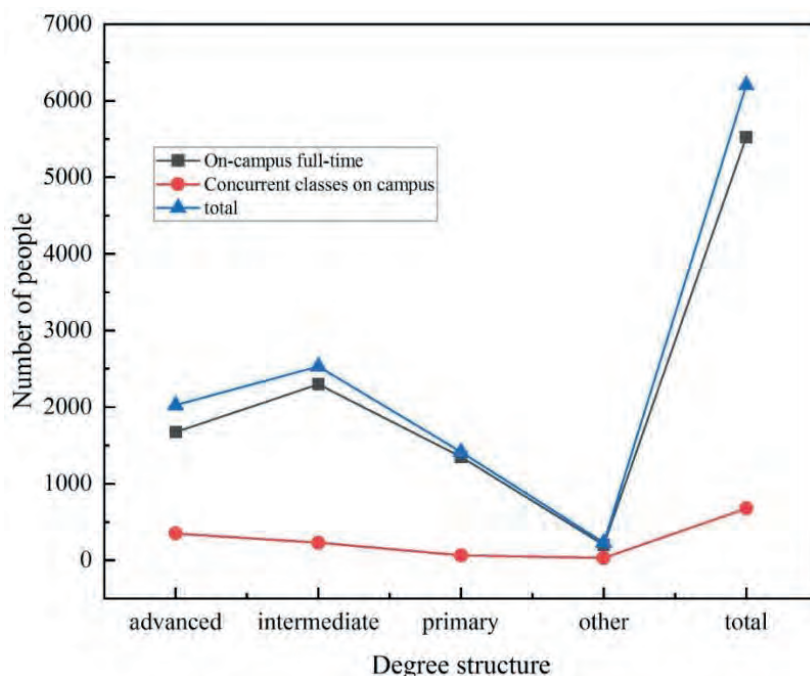


Figure 2. Structural data of teachers' titles

#### 4.1.2. THE EVALUATION SYSTEM OF “DUAL-TEACHER” FACULTY IS NOT PERFECT

In the current title evaluation policy, it is difficult to reflect the characteristics of higher vocational schools in the evaluation of senior high school teachers. The corresponding policy regulations do not have clear provisions on the connotation, requirements, cultivation and treatment of “dual-teacher” teachers. If they are not improved in time, it is difficult for higher

vocational teachers to enter into the world of students and become their true mentors and friends. The charisma of teachers' personality includes both the profound professional knowledge and extensive learning possessed by teachers, and more importantly, these comprehensive qualities of teachers should be recognized by students, and then students can trust teachers. In this way, teachers can do their best to serve students and solve their problems, and students can learn knowledge and improve their own cultivation by following the teacher as a model, which is a comprehensive quality improvement process.

#### **4.1.3. INADEQUATE TRAINING CHANNELS**

On the one hand, the development of higher education institutions requires an urgent need to increase training, while another reality is that the training policies of individual schools are not uniform. Many new teachers accept heavy substitute teaching tasks as soon as they arrive at the school and have no time to attend training again. Although most higher vocational colleges and universities have established close school-enterprise cooperation internship bases, not many have entered into substantial cooperation for various reasons. In addition, it is difficult to go to foreign countries for training due to the limitation of funding, and the policy of training is not implemented by each school. The training channels are not smooth, which is not conducive to the cultivation and improvement of teachers' individual "double teacher" quality. Despite the great efforts made by institutions of higher education, the problem of poor training channels still exists, because there are few training opportunities.

### **4.2. A NEW MODEL OF FACULTY DEVELOPMENT IN HIGHER EDUCATION INSTITUTIONS**

#### **4.2.1. SCIENTIFIC TOP-LEVEL DESIGN TO ACHIEVE ORDERLY DEVELOPMENT**

The construction of teachers' team in higher vocational colleges is a long-term system project with the joint participation of multiple interests such as government, enterprises, vocational colleges and teachers. In order to ensure the orderly promotion of this project, the government, as the representative of public interests, should firstly carry out the top-level design scientifically and focus on three aspects of work. The first is to develop vocational education teacher standards based on the development plan of vocational education teachers' lifelong career. The second is to clarify the vocational education teacher qualification certification process, standardize the national vocational education teacher qualification certification process, and raise the visibility and standardization of vocational education teacher qualifications to a level comparable to CPA credentials and attorney licenses, so as to provide authoritative certification navigation for talented individuals who are committed to becoming vocational education teachers. Third, we will improve the mechanism for prospective vocational education teachers and establish a strict vocational education assessment and appointment system.

#### **4.2.2. DEEP LEARNING CONSTRUCTION FOR SYNERGISTIC DEVELOPMENT**

First, we build a platform for curriculum development and curriculum resource sharing. Serving the teaching work of vocational education teachers. Along with the rapid changes of new technologies and inventions, the vocational education curriculum has a high elimination rate and difficult curriculum development.

Second, build a platform for professional learning and experience exchange . Supporting the continuous learning of vocational education teachers.

Third, we build a platform for inter-school linkage and school-enterprise collaborative development to help vocational education teachers' deep learning.

Fourth, the international vocational education information sharing and skills cutting platform.

Broadening the international vision of vocational education teachers. Vocational education teacher training is the common cause of vocational education actors all over the world, so only open cooperation can make the vocational education teachers in the new era international.

## 5. CONCLUSION

This paper analyzes the current situation and problems of “dual-teacher” professional teachers in higher education institutions in the context of deep learning, and addresses the problems of “dual-teacher” teacher team structure, “dual-teacher” teacher evaluation system and training channels. In order to realize a new model of collaborative development, we propose scientific top-level design, order development and deep learning construction. Among the full-time teachers, there are 1675 teachers with “double-teacher” quality, accounting for 30.32% of the full-time teachers. The ratio is obviously lower than the requirement of “double-teacher” teachers in higher vocational education. In some institutions of higher education, the teacher-student ratio hovers around 18:1 for a long time. Build inter-school linkage and school-enterprise collaborative development platform to help vocational education teachers’ deep learning. The construction of vocational education teachers is a common undertaking of vocational education actors all over the world, so only open cooperation can make vocational education teachers international in the new era.

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# EXPLORING THE VALUE AND ETHICS OF HUMANISTIC NURSING IN NURSING EDUCATION FROM A DEEP LEARNING PERSPECTIVE

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## ABSTRACT

Under the perspective of deep learning, the conceptual idea of humanistic nursing in nursing education must be updated. This paper mainly explores the value of humanistic nursing in nursing education, and implements professional ethics education for students by combining the actual needs of nursing with their personal qualities to realize the cultivation of humanistic care ability under the perspective of deep learning. The data difference between the control group and the observation group before and after receiving humanistic nursing education was analyzed. After receiving humanistic education, the total humanistic care ability of the observation group was  $175.2 \pm 11.7$ , and the total humanistic care ability of the control group was  $169.6 \pm 11.9$ , and the humanistic care ability of both groups was improved.

## KEYWORDS

Humanistic nursing; Deep learning; Nursing education; Professional ethics education; Observation group; Control group

## 1. INTRODUCTION

Humanistic nursing refers to the nursing care with humanistic care for nursing subjects by nursing staff with good humanistic qualities. Humanistic quality includes humanistic knowledge and humanistic spirit, which is an internal quality of an individual integrated by various factors such as knowledge, ability, concept and emotion, and is expressed as a person's personality, temperament and cultivation, which becomes a relatively stable internal quality of an individual [1-3]. The basic principles of medical ethics are respect for autonomy, medical practice, and fairness and justice. With this as the bottom line, nursing emphasizes on dispelling patients' physical diseases while also giving them spiritual care, psychological comfort and guidance on how to behave, meeting their physical, psychological, social and spiritual needs and making them feel cared for [4-5].

In the context of today's time, with the continuous development of the economy, there has been a comprehensive improvement in the level of people's quality of life. People have higher requirements for their own health, so whether the medical care technology in the medical field is humane has become a key concern of the social masses [6]. For the time being, there are certain problems with the humanistic qualities of medical and nursing staff, and there is still a lot of room for improvement in many aspects [7]. One of the more prominent ones is the low humanistic literacy of nursing staff, which can easily cause conflicts between patients and nursing staff and is not conducive to the use of excellent clinical decision-making by nurses in clinical practice and the development of medical care work [8-9]. In order to effectively improve the service level of nursing staff, it is necessary to improve the humanistic quality of nursing

staff, so that the enthusiasm and initiative of nursing staff can be effectively stimulated, and then the overall efficiency and quality of nursing staff can be improved, which is conducive to the improvement and soundness of the institutional system of the nursing industry.

## **2. THE VALUE AND ETHICAL ROLE OF HUMANISTIC CARE IN A DEEP LEARNING PERSPECTIVE**

Humanistic nursing refers to nursing staff with high humanistic quality, fully reflecting their humanistic care in the nursing process, which actually means fully caring for patients and showing the pursuit of the value and meaning of life. Humanistic nursing is very important to the treatment and rehabilitation of patients' diseases. It includes humanistic knowledge and spirit, which is a personal cultivation composed of various factors and is a long-term inner quality of human beings. Humanistic education, on the other hand, combines the actual needs of nursing and students' personal qualities to implement professional ethics education and realize the effective cultivation of students' modern humanistic literacy.

Medical theorizing is to follow the principles of justice, righteousness, respect and kindness, to give patients drug care and life care at the same time, to implement spiritual care and psychological care for patients, to focus on the guidance of the patient's mind, to make the patient's treatment emotion more positive, so that patients establish the confidence of recovery, and to improve the nurse-patient relationship.

The realization of the value and ethical role of humanistic nursing in nursing education is achieved by infiltrating the ideological education into the professional curriculum, promoting the same direction of ideological education and professional education, and integrating the knowledge of humanistic care into the teaching of nursing education. Embodying humanistic knowledge in the process of nursing can make patients feel safe and give them a sense of dependence. In the process of communicating with patients, humanistic care can enhance patients' desire for health and inspire confidence in early recovery, thus achieving the nursing goals of alleviating pain, treating disease and restoring health and promoting wellness. Clinical nursing work under the perspective of deep learning advocates quality nursing, and interpenetrates quality nursing and humanistic care to make nursing more humane, which will gradually increase patients' satisfaction with nursing care.

## **3. EXPLORING THE VALUE OF HUMANISTIC EDUCATION IN NURSING EDUCATION**

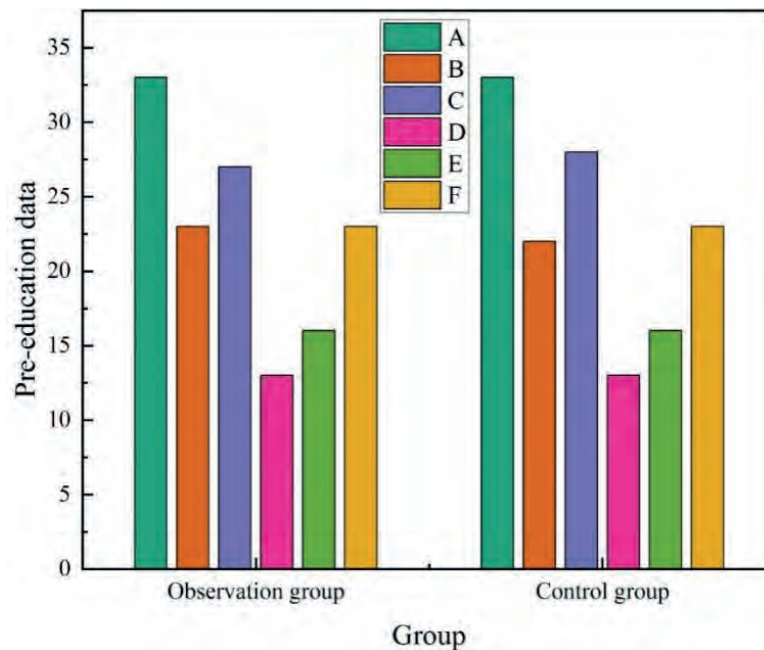
### **3.1. TEACHING METHODS AND EVALUATION CRITERIA**

The study subjects in the control group were taught according to the conventional nursing teaching process. The study subjects in the observation group received humanistic education based on the teaching operation of the control group, which was divided into several scenarios according to the difficulty of nursing operations, instrument education, operation requirements, and teaching methods.

Questionnaires were used before and after nursing care to count the humanistic care attitudes and abilities of the study subjects before and after receiving education. It was mainly divided into two aspects: nursing attitude and humanistic care ability. The nursing attitude aspect included a 30-question questionnaire with a total score of 150, and the questionnaire of humanistic care ability contained six dimensions of instilling beliefs, forming humane altruistic concepts, health education, problem-solving, meeting basic needs, and emotional communication, with a total score of 200.

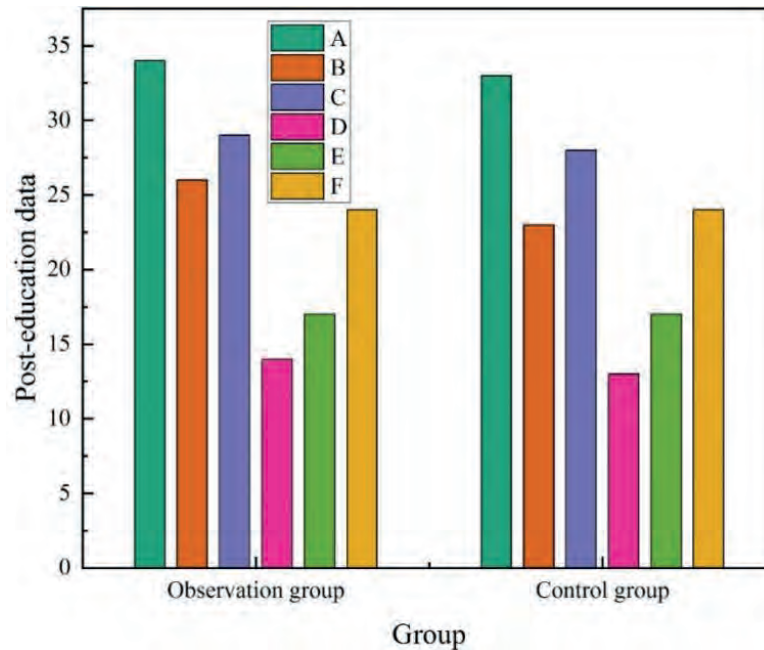
### 3.2. COMPARISON OF DATA BEFORE AND AFTER HUMANITIES EDUCATION

The questionnaire scores of the two study groups were counted, and the questionnaire data were entered into SPSS16 statistical software for data analysis, using a  $\chi^2$ -test square test, with significant differences when  $P < 0.05$ . The comparison of the data before the two groups of study subjects received education is shown in Figure 1. The six dimensions of the survey were A instilling beliefs, B forming humane altruistic concepts, C health education, D problem solving, E meeting basic needs, and F emotional communication. The total humanistic care ability of the observation group before receiving humanistic education was  $170.4 \pm 11.3$ , and the total humanistic care ability of the control group before receiving education was  $168.8 \pm 11.5$ , and there were no significant differences between the groups, i.e.,  $P > 0.05$ .



**Figure 1.** Comparison of data before receiving education

The comparison of the data after the two groups of study subjects received education is shown in Figure 2. After receiving humanistic education, the total humanistic care ability score of the observation group was  $175.2 \pm 11.7$ , and the total humanistic care ability score of the control group was  $169.6 \pm 11.9$ , and both groups were able to improve their humanistic care ability.



**Figure 2.** Comparison of data after receiving education

#### 4. CONCLUSION

This paper focuses on the comparative investigation of the value of humanistic nursing in nursing education from the perspective of deep learning. The observation group and the control group were selected as the research subjects, and humanistic education was administered on top of the teaching operations of the control group, and they were divided into different scenarios according to the degree of difficulty of nursing operations. The data analysis revealed that the students in the humanistic education group after receiving education had higher humanistic nursing attitude score and humanistic nursing ability score than the conventional teaching, with a significant difference, i.e.,  $P < 0.05$ . Thus, humanistic education can improve the humanistic nursing ability of students and has a value and ethical role in nursing education that cannot be ignored.

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# A STUDY ON THE CLINICAL EFFICACY OF DAGLIFLOZIN IN PATIENTS WITH TYPE 2 DIABETES BASED ON INTELLIGENT DATA ANALYSIS

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## ABSTRACT

In this paper, the clinical efficacy of Dagliflozin was analyzed using intelligent data analysis techniques based on the increased prevalence of type 2 diabetes and the risk of cardiovascular disease in type 2 diabetic patients. Patients diagnosed with type 2 diabetes mellitus were selected as the study population, and the treatment was divided into two groups, basic education treatment and group treatment. SPSS26.0 software was used to statistically analyze the information and data, and the independent  $t$  test was used for comparison between groups, and the paired  $t$  test was used for comparison within groups. It was found that after 12 weeks of treatment, the FPG, 2h-PG and HbA1C levels decreased in both groups compared with those before treatment, and all of them achieved the predetermined glucose control goals, and the BMI values were lower than the overweight values, i.e., less than  $23\text{kg}/\text{m}^2$ , and significantly lower than those of the control group during the same period, with statistically significant differences, i.e.,  $P < 0.001$ .

## KEYWORDS

Type 2 diabetes mellitus; Intelligent data analysis; FPG; 2h-PG; HbA1C

## 1. INTRODUCTION

According to data released by the International Diabetes Federation, it is estimated that there will be nearly 550 million people with diabetes worldwide by 2030 and more than 629 million by 2045 [1-3]. In fact, not only is the number of people with diabetes increasing, but the number of people with diabetes projected by the Global Diabetes Survey is also constantly being adjusted. The 2009 Global Diabetes Survey predicts that the number of people with diabetes will reach 438 million in 2009. In 2030, it was raised to 552 million in 2011 and further raised to 578 million in 2019. The 2045 forecast has also undergone several adjustments. These alarming increases and rising forecasts mean that the prevention and control of diabetes has not really materialized, and the number of digital diabetics is still growing. The rapid increase in the number of patients not only causes physical and psychological damage and reduces the quality of life, but its associated complications also lead to a shortened life expectancy [4-5]. The main danger of diabetes is its complications, with microvascular and macrovascular complications being the main cause of disability and death in diabetic patients [6]. Cardiovascular disease also significantly increases the risk of death in patients with T2DM.

Diabetes mellitus is an independent risk factor for cardiovascular and cerebrovascular diseases, which is often associated with high-risk risk factors for vascular events [7]. The short-term and long-term effects of proteinuria in diabetic patients were compared in reference [8]. The literature [9] mainly conducted clinical trials on the safety and tolerability of empagliflozin in patients with type 2 diabetes. Type 2 diabetes has become a serious global public health problem, and the incidence of combined chronic kidney disease (CKD) is on the rise. There are no comprehensive clinical multi-drug safety guidelines for patients with T2DM combined with CKD in China or abroad. It is urgent to provide clinical pharmacists and patients in China with relevant guidelines, summarize information on dosage, relevant pharmacological characteristics, and medication use in special populations to serve the needs of clinical healthcare professionals for standardized medication use.

## **2. INTELLIGENT DATA-BASED ANALYSIS OF CLINICAL EFFICACY OF DAGLIFLOZIN**

### **2.1. SUBJECTS AND RESEARCH METHODS**

Patients diagnosed with type 2 diabetes mellitus in the endocrinology department of the downtown hospital were selected, and a total of 80 patients who met the criteria were informed of the purpose and content of this clinical study in advance. The experimental drugs were selected as Dagliflozin and Metformin Hydrochloride tablets. The treatment was divided into two groups, basic education and treatment and group treatment.

### **2.2. RESULTS OF DATA ANALYSIS**

#### **2.2.1. COMPARISON OF BLOOD GLUCOSE INDEX AND BMI BETWEEN THE TWO GROUPS**

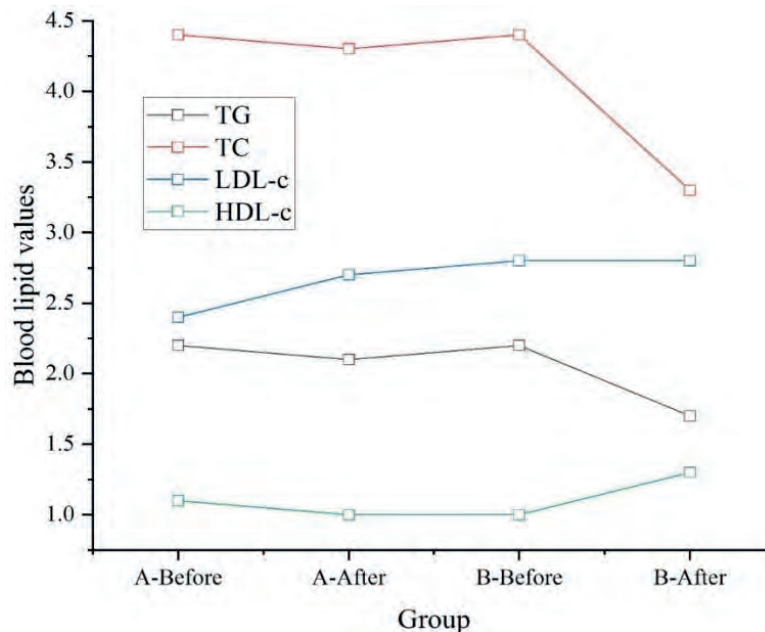
A total of 80 subjects were studied in both groups, 40 in each of the two groups. There were 27 males and 13 females in the control group and 26 males and 14 females in the daguerreotide group. There was no statistical difference between the basic information of patients in the two groups. The comparison of blood glucose indexes before and after treatment between the two groups of patients is shown in Table 1. After 12 weeks of treatment, the FPG, 2h-PG and HbA1C levels of patients in both groups decreased compared with those before treatment, and all of them achieved the scheduled glucose control target, and the difference was statistically significant, i.e.,  $P < 0.001$ , indicating that the glucose-lowering treatment was effective in both groups. However, the post-treatment glucose index in the dagliflozin group was lower than that in the control group after treatment, i.e.,  $P < 0.001$ , suggesting that dagliflozin could further lower glucose. The BMI value after treatment in the dagliflozin group was lower than the overweight value, i.e., less than  $23 \text{ kg/m}^2$ , which was significantly lower than that in the control group during the same period, and the difference was statistically significant, i.e.,  $P < 0.001$ .

**Table 1.** Comparison of blood glucose indexes before and after treatment

Group	FPG	HbA1C	2h-PG	BMI
Control group				
Before treatment	8.78±0.79	8.34±0.62	15.43±1.23	25.34±2.56
After treatment	6.89±0.55	6.92±0.45	9.45±0.89	24.66±2.67
P	<0.001	<0.001	<0.001	0.487
Observation group				
Before treatment	8.88±0.68	8.34±0.62	15.02±0.89	26.42±2.67
After treatment	6.57±0.45	6.59±0.25	8.90±0.77	24.42±2.35
P	<0.001	<0.001	<0.001	<0.001

### 2.2.2. ANALYSIS OF CHANGES IN BLOOD LIPID LEVELS IN THE TWO GROUPS

The changes in lipid levels before and after treatment in the two groups are shown in Figure 1. Where A is the control group and B is the dagliflozin group. After 12 weeks of treatment, there was no significant change in LDL-C level in both groups compared with that before treatment, and there were significant differences in TC, TG and HDL-C levels in the dagliflozin group after treatment.



**Figure 1.** Changes in blood lipid levels before and after treatment

## 3. DISCUSSION

### 3.1. EFFECT OF DAGLIFLOZIN ON BLOOD GLUCOSE LEVELS IN PATIENTS WITH T2DM

Dagliflozin may be effective in improving glycemic control with the added benefit of lowering blood pressure and body weight. Several recent studies have also demonstrated the superior efficacy of dagliflozin in the glycemic control of T2DM patients with poor glycemic control. Unlike previous drugs that were dependent on the function of pancreatic B cells or tissue sensitivity to insulin, dagliflozin acts primarily on sodium-glucose co-transport proteins in the renal tubules, significantly reducing renal tubular glucose reabsorption to lower blood glucose. In addition, in addition to its mechanism of lowering blood glucose independently of insulin action, Macdonald FR et al. found that dagliflozin improved insulin sensitivity and islet B cell function in rats through animal model experiments, similar to the function of insulin potentiators.

Clinical studies have also found that that dagliflozin significantly improves muscle insulin resistance by lowering blood glucose concentrations in patients with T2DM.

### **3.2. EFFECT OF DAGLIFLOZIN ON BMI AND LIPID LEVELS IN PATIENTS WITH T2DM**

As a recognized risk factor, obesity is closely associated with a variety of diseases, including T2DM, hypertension, and cardiovascular disease. Several studies have reported the effectiveness of dagliflozin in reducing body weight and improving blood lipids. In a randomized, double-blind, multinational, phase 3 study in patients with poorly controlled metformin, co-administration of dagliflozin resulted in weight loss primarily through a reduction in fat mass, which accounted for approximately two-thirds of the total weight loss, compared to placebo. The study by Kannenkeril D et al. also showed increased skin sodium levels in patients with T2DM compared with those with simple essential hypertension. "In a recent study, through the mechanism of urinary sodium, the effect of sodium and water retention is reduced, and blood volume is reduced, thereby contributing to blood pressure reduction." The fact that SGLT-2 inhibitors lower blood pressure while increasing hemoglobin or hematocrit also supports this notion.

## **4. CONCLUSION**

Diabetes is a chronic disease caused by the long-term joint action of genetic and environmental factors. In recent years, with the change of lifestyle and dietary structure of our residents, the prevalence of diabetes is increasing year by year, which seriously endangers the health of residents and is an important public health problem facing China at present. Long-term chronic hyperglycemia can lead to a series of complications due to damage of tissues and organs such as eyes, nerves, kidneys and cardiovascular, which seriously endangers human health. Monitoring and controlling the blood glucose level in patients with diabetes plays an important role in reducing the incidence of diabetes, so it is necessary to analyze and evaluate clinical efficacy studies. In this paper, a comparative study of the clinical efficacy of dagliflozin was conducted using intelligent data analysis methods. The data showed that after 12 weeks of treatment, dagliflozin was effective in improving glycemic control with the added benefit of lowering blood pressure and weight, was effective in reducing the risk of death and worsening heart failure, and improved symptoms of heart failure, but there were no significant differences in tolerability or safety events. Dagliflozin has been shown to be effective in reducing body weight and improving lipids in patients with T2DM.

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# THE CONSTRUCTION OF AN INTERACTIVE PLATFORM FOR PHYSIOLOGICAL INTELLIGENT EDUCATION BASED ON CLOUD COMPUTING

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## ABSTRACT

In this paper, a new interactive platform for physiology wisdom education is constructed by using cloud computing technology according to the requirements of physiology education. The physiology wisdom education cloud platform needs to rely on big data environment, cloud computing and other technologies to integrate and store massive teaching resources. The overall architecture of the wisdom education cloud platform includes four core architectures: system layer, resource layer, application layer, and user layer, and each layer unifies the management, integration, and distribution of basic information to realize data sharing. The physiology wisdom education interactive platform is tested from two aspects: environment test and performance test.

## KEYWORDS

Smart education; Cloud computing; Teaching resources; Data sharing; Performance testing; Environment testing

## 1. INTRODUCTION

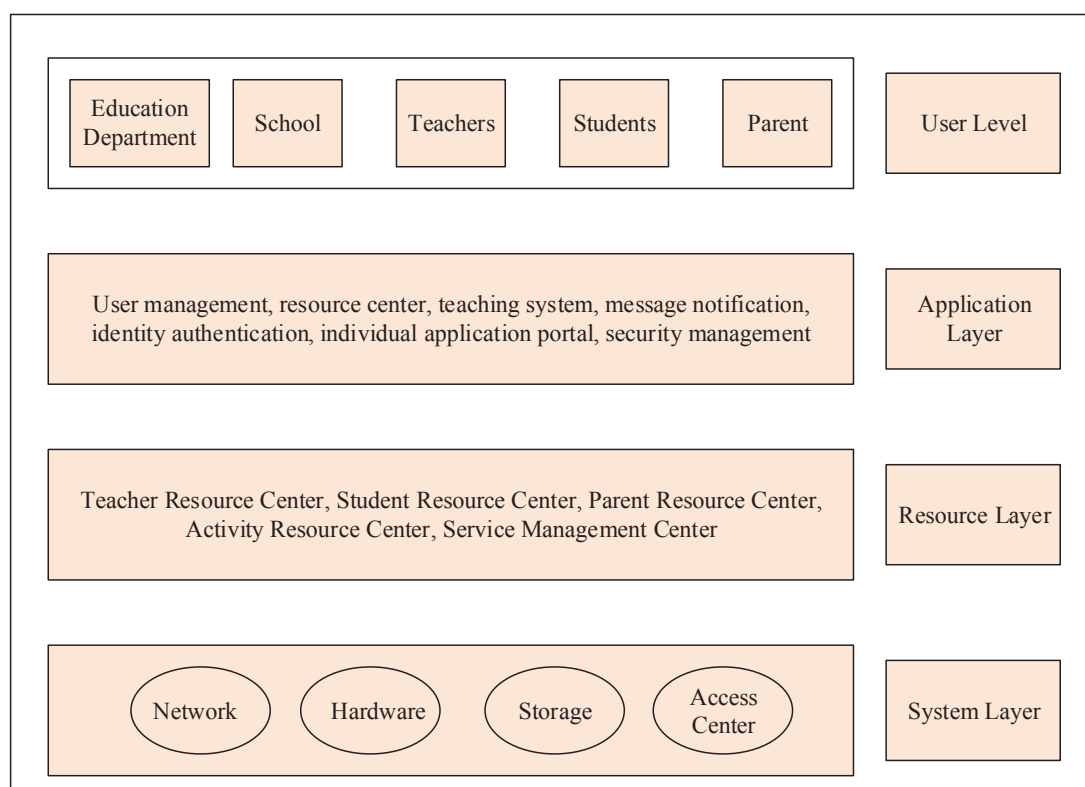
Smart education is an advanced education model that deeply applies information technology to educational field activities such as educational teaching, educational management and scientific research evaluation, and provides digital and intelligent support for the smooth implementation of educational teaching and the distribution and sharing of related educational resources, human, material and financial resources. The basic features of smart education are openness, sharing and collaboration [1-3]. Unlike traditional educational information systems, smart education provides good organization and management of various teaching equipment and educational resources [4]. A smart education platform is a one-stop smart education service platform that combines the concept and practical research of smart education and integrates teaching, learning, management, entertainment, and communication by relying on the Internet and using the construction of information technology as the basis of the educational environment [5-6]. The establishment of a smart education platform allows education departments, schools, teachers, students, and other people with learning needs and other workers in the education field to be in the same environment. Different educational work and learning tasks are accomplished according to different needs and permissions, thus achieving practical, comprehensive, and scientific development of smart education [7-8]. At this stage and for some time to come, the development of smart education focuses on the integration with cloud computing technology. Based on the big data computing and storage, resource virtualization and other capabilities provided by the cloud environment, it is possible to build stable, reliable and easily scalable education cloud services that meet the characteristics of smart education [9-10].

## 2. CONSTRUCTION OF THE PLATFORM

The physiology wisdom education cloud platform needs to rely on big data environment, cloud computing and other technologies to integrate and store massive teaching resources and provide personalized learning services for multiple subjects including teachers, students and parents. Smart education cloud platform helps break the limitation of time and space and helps students find teaching resources anytime and anywhere. Smart classrooms and smart campuses all provide the premise and foundation for the construction of a smart education cloud platform. The construction of smart education cloud platform should be designed as a whole in terms of hardware structure and software functions. Hardware structure includes servers, storage, user terminals, network devices, etc., and software functions include database development and education informatization deployment.

### 2.1. OVERALL ARCHITECTURE DESIGN OF PHYSIOLOGY SMART EDUCATION CLOUD PLATFORM

The overall architecture of physiology wisdom education cloud platform should include four core architectures: system layer, resource layer, application layer, and user layer. The system layer includes hardware and software systems such as big data systems, such as using cloud technology to do data collation, storage and promotion services, and using automated management systems to realize traffic distribution control, CPU automation management and storage automation management. The resource layer includes teaching resources such as data products. The application layer includes user management, resource center, teaching system, message notification, identity authentication, individual application portal, security management and other components, and is also equipped with a network identity unified authentication system. The user layer includes various types of objects using educational resources, such as educational management, schools, teachers, parents and students, and is handled by relevant departments such as development and management services. The overall architecture of the cloud-based physiology wisdom education interactive platform is shown in Figure 1.



**Figure 1.** Overall architecture of intelligent education interactive platform

## 2.2. DEVELOPMENT OF PHYSIOLOGY SMART EDUCATION CLOUD PLATFORM

The physiology wisdom education cloud platform should manage and integrate all the basic information in a unified way, and then distribute it reasonably in order to achieve data sharing. The technology of mutual sharing and data commons can be used in this platform to realize the unified management of data. For the system architecture of the platform, a multi-layer and multi-tier model is adopted and layered according to the different functions used. In each layer, different functions are implemented to divide the business requirements at different stages. In the development process, object-oriented technology is used to improve the malleability of the whole architecture, thus making the system development efficiency much higher.

For users, who may use a certain function repeatedly, this requires the development of the physiology wisdom education cloud platform system to be component-based to achieve the need for repeated calls to different functional sub-modules within the system. The design of the system is mainly implemented using SOA software architecture, so that the functions of subsystems can be somewhat simplified and improved in accuracy, thus distinguishing the functional data of different system modules and reaching the demand for modular services. As the whole platform in the process of operation, different sub-systems will produce different types of sub-data, in this cycle will form a huge number of background to ensure the accuracy and data integrity of the entire data volume by setting up real-time data change emergency module at the back end of each sub-function module output function.

## 2.3. TESTING OF THE PHYSIOLOGY SMART EDUCATION CLOUD PLATFORM

### 2.3.1. TEST ENVIRONMENT

The laptop is used as a mobile client to send HTTP requests based on SOA Web Service through the browser and the desktop computer to build a virtual machine. In the virtual machine, tomcat server is installed, development platform is installed, Hadoop and Hbase are installed and Hadoop environment is configured.

### 2.3.2. PERFORMANCE TESTING

The physical machine uses Win10 system, the virtual machine uses VMware, and the haproxy inverse proxy server. The load balancing test data of the service is shown in Table 1. When the current number of connections is 2, the bytes received and sent are 1172 vs. 1011, and the maximum concurrency is 3000.

**Table 1.** Functional test data

	Number of current connections	Service Status	Receiving/sending bytes	Maximum number of concurrent connections
frontend	2	OPEN	1172/1011	3000
web1	1	12m35sUP	734/556	-
web2	2	12m35sUP	416/285	-
backend	1	12m35sUP	1165/1005	3000

## 3. CONCLUSION

In this paper, a physiology wisdom education service model is designed using cloud computing technology, in which learners, teachers, educational organizations, training institutions, schools, cloud service platform developers, and cloud service platform providers build a healthy wisdom education interactive platform in their service model. It also introduces the environment building, development tool deployment, and service development release process carried out for platform implementation, and finally completes the testing of the physiology wisdom education interactive platform cloud services. The test results show that



the physiology wisdom education interactive platform built in this paper has good operational performance.

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# RESEARCH ON THE DEVELOPMENT OF PARALLEL AND INTEGRATED RELATIONSHIP BETWEEN CULTURAL EDUCATION AND MENTAL HEALTH EDUCATION OF COLLEGE STUDENTS BASED ON ASSOCIATION PLANNING MINING

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## ABSTRACT

In this paper, in order to improve the mental health of college students firstly, data mining and association rules are analyzed and the association planning mining process is obtained. Then, by analyzing the psychological state and characteristics of contemporary college students, the parallel relationship between college students' mental health and college students' cultural education is mined, and the integration of college students' cultural education and mental health education is based on association rule mining. Finally, the countermeasures for the parallelism and integration of cultural education and mental health education are obtained, which require the formation of self-reflective consciousness and the promotion of psychological regulation, as well as the need to face up to setbacks and cultivate resilient qualities, and also to be open-minded and learn to relieve oneself.

## KEYWORDS

Mental health level; Data mining; Association rules; Association planning mining; Cultural education

## 1. INTRODUCTION

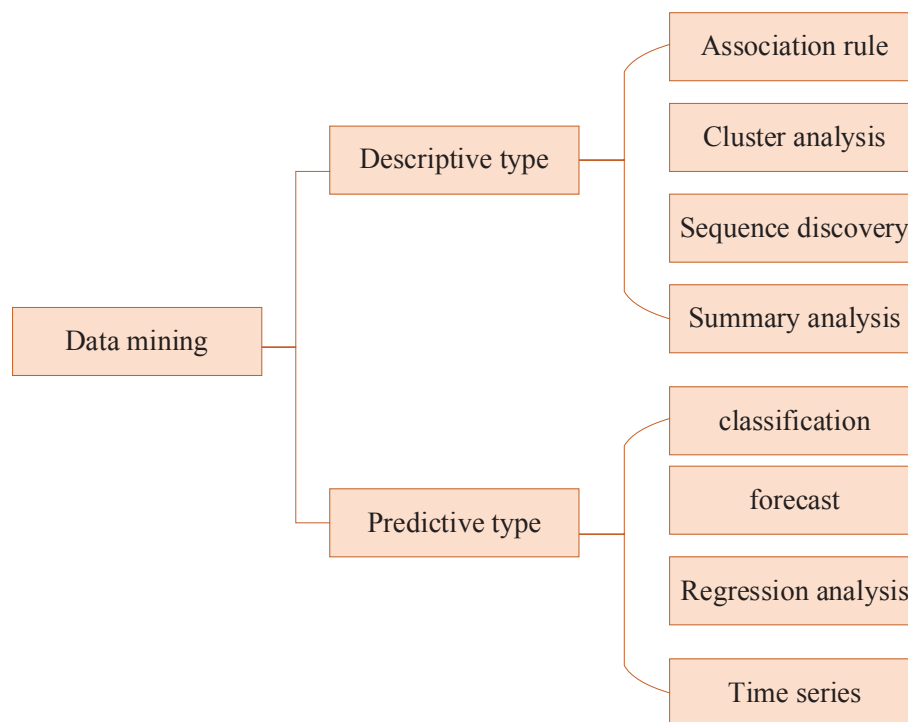
Culture is the eye and soul of the Chinese nation, and how far the Chinese nation can see and go depends on what kind of intellectual wisdom the national culture can bring, and in recent years, people have paid a lot of attention to "cultural literacy" [1-2]. Cultural literacy refers to the relatively fixed, basic and intrinsic qualities of human beings in the field of culture and education, which expresses the basic comprehensive abilities, technical level and personality characteristics of human beings in the relevant cognitive fields and their matching behavioral abilities, psycho-emotional and other fields of development [3-4]. The formation and enhancement of cultural literacy is also of great significance for the implementation of the strategy of strengthening the country through culture and talent [5]. To improve the cultural literacy of college students, to connote their values and moral cultivation, to enhance their cultural identity, and thus to improve their national and ethnic identity, mental health education is an important means to improve students' health and an important part of ideological education [6-7]. In the new era, higher vocational students show differentiated psychological problems. Therefore, higher vocational mental health education needs to actively adapt to the changes, take up the important mission of moral education, focus on the guidance of students' psychological problems, and promote the healthy growth of students' body and mind [8-9]. How to carry out mental health education activities with high quality and solve the psychological problems of students is a topic that needs further research in higher education institutions. In this paper, we combine data mining and association rules to sort out the mining process of

association planning, uncover the parallel relationship between college students' cultural education and mental health education, and integrate the two, focusing on the method of integration as well as its development.

## 2. DATA MINING AND ASSOCIATION RULES

### 2.1. DATA MINING

Data mining is the process of extracting knowledge from large, incomplete, noisy, imprecise, and random data that is implicit, unknown, and potentially useful. The introduction of this concept makes people aware of the very useful information and knowledge hidden in the "useless" data. The specific task representation of data mining is shown in Figure 1. The descriptive type of data mining describes the data in a summarized way, analyzes the relationships between the target data, and explores what is of interest to people.



**Figure 1.** Data mining specific task representation

### 2.2. ASSOCIATION RULES

Association rules are used to describe the interdependence and interrelatedness of a thing and other things. In layman's terms, it means that among multiple things, there is one or another special relationship between things, and these relationships have some intrinsic meanings to a certain extent, and these intrinsic meanings are analyzed and organized, so that they can be used as a criterion for judgment and decision making. Association rules describe the probability of something happening when another thing happens.

### 2.3. THE PROCESS OF ASSOCIATION PLANNING MINING

Association rule mining is to find all the strong association rules from the transaction database after passing two thresholds, minimum support and minimum confidence, given by the user. The association rule mining problem can be divided into two subproblems: mining frequent item factor sets and generating association rules. The process of association rule mining is shown in Figure 2. D is the transaction database to be mined, Algorithm-1 is the algorithm that represents the frequent itemset to be mined, and the algorithm is executed to obtain the frequent itemset. Algorithm-2 is the algorithm that represents the association rules to be generated from the generated frequent itemset. minsupport and minconfidence are the

minimum support and minimum confidence set by the user. The association rule R is all the association rules mined at the end of the whole process.

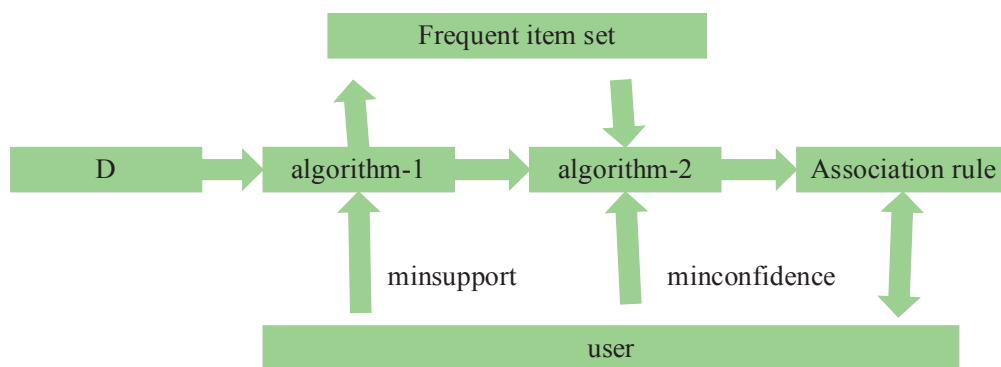


Figure 2. shows the process of association rule mining

### 3. INTEGRATION OF CULTURAL EDUCATION AND MENTAL HEALTH EDUCATION FOR COLLEGE STUDENTS

#### 3.1. PSYCHOLOGICAL STATE AND CHARACTERISTICS OF CONTEMPORARY COLLEGE STUDENTS

The development of Internet information technology has profoundly affected the mental health of college students. The Internet is a means of information dissemination, and the amount of information is extremely large, the information is mixed, and various ideologies intertwine and collide, making it difficult to distinguish, which has caused many negative effects on the values of college students. Utilitarian, hedonistic and consumerist values occupy the mainstream channels in the dissemination of information on the Internet and take up a large amount of valuable school time of college men and women, which can easily lead to their disconnection from society and affect their values and outlook on life, thus leading to their psychological problems. Parents are important members of the family, and their education and knowledge have a very important influence on the members of the family. The family environment is a mirror in front of which the psychological health of college students is undoubtedly reflected accurately.

#### 3.2. PARALLELISM AND INTEGRATION OF CULTURAL EDUCATION AND MENTAL HEALTH EDUCATION UNDER CORRELATION PLANNING EXCAVATION

At the present stage, the mental health education of college students mainly adopts western teaching materials and introduces western psychology education concepts and education methods, however, the effect is not satisfactory. After profound reflection, we were able to explore the essential causes of this problem in the development. The mental health education of a country and a nation must be built on the nation's own cultural values, and must be based on the development history and cultural heritage of the nation, and imported products will have the problem of unconformity and cannot be fully adapted to the mental health education of contemporary college students. Based on the excellent Chinese traditional culture, it is the right way to establish the social and psychological foundation of the whole nation with this as the support point. For college students, they have a high level of knowledge background, and their studies from elementary school to high school have also laid a good foundation for their understanding of traditional cultural texts, so they should dig deep into their traditional cultural heritage and play the positive role of traditional culture to help college students adjust their psychological state and establish a correct outlook on life and values. We should return to the tradition and give full play to the educational role of traditional culture on culture and psychology, especially in colleges and universities, we should promote traditional culture, remove the falsehoods and keep the truth, remove the roughness and extract the essence, so as to

cultivate the healthy psychological state of contemporary universities. Table 1 shows the psychological education embedded in the cultural education of college students and its promotion.

**Table 1.** Psychological education and development contained in cultural education

Psychological education resources contained in traditional culture	In contemporary society, the tendency of materialization is serious. Giving full play to people's subjective initiative, changing cognition and improving inner cultivation to cope with external pressure can make people calm.
Carry forward traditional culture to promote mental health water leveling	In cultivating and practicing Chinese traditional cultural concepts can help greatly Students to establish a correct view of the state, outlook on life, values, concepts of justice and interests, not only can improve their mental health level, but also to promote the internalization and practice of socialist core values is of great benefit.

#### **4. PARALLEL AND INTEGRATED MEASURES AND DEVELOPMENT OF CULTURAL EDUCATION AND MENTAL HEALTH EDUCATION**

##### **(1) Forming self-reflective consciousness and promoting psychological regulation**

In the development of mental health education for college students, students can be guided by the traditional culture's concept of "I think about myself three times a day" in the management of mental health education, so that students can form a self-reflective consciousness while receiving the penetration of mental health education concepts, so that in the subsequent learning process, they can change the way of mental health education cultivation and provide scientific control for the development of mental health education for college students. The development of mental health education of students is guaranteed and the scientific control of the development of mental health education of college students is realized.

##### **(2) Facing up to setbacks and cultivating the quality of resilience**

In the work of mental health education for college students based on traditional culture, the penetration of traditional cultural concepts enables students to have the courage to face up to setbacks, thus providing a guarantee for the development of mental health education for students. Teaching methods should be integrated scientifically to improve the level of mental health education for college students and lay the foundation for the development of mental health education for students in the new era.

##### **(3) Be open-minded and learn to relieve oneself**

In the development of student teaching work, students should be allowed to adjust their own mentality, not to be affected by the immediate failures, timely change the concept of learning, to provide protection for the implementation of student learning work planning, to achieve the scientific development of the arrangement of mental health education work for students, to provide protection for the development and implementation of mental health education work for students, to improve the quality of mental health education for college students, and to lay the foundation for promoting the development of mental health education for students Foundation.

Chinese traditional culture is rich in connotation, and combining excellent traditional culture with advanced mental health education theory and practice can more effectively solve the mental health problems of contemporary college students. Mental health education of college students is also an important foundation for realizing the inheritance of excellent Chinese traditional culture, which can play a positive role in the mental health education of contemporary college students, and ultimately, the excellent Chinese traditional culture can be better inherited and carried forward.

#### **5. CONCLUSION**

This paper combines data mining and association rules to design the mining process of association planning, based on which the parallel relationship between cultural education and mental health education of college students is mined, and the integration of cultural education and mental health education of college students is obtained to guide the mental health education of students with the concept of "I think about myself three times a day" in traditional culture. Management. In the work of mental health education for college students based on traditional culture, students are given the courage to face up to setbacks through the infiltration of traditional cultural concepts, thus providing a guarantee for the development of mental health education for students. We also hope that students will adjust their own mentality, not to be affected by the immediate failure, and timely change the concept of learning.

## **ABOUT THE AUTHOR**

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# MULTISCALE RESIDUAL MULTISCALE RESIDUAL NETWORKS IN MAGNETIC RESONANCE IMAGING DIAGNOSIS OF SMALL HEPATOCELLULAR CARCINOMA

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## ABSTRACT

In this paper, we analyze the magnetic resonance imaging MRI, which is a class of imaging device technology for medical examination made by using nuclear magnetic resonance phenomenon. A multiscale residual dual-domain attention network was constructed by fusing a multiscale residual learning block and a dual-domain attention unit based on a convolutional neural network and applied to the diagnosis of small hepatocellular carcinoma by magnetic resonance imaging. The results showed that the liver scan noise was lower in the control patients, and the difference was statistically significant ( $P < 0.05$ ), and the multi-scale residual dual-domain attention network based on multi-scale residuals could improve the diagnosis of small hepatocellular carcinoma magnetic resonance imaging.

## KEYWORDS

MRI; Convolutional neural network; Multiscale residual block; Multiscale residual block; Small hepatocellular carcinoma

## 1. INTRODUCTION

Small hepatocellular carcinoma is also called early stage hepatocellular carcinoma. The maximum diameter of a single cancer node is  $< 3$  cm, or the sum of the maximum diameter of two cancer nodes is  $< 3$  cm. Small hepatocellular carcinoma has mostly insignificant clinical symptoms, and clinical small hepatocellular carcinoma is mainly of beam-like type, which often has the role of infiltrative growth and swelling growth and is more harmful to patients. Early diagnosis and early treatment of small hepatocellular carcinoma are of great significance for disease treatment [1-3]. Clinically, patients with small hepatocellular carcinoma are mostly

combined with cirrhosis and chronic hepatitis. Patients' diseases generally go through regenerative nodules - atypical nodular hyperplasia - early carcinoma - hepatocellular carcinoma. Therefore, early differential diagnosis of liver disease plays an important role in disease treatment and can affect the prognosis of patients with liver disease. MRI of the liver is radiation-free, safe and has good soft tissue resolution, and has irreplaceable advantages for the detection of diffuse liver disease and focal liver disease. Most patients attending medical imaging departments are patients with liver disease, which requires attention to new imaging techniques and experience in liver disease, and the clinical diagnostic value of MRI enhancement and MRI plain scan for small hepatocellular carcinoma [4-6]. Convolutional neural networks have become a mainstream computational model for medical image analysis and a powerful tool for segmentation tasks. Automatic tumor segmentation methods based on convolutional neural networks do not require human intervention, but the network structure is too deep and the number of parameters is too large, which causes difficulties in network training and cannot effectively identify multi-scale tumor targets, resulting in low segmentation accuracy [7-9]. To address the problems in the current study, this paper proposes a multiscale residual two-domain attention fusion network and hybrid adaptive weight loss function applied to the magnetic resonance imaging diagnosis of small liver cancer.

## **2. MAGNETIC RESONANCE IMAGING DIAGNOSIS OF SMALL HEPATOCELLULAR CARCINOMA**

### **2.1. MAGNETIC RESONANCE IMAGING**

Magnetic resonance imaging MRI is a class of imaging equipment for medical examination made by using the phenomenon of nuclear magnetic resonance, magnetic resonance imaging technology. It is widely used in clinical medicine and medical research due to its advantages of no radiation and high resolution. Some advanced equipment manufacturers work with researchers to optimize the performance of MRI scanners and develop new components. Magnetic resonance imaging has obvious advantages as a non-invasive examination method applied to liver disease examination, but it also has certain limitations when it comes to examination. The results obtained from different sequences of magnetic resonance imaging can vary, and its operation technique requires high technical skills, and phenomena such as difficulties in patient participation and artifacts associated with implanted hardware can also adversely affect image acquisition.

### **2.2. MRI OF THE LIVER**

MRI of the liver is mainly performed in cross-sectional and coronal scans, and the conventional scan sequences include T1WI with homo- and antiphase sequences and T2WI with fat suppression sequences. MRI of the liver measures the signal difference between homo- and antiphase and allows quantitative analysis of liver fat content, but patients with intrahepatic iron deposits and mild fatty liver tend to have significant bias in the quantitative assessment of liver fat. In contrast, T2WI mostly uses fast spin-echo sequences, which enhance the degree of contrast based on the combination with fat suppression and effectively reduce the impact of the examination process on the abdominal wall and perihepatic fat.

## **3. MULTI-SCALE RESIDUAL TWO-DOMAIN ATTENTION NETWORK**

To address the current problems in small hepatocellular carcinoma-MRI tumor region segmentation, this paper proposes a multi-scale residual two-domain attention fusion network MSRDANet model, which performs tumor extraction in a single-stage segmentation mode and substantially reduces the number of model parameters on the basis of improving segmentation accuracy. The model has an encoder-decoder structure as the backbone architecture of the network, containing encoders (Conv1 to 5), fusion decoders (AConv5, AFNet4 to 1) and long-



hop connections for transporting encoded path feature maps. The network takes 4-channel images as input, performs 5-stage feature extraction and 4 times coded downsampling by multi-scale residual blocks, passes the final extracted feature map through 1 time dual-domain attention unit first, followed by upsampling by inverse convolution to recover the resolution and reduce the number of channels, while the coded path feature map and the upsampled feature map are fused by the decoder under the guidance of the dual-domain attention unit, after 4. Finally, the up-sampled feature map is further reduced by  $1 \times 1$  convolution, and the network is optimized by iterating through the hybrid adaptive weight loss function to finally output the 2-channel tumor segmentation map.

### 3.1. MULTISCALE ATTENTION LEARNING BLOCKS

Multiscale feature representation is essential in various vision tasks. More efficient feature representation can be obtained by embedding multi-scale feature extraction operators in a convolutional neural network. On the other hand, CNN can learn multi-scale features from coarse-grained to fine-grained naturally by a set of convolutional operators. The feature mapping information of each channel direction of the image is obtained through the multiscale network structure, while its channel dimension is compressed to extract spatial information from each channel at different scales. Second, the channel attention weights of the multi-scale feature map are extracted using the SEWeight module, and the corresponding channel attention weights are recalibrated using Softmax operations to establish remote channel dependencies. Finally, the recalibrated weights and the corresponding feature maps are subjected to the element-by-element product operation to obtain the multiscale feature maps as the output.

First, the input feature map is subjected to multiscale convolution with the following equation:

$$feat_i = Conv(k_i \times k_i)(inpt), i = 0, 1, 2 \dots S-1 \quad (1)$$

Where, the size of the  $i$  st convolution kernel  $k_i = 2 \times (i + 2) + 1$ ,  $feat_i \in R^{C \times H \times W}$  indicates the feature maps at different scales. The result after the multi-scale convolution operation is obtained from the following equation:

$$Feats = Cat([feat_0, feat_1, \dots, feat_{S-1}]) \quad (2)$$

where  $Feats \in R^{C \times H \times W}$  is the obtained multiscale feature map.

The channel attention information is extracted from the multiscale preprocessed feature map to obtain each channel weight information. The weight vector can be expressed as

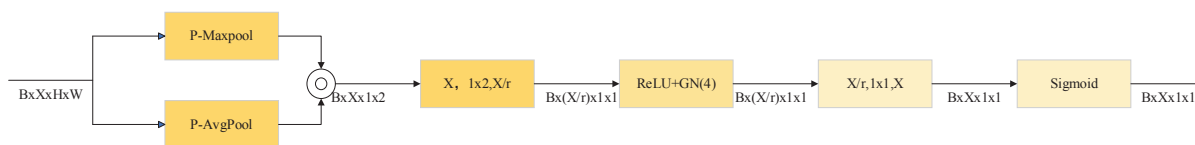
$$w_i = SEWeight(feat_i), i = 0, 1, 2 \dots S-1 \quad (3)$$

where  $w_i \in R^{C \times 1 \times 1}$  is the attention weight.

### 3.2. DUAL DOMAIN ATTENTION UNIT

In order to realize the full utilization of effective features and the reduction and suppression of invalid features, to better realize the extraction of key detail information in the feature maps delivered by long-hop connections, to make more use of shallow spatial cues, edge information and early refinement features, so as to accomplish more valuable feature map fusion in the decoder, and to improve the problem of intra-class inconsistency and inter-class non-differentiation in semantic segmentation, the design of the dual-domain attention unit with attention mechanism for low-level features guided by high-level features is designed. The dual-domain attention unit is shown in Figure 1. Firstly, for the squeezing operation of global

information embedding, both global maximum pooling and global average pooling are used to perform, so as to achieve a more comprehensive retention of global spatial information, and secondly, for the stimulation operation, two fully connected layers are removed and replaced by two convolution operations, and the activation functions after convolution still use ReLU and Sigmoid functions.



**Figure 1.** Dual domain attention unit

## 4. EXPERIMENT AND ANALYSIS OF MIR REGION SEGMENTATION IN SMALL HEPATOCELLULAR CARCINOMA

### 4.1. EVALUATION INDICATORS

In this paper, the tumor segmentation accuracy was evaluated by three groups of metrics, namely region metrics, pixel metrics and distance metrics, and Table 1 shows the definitions of specific metrics and evaluation criteria.

**Table 1.** Definition and evaluation criteria of specific indicators

Evaluation index		Specific name	Definition representation	Evaluation criteria
Regional index	DSC	Dice Similarity Coefficient	Set similarity measure	The larger the value, the phase between the predicted region and the real region The higher the similarity, the better the segmentation effect IOU
	IOU	Intersection of Union	Split standard performance measures	
Pixel index	TPR	True Positive Rate	Predict the correct positive sample Proportion of total positive sample	The larger the TPR, PPV and ACC values are, the higher the sensitivity, accuracy and accuracy respectively, and the better the segmentation effect will be
	PPV	Positive Predictive Value	The prediction is in the positive sample Predict the rightratio	
	ACC	Accuracy	Predict the correct sample As of the total sample	
Distance index	HD	Hausdorff Distance	Measure between two sets of points Maximum mismatch	The smaller the value, the prediction region The closer we get to the real area, The better the segmentation

### 4.2. RESULTS AND ANALYSIS

The difference between the two groups of patients with high contrast resolution of CT examination images of the liver was not statistically significant ( $P>0.05$ ), and the difference in the uniformity of the scanned images was not statistically significant ( $P>0.05$ ). The difference was statistically significant ( $P<0.05$ ), the magnitude of the decrease in the low pair resolution of the scanned images and the jump in the scanned images of the patients in the observation group was significantly greater than that of the patients in the control group, the difference was statistically significant ( $P<0.05$ ), the CT examination image quality of the patients in the observation group was better and the effect of excessive radiation dose in the group was reduced, the difference was statistically significant ( $P<0.05$ ), the CT scan noise of the liver of the patients in the control group was lower, the difference was statistically significant ( $P<0.05$ ). The absorbed dose of control group patients far exceeded that of observation group patients, and the difference between the two groups was statistically significant ( $P<0.05$ ), so the use of multiscale residual two-domain attention network could improve the diagnostic ability of MRI

of small liver cancer.

## 5. CONCLUSION

In this paper, a multiscale residual dual-domain attention fusion network is proposed for the diagnosis of small hepatocellular carcinoma by magnetic resonance imaging. The network uses a multiscale residual block composed of multiscale convolution as the basic building block, and the dual-domain attention unit is incorporated into the network to guide the network to utilize favorable features more effectively and better achieve key information extraction and boundary preservation. The results showed that patients in the control group had lower noise on CT scans of the liver, and the difference was statistically significant ( $P < 0.05$ ), and the absorbed dose of patients in the control group far exceeded that of patients in the observation group, and the difference between the two groups was statistically significant ( $P < 0.05$ ), and the use of multiscale residual dual-domain attention network could improve the diagnostic capability of magnetic resonance imaging of small hepatocellular carcinoma.

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# ANALYSIS OF THE EFFECT OF SYSTEMATIC CARE APPLIED TO GRAY PREDICTION MODEL ON COMPLICATIONS AND PAIN IN PATIENTS UNDERGOING LIVER CANCER INTERVENTION

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## ABSTRACT

This paper combined the gray prediction model with the clinical data of the hospital to provide systematic care for patients with hepatocellular carcinoma intervention through health education, pain care, psychological care, dietary care and environmental care, and set up a comparison experiment in which those who underwent systematic care were set as the study group and those who did not undergo systematic care were the comparison group. The analysis of complications and pain conditions showed that the study group had a significantly lower complication rate than the control group, with a meaningful comparison of  $P < 0.05$ , and the pain perception index was significantly lower compared with the comparison group patients, with  $P < 0.05$ , and the prediction error based on the GM prediction model was within  $\pm 1$ .

## KEYWORDS

Gray predictive model; Systemic care; Hepatocellular carcinoma intervention; Complications; Pain perception

## 1. INTRODUCTION

Hepatocellular carcinoma, or malignant tumors of the liver, has a high incidence, and more than 200,000 people die from it each year worldwide, making it one of the serious diseases that threaten human life and health [1]. Currently, the pathogenesis of liver cancer is unclear and is widely believed to be caused by a combination of factors, such as alcohol consumption, cirrhosis, viral hepatitis, chemical carcinogens, and aflatoxin [2-3]. Interventional therapy is a

new type of minimally invasive procedure that can effectively improve patients' condition and prolong their survival time. However, interventional therapy is still an invasive treatment, and to a certain extent, it also affects the patient's body, thus affecting the surgical effect [4-5]. Therefore, giving certain nursing measures while performing interventions can help improve the success rate of the procedure. Tong, D. et al. closely observed patients to identify symptoms of hepatic encephalopathy and pain in a report of 40 patients with primary hepatocellular carcinoma combined with obstructive jaundice treated with hepatic puncture bile duct drainage interventions [6]. The literature [7] analyzed patients with cirrhosis combined with hepatocellular carcinoma who underwent intervention in the oncology department of the Second Hospital of Dalian Medical University and compared the satisfaction, quality of life score, postoperative complication rate and 20-month postoperative survival rate before and after the nursing intervention in the two groups. The literature [8] suggests that it is important to take steps to ensure that pain specialists and interventional radiologists are fully utilized to manage refractory cancer pain. In this paper, a comparative trial was designed for the effectiveness of the application of the clinical care pathway approach for patients undergoing hepatocellular carcinoma interventions by combining clinical data of patients undergoing hepatocellular carcinoma interventions and a gray prediction model to observe the incidence of complications and pain in patients undergoing hepatocellular carcinoma interventions by systematic care in the comparison group and the experimental group, and to make predictions based on the GM model.

## 2. GRAY PREDICTION MODEL

Uncertainty system is a manifestation of incomplete and inaccurate information caused by the limitations of human cognitive ability and economic and technological conditions. Gray system theory can establish linear differential equations based on partially known information by processing fuzzy and messy small sample data and using the least squares method to find out the laws that exist in the original sequence.

Let the number of residuals be:

$$G^{(0)} = (g^{(0)}(2), g^{(0)}(3), \dots, g^{(0)}(n)) \quad (1)$$

where the residual values:

$$g^{(0)}(k) = |x^{(0)}(k) - \hat{x}^{(0)}(k)| \quad k = 2, 3, \dots, n \quad (2)$$

The mean GM(1,1) model prediction for the residual series of Eq. (2) yields the residual prediction model:

$$\hat{g}^{(0)}(k) = \left\{ (1 - e^a) \left[ g^{(0)}(2) - \frac{\mu'}{a'} \right] e^{-a(k-1)} \right\} \quad k = 3, 4, \dots, n \quad (3)$$

The residual gray model was obtained by merging the mean GM(1,1) prediction model with the mean GM(1,1) residual prediction model (3):

$$\hat{h}^{(0)}(k+1) = (1 - e^a) \left[ x^{(0)}(1) - \frac{\mu}{a} \right] e^{-ak} + m(k+1)(1 - e^a) \left[ g^{(0)}(2) - \frac{\mu'}{a'} \right] e^{-ak} \quad (4)$$

Among them:

$$m(k+1) = \begin{cases} 1 & g^{(0)}(k+1) > 0 \\ -1 & g^{(0)}(k+1) \leq 0 \end{cases} \quad (5)$$

### **3. CLINICAL INFORMATION AND CARE METHODS**

#### **3.1. CLINICAL INFORMATION**

Eighty-eight interventional patients with hepatocellular carcinoma admitted to the interventional department of the hospital from January 2021 to October 2021 were selected for the study and divided into the study group and the control group. The two groups contained a total of 60 male and 30 female patients. The age ranged from 34 to 75 years, with a mean value of  $(55.58 \pm 9.73)$  years. The data comparison between the two groups of patient subjects was not significant ( $P > 0.05$ ), suggesting that statistical analysis can be performed later. Inclusion criteria were those who received hepatocellular carcinoma intervention for the first time, could provide sufficient clinical treatment information, were clinically confirmed and had passed pathological examination. Exclusion criteria were patients with reading, communication, or cognitive impairment, patients with psychiatric disorders, and patients who were breastfeeding. The differences were not statistically significant ( $P > 0.05$ ) when comparing the general data of the two groups and were comparable.

#### **3.2. NURSING METHODS**

In both groups, patients were treated with interventional therapy. In the control group, routine care was provided, including health education, diet and medication. In the observation group, systematic nursing care was implemented, which mainly included health education, pain care, psychological care, diet care and environmental care. Health education is to explain the basic knowledge of liver cancer to patients and family members, eliminate their doubts, and tell them the precautions of the disease and methods to prevent related complications, so as to continuously improve patients' awareness of self-protection. At the same time, according to the patient's condition, the advantages and disadvantages of interventional treatment, operation methods and operation procedures as well as possible adverse reactions during the procedure are told to the patient so that the patient can be prepared in advance. Pain care refers to the fact that patients with hepatocellular carcinoma are mostly accompanied by continuous pain in the liver area, plus after minimally invasive surgery, the excessive volume of edema of liver tissues and traction of liver envelope will also cause pain to patients, which causes great pain to patients. Patients are taught relaxation training, such as breathing adjustment method, muscle relaxation method and listening to music to relieve patients' pain, and appropriate analgesic drugs can be taken to relieve patients' pain when necessary. Psychological care is the nursing staff should actively communicate with patients, tell patients about the successful cases of the disease, eliminate patients' fears, answer patients' questions in time, make patients maintain a good state of mind and establish confidence in curing the disease. Dietary care is the nursing staff to make a scientific and reasonable diet plan according to the patient's condition, following the principle of eating less and more meals, focusing on low-salt, low-fat, high-protein and vitamin-rich foods, avoiding raw, cold, rough and stimulating foods, and also consuming more vegetables and fruits to accelerate the elimination of toxins. Environmental care is to ensure that the temperature and humidity of the ward are appropriate, ventilation is done on time, and bed sheets and bedding are changed in time to keep the environment clean and dry, especially to ensure the quietness of the ward, so as to provide a good recovery environment for patients.

#### **3.3. OBSERVED INDICATORS**

The liver function indexes of patients in both groups after nursing intervention were analyzed, including glutamate transaminase ALT, aspartate transferase AST, and Childpugh. The pain scores of patients in both groups after nursing intervention were counted, and the scores were inversely proportional to the patients' pain. the occurrence of complications in both

groups after nursing intervention was counted. Make a combination of gray prediction model and SPSS statistical software for processing and analysis, the measurement data were expressed as  $(\bar{x} \pm s)$  and compared by t-test, and the count data were expressed as rate (%) and compared by  $\chi^2$  test. The difference was considered statistically significant at  $P < 0.05$ .

#### 4. COMPLICATIONS AND PAIN IMPACT ANALYSIS APPLIED TO GRAY PREDICTION MODEL

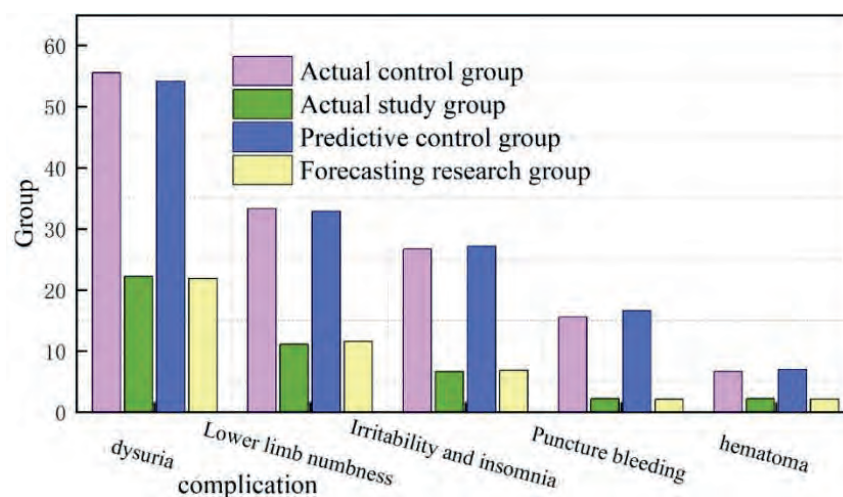
##### 4.1. COMPLICATION OCCURRENCE AND ANALYSIS

Table 1 shows the comparison of complication rates between the two groups before and after instruction. The study group had significantly lower complication rates in the category of irritable insomnia, lower limb numbness, urinary disorders, and bleeding at the puncture site than the control group data comparison was significant ( $P < 0.05$ ). However, there was no significance in the data comparison between the two groups in terms of the incidence of hematoma complications ( $P > 0.05$ ).

**Table 1.** Comparison of complication rate before and after guidance (n/%)

group	dysuria	Lower limb numbness	Irritability and insomnia	Puncture bleeding	hematoma
Control group (n=45)	25 (55.56)	15(33.33)	12(26.67)	7(15.56)	3(6.67)
Research group (n=45)	10 (22.22)	5(11.11)	3(6.67)	1(2.22)	1(2.22)
$\chi^2$	8.115	5.212	6.115	3.868	0.332
P	0.002	0.022	0.015	0.038	0.565

Figure 1 shows the prediction analysis of the occurrence of complications in the two groups based on the gray prediction model. The difference between the results by the gray prediction model and the actual study of the occurrence of complications is not significant, and the error is within  $\pm 1$ , which is an acceptable error, so the occurrence of complications in the two groups can be predicted based on the gray prediction model.



**Figure 1.** Prediction of complications in the two groups by GM model

##### 4.2. PAIN SITUATION ANALYSIS

Table 2 shows the comparison of pain perception between the two groups after systematic nursing intervention, the AST, ALT, Child-pugh, and pain perception indexes of patients in the study group were significantly lower compared with those in the comparison group, with a significant advantage,  $P < 0.05$ , and the prediction error based on the GM prediction model was within  $\pm 1$ , which could be predicted, so the GM model could be used for the analysis of



systematic nursing on patients with hepatocellular carcinoma intervention inter-analysis of the effect of pain.

**Table 2.** Comparison of pain perception after systemic nursing intervention

Group	quantity	AST	ALT	Child-pugh	Aching
Research group	45	45.6 ± 5.2	46.3 ± 5.2	6.1 ± 1.1	4.1 ± 0.2
Control group	45	72.8 ± 6.1	74.8 ± 5.1	8.5 ± 1.4	8.8 ± 1.5
GM Research group	45	44.8 ± 5.1	46.8 ± 5.1	5.9 ± 1.2	4.6 ± 0.5
GM Control group	45	72.2 ± 5.9	73.3 ± 5.7	8.8 ± 1.3	9.2 ± 1.3
t		16.81	24.22	8.58	21.22
P		0.001	0.002	0.002	0.005

## 5. CONCLUSION

In this paper, a comparison experiment between two groups was set up combining gray prediction model and clinical data, using systematic care for the study group and not using systematic care for the comparison group, and complications and pain conditions were analyzed. It was concluded that the study group had significantly lower complication rates than the control group in the category of irritability and insomnia, lower extremity numbness, urination disorder, and bleeding at the puncture site data were comparatively significant. The AST, ALT, Child-pugh, and pain perception indexes were significantly lower in the study group patients compared to the comparison group patients, with a significant advantage at  $P < 0.05$ , and the prediction error based on the GM prediction model was within  $\pm 1$ , which could be predicted by the GM prediction model. Therefore, a systematic care pathway approach can be implemented for patients with hepatocellular carcinoma undergoing interventional therapy.

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# RESEARCH ON PERFORMANCE MANAGEMENT AND EMPLOYEE MOTIVATION MECHANISM OF ENTERPRISE HUMAN RESOURCES COMBINED WITH CPM MODEL

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## ABSTRACT

This paper first compares CPM with IFT to introduce the competitive posture matrix analysis and its specific steps to analyze the competitive advantage of a company through its human resource management. Then the CPM model is applied to the performance management of human resources by analyzing the current situation of enterprise human resources management and performance management. Finally, the employee motivation mechanism of enterprise human resources is designed in conjunction with the CPM model. The results of the study show that enterprises need to develop goal management, form quantitative management, conduct job analysis, establish performance index system with scientific and systematic incentive mechanism, and use intrinsic compensation as an innovative area of employee motivation.

## KEYWORDS

CPM; IFT; Corporate human resources; Performance management; Employee incentives

## 1. INTRODUCTION

The competition between modern enterprises is ultimately the competition of talents is the competition of the comprehensive quality of human resources and the competition of the advantages and disadvantages of human resources allocation [1]. Along with the development of traditional personnel management to modern human resource management, the staff and consulting of human resource management, as well as the increasing role in the development and implementation of corporate strategies, more and more enterprises are aware of the role of human resources in the core competitiveness of enterprises, and human resource management has become the most powerful tool for enterprises to gain competitive advantage [2-3]. How to develop human resources as special resources, so that the enterprise can survive and develop in the competition, and can always maintain vigorous vitality and vitality, also must become the first priority of modern enterprise management [4-5]. Studies on employee motivation programs, performance management systems and employee participation in decision making have shown a strong positive correlation between the level of human resource management and the level of productivity of the company [6-7]. From ancient times to the present, many motivational approaches have been used and many motivational theories have been studied [8]. In the era of "knowledge economy", employees become the decisive force for the efficiency and development of enterprises, so the motivation of employees is especially important [9-10]. In this paper, we investigate the performance management and employee motivation mechanism of enterprise human resources with CPM model.

## **2. CPM MODEL**

### **2.1. CPM AND IFE**

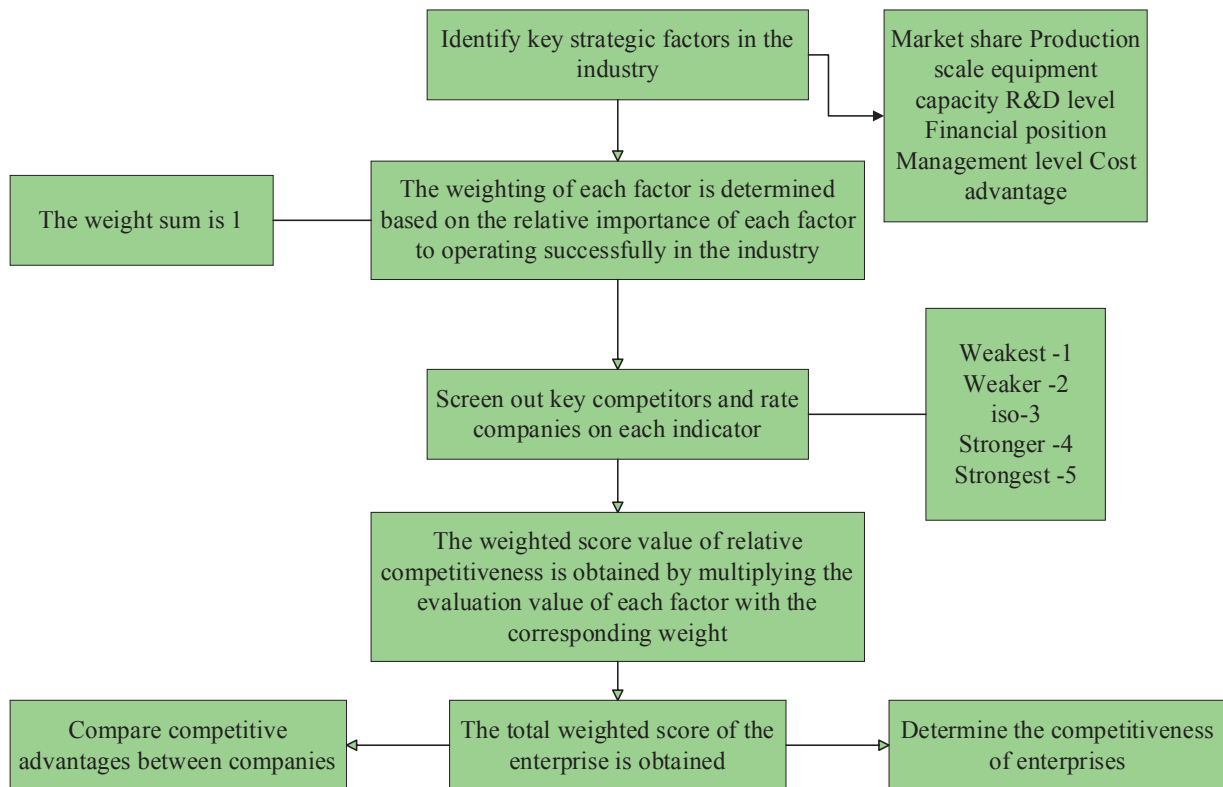
The competitive posture matrix, or CPM, is an analytical tool for internal and external environment analysis, which is mainly used to identify the strategic position of the company's main competitors in relation to the company, as well as to analyze the competitive advantages and competitive weaknesses specific to the company's main competitors. The only difference lies in the fact that the elements of the CPM matrix contain both internal and external dimensions, while the scores indicate the company's current strengths and weaknesses.

### **2.2. COMPETITIVE SITUATION MATRIX ANALYSIS**

It is an effective method to analyze the competition among companies in similar industries. It determines several key elements of competition among companies according to the nature of the industry, and lists the weights of these elements in the company's operation, and screens out the main competition objects similar to the evaluation object.

### **2.3. SPECIFIC STEPS OF THE COMPETITIVE LANDSCAPE MATRIX ANALYSIS**

The steps of the competitive dynamics matrix analysis are shown in Figure 1. Identify all important strategic elements in the industry, including market share, production scale, equipment capacity, cost advantage, management level, and R&D level. Based on the relative importance of each element to the successful operation in the industry, the weight of each element is determined, and the total weight is 1. Key competitors are selected, and the company is rated by each element, with the weakest being 1, the weaker being 3, the same being 3, the stronger being 4, and the strongest being 5, and then analyzed for their respective strengths and magnitudes. Each rating value is multiplied by the corresponding weight to obtain the weighted rating value of each element of each competitor. The total weighted score of the company is added up to get the total weighted score of the company, and the competitiveness of the company is judged in general, so as to determine the strength of the company's competitive ability and compare the competitive advantages between companies, and the competitive advantages of the company are analyzed through the enterprise human resource management.

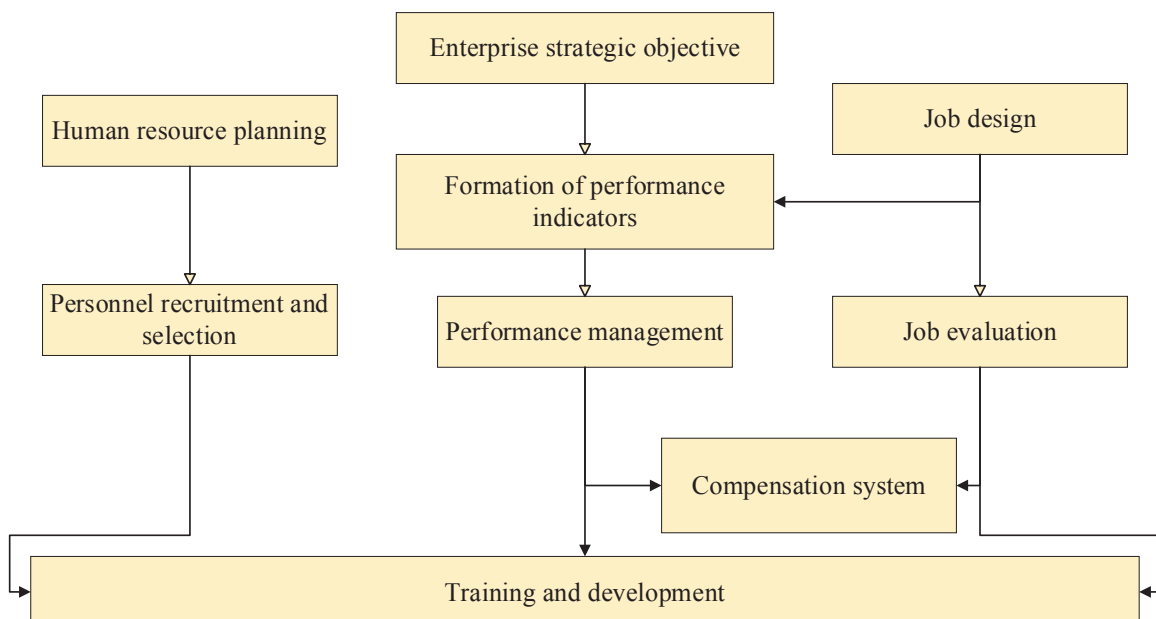


**Figure 1.** Steps of competitive situation matrix analysis

### 3. PERFORMANCE MANAGEMENT OF ENTERPRISE HUMAN RESOURCES COMBINED WITH CPM MODEL

#### 3.1. HUMAN RESOURCE MANAGEMENT

Human resource management is a multi-level and multi-faceted complex integrated management system actually is an organic system of human resource acquisition, integration, retention, motivation, control adjustment and development and utilization, which mainly includes sub-systems such as job analysis and job design, employee recruitment and selection, performance management, compensation management, training and development. The human resource management system is shown in Figure 2, and performance management belongs to the subsystem of human resource management.



**Figure 2.** Human Resource management system

### 3.2. PERFORMANCE MANAGEMENT

Performance management is the management of performance, a set of processes and regulations designed to ensure that an organization accomplishes its strategic goals. It can generally be understood in the following ways.

(1) Performance management is management, and performance management covers all functions of management planning, organizing, leading, coordinating, and controlling. Performance management itself is a complete cycle system within the enterprise, including several important components such as target planning, implementation coaching, evaluation checking, and return feedback etc. This cycle can also be divided into four stages such as performance planning, performance implementation, performance appraisal, and performance feedback.

(2) Performance management is mainly the management of employees' behavior and output, through the process of performance planning, implementation, assessment, feedback, motivation, training, etc., to realize the control of employees' work behavior and the management of their work output results.

(3) The purpose of performance management is to improve, and performance management involves organizational performance management, team performance management, and employee performance management. The sole purpose is to help employees personally, departments and enterprises to improve performance, so that sincere cooperation between managers and employees, timely and effective problem solving. Aiming at success and progress, the core of management is the continuous improvement of business and employee performance, and performance management usually requires a lot of investment in communication.

### 3.3. PERFORMANCE MANAGEMENT MEASURES COMBINED WITH CPM MODEL

The steps of performance management combined with the CPM model are shown in Figure 3. Performance management combined with the CPM model entails setting out management goals at the beginning of the management appraisal cycle and using performance data as a measure of goal achievement or non-achievement by the end of the appraisal cycle. By breaking down corporate goals into clearer, quantified sub-goals, coupled with top-down communication and information transfer, employees at all levels of the company understand the goals, and then manage and implement them to achieve effectiveness in helping the company implement its strategy. To effectively decompose the functions of the organization into positions, clearly define the purpose or mission of each position, specify the responsibilities and tasks to be performed by the position, and determine the basic requirements of the job holder. Establish a system of performance indicators with quantifiable or behavioral criteria for assessing and managing the performance of those being evaluated.

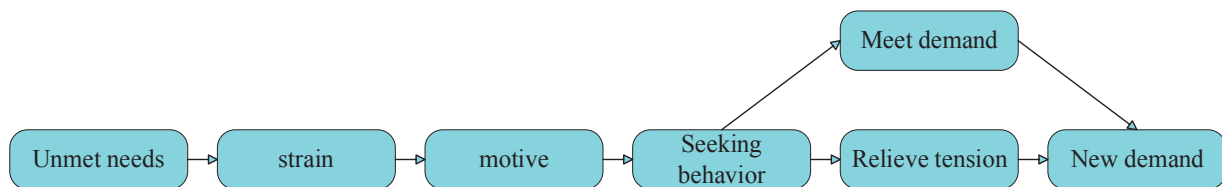


**Figure 3.** Performance management steps combined with CPM model

## 4. EMPLOYEE MOTIVATION MECHANISM OF CORPORATE HUMAN RESOURCES COMBINED WITH CPM MODEL

Employee motivation mechanism is the core of human resource management, which is the key factor to improve labor performance and management. Figure 4 shows the process of employee motivation mechanism. The intrinsic reason for motivation is whether it can meet the

intrinsic needs of individuals. According to the hierarchy of needs theory, human needs and expectations are constantly changing, so the ways and means of motivation need to be constantly innovated. The psychological needs and expectations of employees of different cultural levels, ages and positions are different. The use of many motivation theories to implement differentiated motivation for employees has practical and universal significance. Combined with the CPM model of enterprise human resources staff incentive mechanism, it is necessary to establish a scientific and systematic incentive mechanism, to realize the fairness of the salary system from multiple perspectives, to establish a perfect assessment system, to pay more attention to KPI to improve the corporate culture, and to use the intrinsic salary as an innovative area of staff incentive.



**Figure 4.** Process of employee incentive mechanism

## 5. CONCLUSION

This paper analyzes the steps of the CPM matrix analysis method and applies it to the performance management and employee motivation mechanism of corporate human resources, setting management goals to the end of the appraisal cycle, using performance data as a measure of whether the goals are achieved or not. Decompose corporate goals into clearer, quantifiable sub-goals and effectively break down the functions in the organization into individual positions and determine the basic requirements for job holders. Establish a performance indicator system with a quantified or behavioral standard system for assessing and managing the performance of the appraisees and a scientific and systematic incentive mechanism. Realize the fairness of the remuneration system from multiple perspectives, establish a perfect appraisal system, pay more attention to KPI to improve the corporate culture, and use intrinsic compensation as an innovative area for employee motivation.

## FUNDING

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# ANALYSIS OF THE RELATIONSHIP BETWEEN URBAN PLANNING AND REAL ESTATE DEVELOPMENT MANAGEMENT BY APPLYING GREY PREDICTION MODEL

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## ABSTRACT

This paper analyzes the problems of real estate development management and the relationship between real estate and urban planning, and sorts out that urban planning plays a guiding, regulating, and coordinating role for real estate development management. Urban planning and real estate development management are considered as urban activity information, and a gray prediction model of urban activity information is established and sales volume and price are predicted. It is shown that the actual sales volume is within  $\pm 15\%$  of the predicted sales volume based on the GM model, and the simulated real estate price is within  $\pm 100\%$  of the predicted price based on the GM model.

## KEYWORDS

Real estate development; Urban planning; Grey forecasting model; Urban activity information; Price; Sales volume

## 1. INTRODUCTION

China has a relatively large population and, due to its limited land area, is prone to housing tensions in the course of urban development [1]. This is both an opportunity for development and a major challenge for the real estate industry, and in order to improve the competitiveness of enterprises in the real estate market, it is necessary to correct the problems that exist in real estate open project management [2-3]. After entering the new economic era, managers of real estate enterprises must change the measures of development management under the traditional economic era, and also change the traditional management concept [4-5]. In response to the development situation of social networking, the mechanism of urban planning is optimized and improved so as to promote greater economic efficiency of real estate enterprises and to improve their competitiveness [6-7]. The real estate industry is an important pillar of China's national economy, and improving the level of real estate development management can promote the standardized management of real estate projects [8]. The real estate industry has become one of the pillar industries in China and is the main way of urban construction and planning implementation, and the development of urban planning in China should be based on the characteristics of market economy and in-depth research on real estate development in order to improve planning and design, while the application of urban planning technology in real estate planning is also very promising [9]. In this paper, the relationship between urban planning and real estate development management is explored by combining gray prediction model.

## 2. THE RELATIONSHIP BETWEEN URBAN PLANNING AND REAL ESTATE DEVELOPMENT MANAGEMENT

### 2.1. PROBLEMS OF REAL ESTATE DEVELOPMENT MANAGEMENT

Although the real estate industry is developing relatively fast, the relevant system is not perfect and many development project management systems have large loopholes, which makes it difficult to improve the level of real estate development management and increases the difficulty of management. There are problems in the management of real estate development, such as urban planning is not reasonable enough, the slow transformation of old cities and the failure of infrastructure to meet the requirements of households. Many developers hoard land blindly, but fail to improve the utilization rate of land, which hinders the development of society and creates a development situation of rough land use. The planning and development management of many real estate projects suffer from the problem that the infrastructure construction cannot meet the requirements of the owners.

### 2.2. THE RELATIONSHIP BETWEEN REAL ESTATE AND URBAN PLANNING

After more than a decade of development, the real estate industry has become one of the pillar industries of the national economy. Expanding domestic demand is the foothold of economic development and a long-term strategic policy, and the urban housing market has great potential and high industrial relevance, which plays an important role in promoting structural adjustment and boosting economic growth. The relationship between real estate and urban planning is shown in Table 1. If urban planning is to serve economic development, real estate is bound to become an important research topic of urban planning.

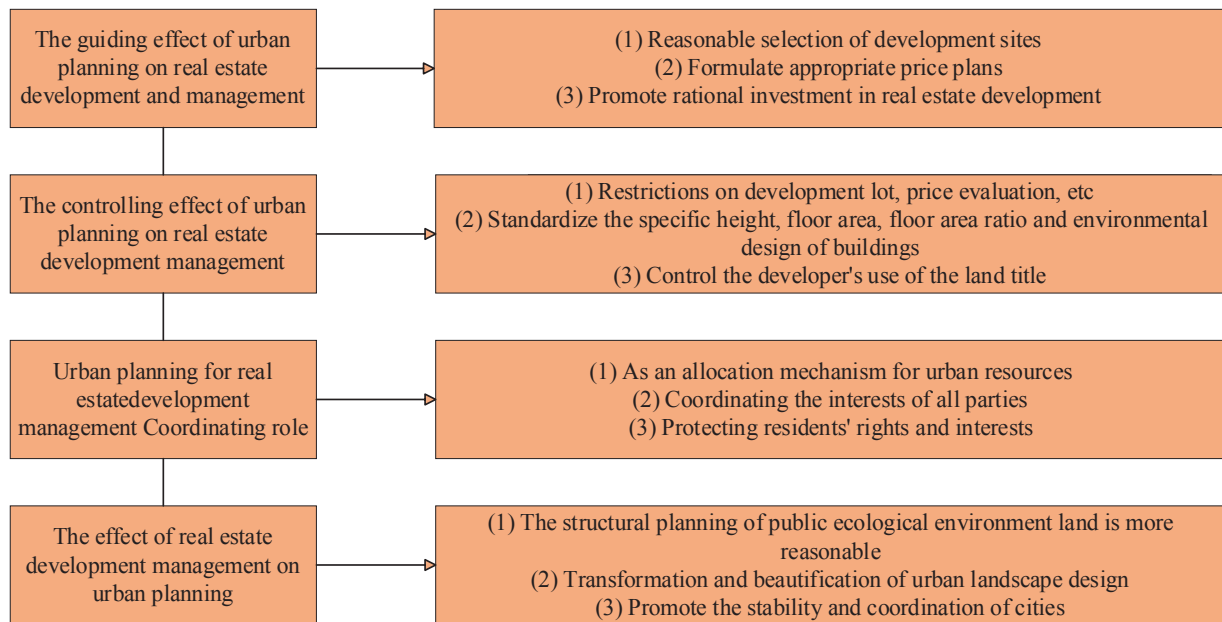
**Table 1.** The relationship between real estate and urban planning

The importance of real estate research to urban planning	Concrete performance
Real estate development is an important way of urban construction and planning implementation	(1) Real estate development is the main way and method of urban construction and planning implementation (2) The quality of real estate development is directly related to the quality of urban development (3) To do a good job in the guidance of development, in the planning management should strengthen the study of real estate
Real estate is an important aspect of the development of urban planning	(1) Real estate development is a very important part of urban economic problems (2) It is conducive to finding and mastering the regularity of urban development (3) It is of great significance to improve the operability of planning
Real estate promotes the renewal of the concept of the city	(1) Under the market mechanism, real estate is a normal thing and an important part of economic life (2) Planners should treat the real estate industry with positive attitude and upright spirit

### 2.3. THE RELATIONSHIP BETWEEN REAL ESTATE DEVELOPMENT MANAGEMENT AND URBAN PLANNING

Urban planning guides and constrains real estate development management through planning blueprints, and real estate development management realizes the grand blueprint of urban planning through building design and development. The two intersect and complement each other to achieve the common purpose of building a beautiful urban environment, creating a livable and comfortable living environment for the people, and realizing the long-term sustainable development of the city through different means. The relationship between real estate development management and urban planning is shown in Figure 1. The guiding role of urban planning on real estate development management, the controlling role of urban planning on real estate development management, the coordinating role of urban planning on

real estate development management, and the role of real estate development management on urban planning.



**Figure 1.** The relationship between real estate development management and urban planning

### 3. GRAY PREDICTION MODEL

#### 3.1. GREY FORECASTING OF URBAN INFORMATION ACTIVITIES

There is known and unknown information, and in fact there is something in between, i.e., uncertainty, which is the meaning of “white”, “black” and “gray”. In fact, a large number of problems in urban economic activity are characterized by “gray”, i.e., these systems have a significant part of known information and a significant part of unknown or unknowable information. The so-called “statistical” method often used in urban activities is actually a typical method of dealing with gray systems - the “white element” extraction of “gray systems”. “The data obtained by statistical processing is regarded as an “estimated value” of the actual problem, which is actually a “whitened value” of the gray element. Therefore, it is feasible to apply the gray prediction model to study the relationship between urban planning and real estate development management.

#### 3.2. ESTABLISHMENT OF GRAY PREDICTION MODEL

The gray prediction model is based on the theoretical idea of gray system, the discrete variables continuous with differential equation instead of differential equation with the generation of the number of series instead of the original time series of the original time series of randomness so that the process of change can be described for a longer period of time, and then establish the differential equation form = the model. The essence of the modeling is to establish the coefficients of the differential equation. The gray model prediction modeling process is as follows:

With N original data as:

$$X^{(0)} = (X^{(0)}(1), X^{(0)}(2), \dots, X^{(0)}(n)) \quad (1)$$

Doing a cumulative generation for  $X^{(0)}$ , i.e., doing 1-AGO, yields:

$$\begin{aligned}
 X^{(1)} &= (X^{(1)}(1), X^{(1)}(2), \dots, X^{(1)}(n)) \\
 &= (X^{(1)}, X^{(1)} + X^{(0)}(2), \dots, X^{(1)}(n-1) + X^{(0)}(n))
 \end{aligned}
 \tag{2}$$

The differential equation for the whitened form is established as

$$\frac{dX^{(t)}}{dt} + aX^{(t)} = \mu
 \tag{3}$$

Letting  $\bar{a} = (a, \mu)^T$ , by the least squares method, we obtain

$$\bar{a} = (B^T B)^{-1} B^T Y_1
 \tag{4}$$

Restore to obtain:

$$X^{(0)}(k) = X^{(1)}(k+1) - X^{(1)}k
 \tag{5}$$

#### 4. ANALYSIS OF THE RELATIONSHIP BETWEEN URBAN PLANNING AND REAL ESTATE DEVELOPMENT MANAGEMENT BASED ON GM MODEL

##### 4.1. ANALYSIS OF THE SALES RELATIONSHIP BETWEEN URBAN PLANNING AND REAL ESTATE DEVELOPMENT MANAGEMENT

Urban planning can have an impact on the sales of real estate development management. Based on the above theory, the data of real estate sales in a city for 8 years from 2004 to 2011 are used as the basis for forecasting the future real estate sales in the city. Table 2 shows the comparison between the gray prediction model and the actual real estate sales volume. The actual sales volume from 2004 to 2011 is within  $\pm 15$  of the GM prediction, which is an acceptable error. The urban planning policy will cause changes in the sales volume of real estate development management, which can be predicted using the GM model.

**Table 2.** Comparison between the GM model and actual real estate sales results

A given year	2004	2005	2006	2007	2008	2009	2010	2011
Actual sales	207.1	233.8	266.5	300.4	340.2	388.5	433.6	482.2
GM forecast	199.8	222.2	244.6	308.2	351.8	380.6	440.9	491.8

##### 4.2. ANALYSIS OF THE PRICE RELATIONSHIP BETWEEN URBAN PLANNING AND REAL ESTATE DEVELOPMENT MANAGEMENT

Urban planning regulates the price of real estate development management, and the annual average price of real estate in the city is forecasted by GM from 2016 to 2020 and compared with the actual price. Table 3 shows the forecast and error of the annual average price of real estate in the city. The property prices simulated using the GM model have a high degree of fit with the real property prices, with an error range of  $\pm 100$  or less, so the prices regulated by urban planning through real estate development management can be predicted based on the GM model.

**Table 3.** Forecast and error of the average annual real estate price in this city

A given year	2016	2017	2018	2019	2020
Real price	5820.2	7882.6	8589.2	8357.6	8488.9
Forecast price	5833.8	7866.9	8688.3	8338.9	8587.7
Residual error	13.6	-24.3	99.1	-18.7	98.8
Relative error	0.12	2.25	4.22	1.86	4.15

## 5. CONCLUSION

This paper sorts out the relationship between urban planning and real estate development management through the problems of real estate development management and the relationship between real estate and urban planning, and introduces a gray prediction model to analyze the sales volume and price regulated by urban planning through real estate development management. It is empirically concluded that the actual sales volume is within  $\pm 15$  error of the GM-based prediction, which is an acceptable error, and the policies of urban planning will cause changes in sales volume in real estate development management, which can be predicted using the GM model. The property prices simulated using the GM model have a high degree of fit with the real property prices, with an error range of  $\pm 100$  or less, and can be predicted based on the GM model for prices regulated by urban planning through real estate development management.

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# INNOVATION OF INNOVATION AND ENTREPRENEURSHIP EDUCATION MODEL FOR HIGHER VOCATIONAL EDUCATION UNDER THE ORIENTATION OF HIGH QUALITY DEVELOPMENT

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## **ABSTRACT**

This paper firstly constructs the evaluation method of high quality development and talent entrepreneurship system, and deeply discusses the comprehensive evaluation of innovative employment as well as talent entrepreneurship and high quality economic development. Then, it focuses on the construction of the education model of each higher education institution with the actual situation, and proposes the 6C education model, and the results show that the 6C education model is an effective model of employment education. The model improves students' overall quality as well as market competitiveness by cultivating their innovative thinking, entrepreneurial ability, school-enterprise collaboration and other aspects. The research in this paper proposes a feasible entrepreneurship education model for higher education institutions, which has important practical significance and value.

## **KEYWORDS**

Innovation and entrepreneurship; Comprehensive evaluation; 6C education model; Innovative thinking; School-enterprise collaboration

## **1. INTRODUCTION**

Talent is the core element of innovation, and there is an urgent need to deepen the reform of education and teaching, and accelerate the cultivation of an innovative talent team. From the central government to the education system, it has become a consensus to carry out comprehensive and in-depth education reform. As an important position for cultivating talents, higher education is also facing increasingly severe challenges in its educational pathway [1-2]. There are many problems in current talent education, such as insufficient educational resources, mismatch between talent cultivation and market demand, and insufficient innovation and entrepreneurship education [3-4]. Literature [5-6] explored the objectives and positioning of employment-related education in higher education and argued that education in this area should take cultivating innovative talents as the core goal. Therefore, promoting the innovation of education model has become one of the current reform priorities of schools [7]. This paper aims to explore the entrepreneurship education model under the orientation of high-quality development in higher education institutions, and discusses the strategies and ways of innovation of talent employment education model in terms of the objectives, contents, methods

and evaluation of education. Finally, this paper proposes the 6C innovative entrepreneurship education model in the context of current practical education.

## 2. COMPREHENSIVE EVALUATION OF INNOVATION AND ENTREPRENEURSHIP AND QUALITY DEVELOPMENT

Based on the mechanism of action and theoretical framework, this paper comprehensively analyzes the level of innovation and entrepreneurship and high quality development in time and space by constructing the innovation and entrepreneurship index system and high quality development index system.

### 2.1. HIGH QUALITY DEVELOPMENT EVALUATION METHOD

Due to the large number included in the index system, it will directly affect the comprehensive evaluation later. When measuring the comprehensive evaluation level of innovation and entrepreneurship and high-quality development, the indicator weight calculation method needs to be reasonably used to clarify the weight of each indicator to ensure the accuracy and reliability of the empirical conclusion. Therefore, the entropy value method is chosen to calculate the weights of each indicator. The detailed steps of indicator measurement are as follows:

#### (1) Standardized processing

When the indicator is positive, the formula is:

$$X_{ij} = \frac{x_{ij} - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})} \quad (1)$$

When the indicator is negative, the formula is:

$$X_{ij} = \frac{\max(x_{ij}) - x_{ij}}{\max(x_{ij}) - \min(x_{ij})} \quad (2)$$

#### (2) Dimensionless standardization

To prevent the effect of "0" on the results after normalization. Therefore, let:

$$Y_{ij} = 0.999 * X_{ij} + 0.001 \quad (3)$$

#### (3) Determine the weights

The same metric is processed as:

$$P_{ij} = \frac{Y_{ij}}{\sum_i^n Y_{ij}} \quad (4)$$

Calculate the indicator entropy value as:

$$e_j = -k \sum_{i=1}^n P_{ij} \ln(P_{ij}) \quad (5)$$

where  $e_j \geq 0$ ,  $k = \frac{1}{\ln(n)}$ .

Determine the weights as:

$$W_i = \frac{g_j}{\sum_{j=1}^p g_j} \quad (6)$$

(4) Comprehensive evaluation indicators measured as:

$$U_i = \sum_{j=1}^p w_i Y_{ij} \quad (7)$$

## 2.2. INNOVATION AND ENTREPRENEURSHIP SYSTEM CONSTRUCTION

Innovative talent entrepreneurship and employment are the fundamental drivers of high-quality economic development, driving rapid and steady economic growth.

The innovation and entrepreneurship evaluation index system constructed in this paper is shown in Table 1. Entrepreneurial development also contains two parts: entrepreneurial input and entrepreneurial output. Entrepreneurial input reflects the government's input and support to enterprises. In this paper, we choose two indicators, the amount of private enterprise investment and the amount of construction capital investment, to visualize the input of entrepreneurship, and the output of entrepreneurship is expressed by the number of enterprise trademark applications and the number of new private enterprises.

**Table 1.** Innovation and entrepreneurship evaluation index system

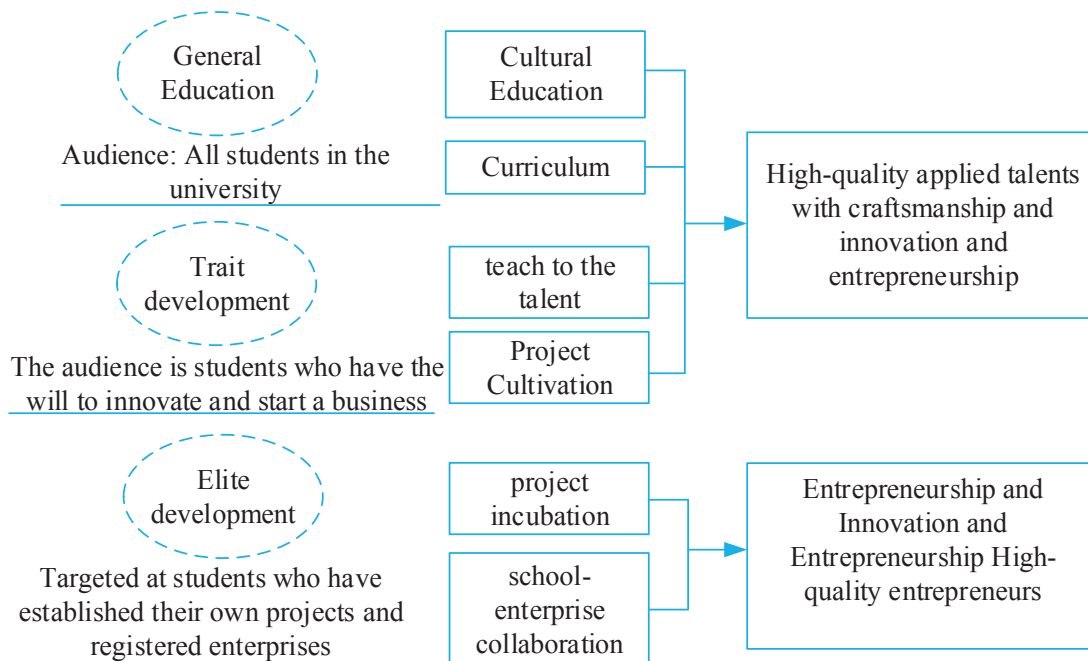
Primary Indicators	Secondary indicators	Three-level indicators
Innovative Development	Innovation input	Internal expenditure of R&D funds
		Number of technology development institutions
		R&D personnel full time equivalent
		Science and technology financial expenditures
Venture Development	Innovation output	Number of new product development projects
		Technology Market Turnover
		Main Business Income of High Technology Industry
		Number of patent applications
	Entrepreneurial Inputs	Amount of private enterprise investment
		Amount of construction capital investment
	Entrepreneurial output	Number of trademark applications by enterprises
		Sales revenue of new products
		Number of new private: enterprises

## 3. THE CONSTRUCTION OF INNOVATION AND ENTREPRENEURSHIP EDUCATION MODEL IN HIGHER EDUCATION

### 3.1. THE REALIZATION PATH

Integration, openness and upgrading are important features and desirable orientations for the high-quality development of education related to innovation employment and talent employment. In this paper, based on the purpose of optimizing the education system and upgrading the quality of talent training, the progressive dual-trend 6C education model is constructed as shown in Figure 1.

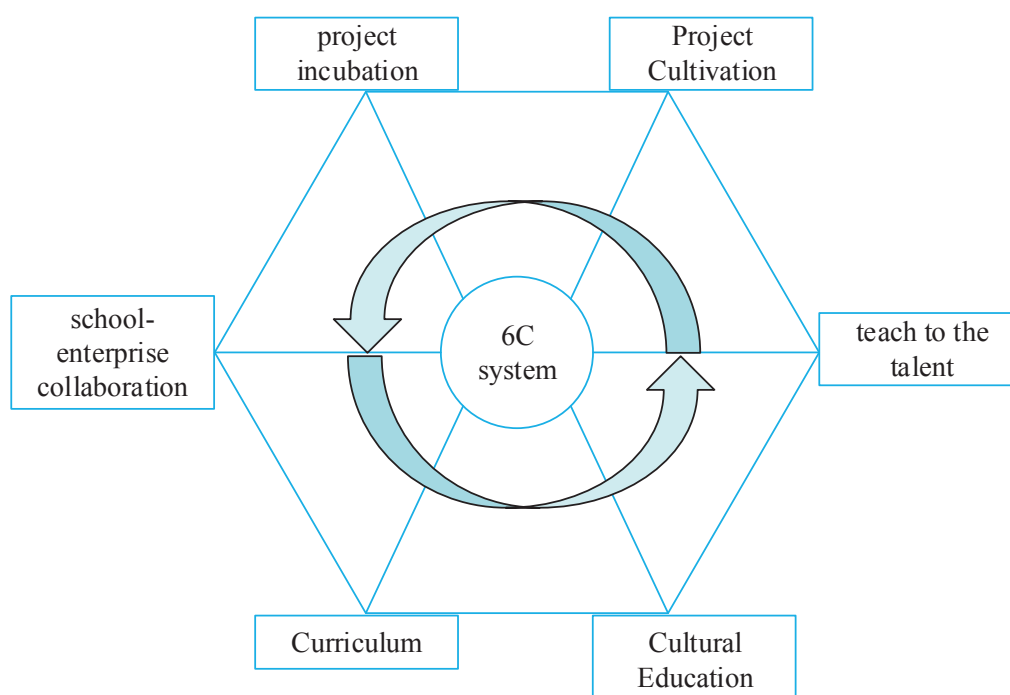




**Figure 1.** Progressive dual convergence 6C innovation and entrepreneurship education model

### 3.2. 6C INNOVATION AND ENTREPRENEURSHIP EDUCATION MODEL

The 6C innovation and entrepreneurship education model divides the student audience into three tiers: the first tier is all students, the second tier is students with innovation and entrepreneurial traits, and the third tier is entrepreneurs. 6Cs are interlinked to form a closed loop as shown in Figure 2, which promotes the output of high-quality innovation and entrepreneurial talents from six aspects: culture cultivation, curriculum cultivation, teaching according to the material, project cultivation, project incubation, and school-enterprise collaboration, cultivates high-quality applied talents with craftsmanship and innovation and entrepreneurship, and incubates high-quality entrepreneurs with entrepreneurial spirit and innovation. We will cultivate high-quality applied talents with craftsmanship and innovation and entrepreneurship.



**Figure 2.** 6C interlinking to form a closed loop

(1) Cultural education

This refers to creating an environment for innovation and entrepreneurship education, cultivating students' craftsmanship, and supplying spiritual nutrients for students' entrepreneurial practice.

(2) Curriculum education

This refers to the combination of explicit and implicit courses, the exploration of a student education integration curriculum model, and the holistic design of the curriculum to discover the depth and expand the breadth of nurturing.

(3) Teach students according to their abilities.

This refers to identifying students' innovative and entrepreneurial traits and teaching them according to their different levels of development. Entrepreneurs have unique character traits and personality characteristics, and have unique performance in innovative thinking, creative ability, risk appetite, and stress resistance.

(4) Project Cultivation

This refers to the process from the inclination of innovation and entrepreneurship to the practice of entrepreneurship. We promote innovation and entrepreneurship through competitions, and give birth to projects, polish ideas and perfect models in innovation and entrepreneurship competitions. Through the competitions, we explore project highlights, sort out operation processes and improve the quantity and quality of projects.

(5) Project Incubation

This refers to the establishment of a branded, characteristic and diversified campus innovation and entrepreneurship comprehensive incubation and practice platform or "crowdsourcing space", which is built by the school and enterprises in cooperation, with clear responsibilities and obligations and long-term mechanism.

(6) School-enterprise collaboration

This refers to the collaboration between institutions of higher education and influential enterprises in the industry to integrate their resources, develop management systems, establish collaborative education mode and implement collaborative education in terms of culture, teachers, curriculum and base construction of innovation and entrepreneurship education.

#### **4. CONCLUSION**

Through discussing the evaluation method of high quality development of higher education and the construction of employment education system, this paper deeply analyzes the comprehensive evaluation of both and puts forward the important role of education for high quality development. On this basis, it focuses on the construction of the education model related to talent entrepreneurship, proposes the 6C education model, and elaborates the realization path and specific realization methods of this model. Through practical exploration, the effectiveness and practical application value of the 6C education model are proved, and useful references are provided for the improvement of this model in the future.

#### **FUNDING**

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# RESEARCH ON THE CHANGE OF INFORMATIONIZATION OF IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES

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## ABSTRACT

This paper discusses the importance of integrating information technology into the design of ideological and political teaching model, and discusses the role of information technology in the transformation of higher education, as well as the integration of information technology into the planning of the curriculum system of Civic and Political Science teaching and the development model of coupling and coordination and integration with Civic and Political Science education. Through the analysis of the system function and composition of the information platform of the university's thought politics education, the thought politics teaching model applying new information technology is discussed. The results show that by placing teachers and students in the information technology environment, a teaching model of Civics and Political Science classroom with clear process, high applicability and flexible use can be constructed. At the same time, it also provides a useful reference for the informationization change of ideological and political education in colleges and universities.

## KEYWORDS

Information technology; Ideology and politics; Educational change; Coupling and coordination; Integration and development model; Information technology platform

## 1. INTRODUCTION

In the information age, no one can deviate from the information, only with a strong awareness of information and information literacy, to adapt to the information age, lay the foundation for future development. At present, with the continuous development and popularization of information technology, political and ideological education is gradually moving towards informatization [1-2]. The application of information technology in education is increasing, and the information age has remarkable characteristics. People have more extensive channels to obtain information, and the amount of information is also very large, which can drive the development of education and is a powerful engine [3-4]. Information technology can provide more efficient education for colleges and universities [5]. Education informationization reform mainly focuses on the application of information technology in education [6-7]. Therefore, this study will comprehensively analyze the current situation of education and the problems existing in information reform from multiple perspectives, and discuss how to better use information technology to support the development of education.

## 2. INFORMATION TECHNOLOGY IS INTEGRATED INTO THE DESIGN OF IDEOLOGICAL AND POLITICAL TEACHING MODEL

### 2.1. THE ROLE OF INFORMATION TECHNOLOGY IN THE TRANSFORMATION OF HIGHER EDUCATION

First, the information age has led to the reconstruction of educational purposes

To the talent view of multiple intelligences theory, the cultivation of talent innovation ability and information literacy, and the emphasis on the all-round development of talent. As a tool of education, information technology not only promotes the reform of education system structure, but also integrates technology and curriculum. The development and driving of information technology are increasingly needed in education system.

Secondly, information related technology promotes the innovation of higher education concept

Information technology has the characteristics of cross-time and space, breaking the limitations of existing teachers and classrooms, through the establishment of a huge educational resource library, enhance the capacity of learning, alleviate the demand contradiction of the education market, so that learning is not limited to the classroom, and encourage students to create and think in learning.

Third, information related technology promotes the reform of higher education management

With the rapid development of information technology, higher education has entered the information age, and the management ideas and management methods of universities are also taking place quietly.

### 2.2. INFORMATION TECHNOLOGY IS INTEGRATED INTO THE CURRICULUM PLANNING OF CIVICS TEACHING SYSTEM

In the process of reforming the university's Civic Science course, we continue to explore and discover the curriculum content design and curriculum planning system with school-based characteristics that are applicable to the main channel of classroom teaching. The Civic Science Course initiative to turn to curriculum Civic Science, Shanghai as a pilot implementation of curriculum Civic Science, China series of curriculum Civic Design as shown in Table 1.

**Table 1.** Ideological and Political Design of Chinese Series Courses

university	curriculum	teachers	method	Value leadership
Shanghai University	Great Country Strategy	Gather a team of top teachers, emphasizing team organization and thematic teaching, with each thematic lecturer being a leading figure	Based on information technology, integrating teaching methods such as classroom lectures and feedback	Cleverly integrate the essence of Core Socialist Values into diversified classroom teaching
Fudan University	Governance			
Shanghai Jiao Tong University	Understanding China			
Tongji University	China Road			
Shanghai Normal University	Wen Dao China			

### 2.3. DEVELOPMENT MODEL OF INFORMATION TECHNOLOGY AND CIVIC EDUCATION INTEGRATION

Ideological and political education and information technology change in colleges and universities is a systemic two-way development project, the two originally belong to two different systems, under the role of coupling, so that the two form a composite organism.

### 2.3.1. SUBSYSTEM DEVELOPMENT LEVEL MODEL

The subsystem development level is the primary condition for the development of the coupled system, and is the basis for determining the coordinated development of the coupling. Therefore, the subsystem development level model can be calculated to derive the scores of relevant subsystems, thus providing a relevant basis for the construction of the coupling model.

Definition,  $F_a$  for college ideology and politics,  $F_b$  teaching information change, and its subsystem development level model is calculated by the formula

$$F_a = \sum_{j=1}^n U'_j W_i \quad (1)$$

$$F_b = \sum_{j=1}^n U_j W_i \quad (2)$$

Where,  $F_a$  and  $F_b$  take values in the range of  $[0, 1]$ ,  $U'_j$  is the standardized value of the  $j$ th index under the development level of ideology, politics and teaching informatization in universities.  $W_i$  is the index weight. The above formula leads to the assumption that the level of subsystem development is proportional to the values derived from  $F_a$  and  $F_b$ , and the larger the values of  $F_a$  and  $F_b$  under the condition of basic equality. The higher the level of order of the development level of teaching informatization and university ideology and politics, and vice versa, the lower.

### 2.3.2. COUPLED COORDINATED DEVELOPMENT MODEL

Coupling is a phenomenon in physics about two or more systems that are interconnected and developed in coordination with each other. It is generally divided into two types of positive coupling and negative coupling. And the coupling degree is the evaluation index of the importance degree of coupling between systems. The existing physics-based coupling model is used in the construction of the coupling degree model of ideology and politics and teaching informatization in colleges and universities. The calculation formula is:

$$C_n = \left\{ (u_1 \times u_2 \times \dots \times u_n) / \Pi(u_1 + u_2 + \dots + u_n) \right\}^{1/n} \quad (3)$$

Where,  $C_n$  denotes the value of coupling index, and the value range is  $[0, 1]$ .  $u_1, u_2, u_n$  denote the development indices of the subsystems of the two major systems, respectively.

When the value of  $C_n$  is between  $[0, 1]$ , the larger the value of  $C_n$ , the greater the coupling degree and tightness of the coupling between the two systems will be, showing a positive coupling trend. On the contrary, when the value of  $C_n$  is smaller, the coupling degree and the tightness of coupling between the two systems will be smaller, and the trend of negative coupling will be shown. Thus, it is deduced that the coupling degree between ideology and politics and teaching informatization in colleges and universities, is:

$$C_2 = \left\{ (u_1 \times u_2 \times u_3) / \Pi(u_1 + u_2 + u_3) \right\}^{1/n} \quad (4)$$

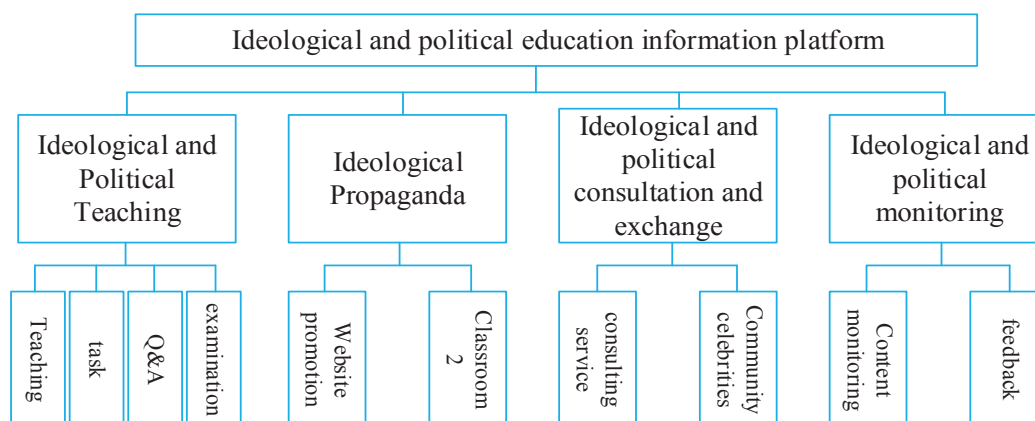
Among them,  $C_2$  indicates the coupling and coordination of the two systems of ideology and politics and teaching information technology in colleges and universities,  $u_1$  indicates the education subsystem of the coupling point.  $u_2$  represents the cultural subsystem of the

coupling point of the two, and  $u_3$  represents the value concept subsystem of the coupling point of the two.

### 3. INFORMATIONIZATION PLATFORM OF CIVIC AND POLITICAL EDUCATION IN HIGHER EDUCATION

#### 3.1. SYSTEM FUNCTIONAL ANALYSIS AND COMPOSITION

Because the contents of ideological and political education are diverse, the methods are diverse, and the education process is complex. Divided into subsystems, the functional structure of the system is shown in Figure 1.

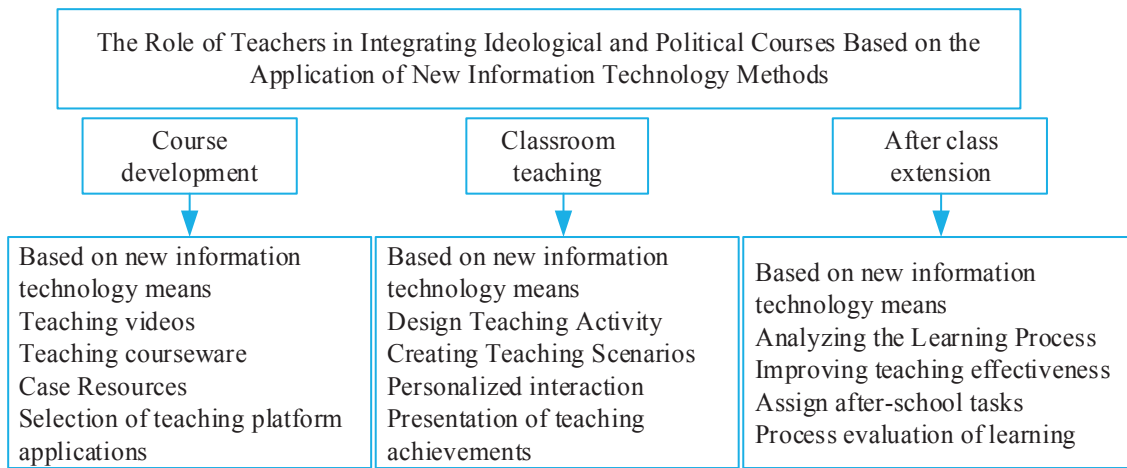


**Figure 1.** System Structure of Ideological and Political Education Information Platform

#### 3.2. CIVICS TEACHING MODE OF APPLYING NEW INFORMATION TECHNOLOGY

Figure 2 shows the design of the teaching model based on the application of new information technology tools into the Civic Science class. By analyzing the fit between information technology and Civic Science classroom teaching, the corresponding teaching objectives are set by combining the characteristics of the subject. By placing teachers and students in the information technology environment, a classroom teaching model with a clear process, high applicability and flexible use is constructed.

In the curriculum development stage, teachers make full use of new information technology to develop teaching resources to support teaching and learning, and need to have the ability to use technology proficiently to complete the basic knowledge teaching design required by the curriculum in conjunction with teaching priorities. In the classroom lecture stage, students are guided and encouraged to conduct inquiry-based learning and create certain scenarios to provide personalized instruction and ensure the integrity of the teaching content. In the post-class extension stage, internalize and transfer the classroom teaching knowledge, summarize the experience and shortcomings in the actual teaching process, and provide timely feedback on the completion of students' post-class tasks, analyze students' learning dynamics with the help of online teaching platform, and improve the teaching effect.



**Figure 2.** Design of Informationization Teaching Mode for Ideological and Political Education

#### 4. CONCLUSION

Based on the reform of ideological and political education of information technology, this paper discusses the application of information technology in ideological and political education in colleges and universities, puts forward a model of integrated development, and introduces the system function and composition of information platform for education. Through research, it is found that the application of information related technology in higher education has become a trend. In the application of teaching practice, the application of information technology can improve the quality, update the teaching form, and cultivate students' self-learning ability and innovation ability. At the same time, through the establishment of integrated development model, we can better promote the deep integration of ideological and political education and information technology.

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# RESEARCH ON CHINA'S ECONOMIC DEVELOPMENT TREND UNDER THE BELT AND ROAD STRATEGY BASED ON NIIT SOFTWARE

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## ABSTRACT

This paper presents a detailed analysis of the measures of economic development in countries along the Belt and Road, including boosting domestic demand to promote employment, expanding exports to export production capacity, and promoting the transformation of industrial structure. Then, the impact mechanism of the Belt and Road on China's real economy is explored through parallel trend (NIIT) test analysis and event study method test analysis. The results show that the estimated economic development index of the interaction term Time\*Treat of the Belt and Road Initiative rises significantly above 0.2 after the implementation of the initiative in 2015. The interaction term Time\*Treat fluctuates somewhat at a later stage, but the overall trend of change is upward. The findings of this paper are important for understanding the role of NIIT software in the "Belt and Road" strategy and promoting China's economic development.

## KEYWORDS

Belt and road; Industrial structure; Economic development index; Parallel trends; Event study method; Interaction term

## 1. INTRODUCTION

China's economy has developed rapidly in the past decades and become the second largest economy in the world. With the "One Belt, One Road" strategy, China's economy has entered a new stage of development [1-2]. NIIT Software is a company that focuses on IT technical training, and it has a remarkable position and influence in the Chinese IT training market [3]. This study aims to reveal the new pattern of China's economic development by exploring the economic development trend of NIIT Software under the Belt and Road strategy, and to provide reference for related research [4]. In recent years, the development trend of China's economy has been extensively studied by scholars [5]. Among them, some scholars focus on the development trend of China's economy under the "One Belt, One Road" strategy [6-7]. Meanwhile, some scholars also focus on the role of NIIT software in the "One Belt, One Road" strategy [8]. In general, the current research on China's economic development trend covers many fields and perspectives, but the role of NIIT software in the "One Belt, One Road" strategy still needs to be explored in depth.

## **2. ECONOMIC DEVELOPMENT MEASUREMENT ANALYSIS OF COUNTRIES ALONG THE BELT AND ROAD**

### **2.1. THE POSITIVE EFFECT OF BELT AND ROAD ON CHINA'S ECONOMIC DEVELOPMENT**

#### **2.1.1. PROMOTE EMPLOYMENT BY BOOSTING DOMESTIC DEMAND**

China has been in a state of rapid development since its reform and opening up, and many developed countries are interested in China's huge labor resources and vast natural resources. The launch of the Belt and Road Initiative is a sign that China will be more open to international investment, which is a positive sign for foreign investors and may lead to a new wave of investment in China in the future.

#### **2.1.2. EXPANDING EXPORT OUTPUT CAPACITY**

China's economic growth has been dependent on labor-intensive industries, but with the country's rapid economic development, domestic labor costs have been rising. The idea of using cheap Chinese labor in developed countries is difficult to realize, and they are seeking new cheap labor resources from other countries. China, on the other hand, has accumulated much excess capacity as a result. This has resulted in a state of over-saturation in many heavy industries, which has had a significant negative impact on the use of resources.

Contrary to China's over-investment and under-consumption, most of the countries along the Belt and Road are developing countries with low levels of economic development. Exporting China's excess production capacity will avoid wasting resources on the one hand, and promote the infrastructure and social aspects of the countries along the route on the other.

#### **2.1.3. PROMOTE THE TRANSFORMATION OF INDUSTRIAL STRUCTURE**

The Belt and Road to boost domestic demand and expand exports are signs of good economic development, and the huge national capital investment will also bring more foreign investment to China. The joint development of local and foreign enterprises will lead to the rapid development of technology industries, especially the rapid development of some new high-tech industries, and accelerate the optimization and transformation of China's economic structure. At the same time, the establishment of ADB is also a great opportunity for the development of the financial sector. The goal of financial reform and deepening can be further realized.

### **2.2. CALCULATION OF INDICATOR MEASURES OF ECONOMIC DEVELOPMENT**

The economic development indicator system of Belt and Road countries established in this paper based on the G20 definition of economic development is shown in Table 1. This indicator system covers three aspects: infrastructure, R&D and innovation environment and transaction development dynamics. And this is used as the primary indicator, after which this paper uses the entropy value method to weight and comprehensively assess each secondary indicator of Belt and Road China, and finally arrives at the economic development index of China.

**Table 1.** Economic Development Indicator System of the Belt and Road Countries

Primary indicators	Secondary indicators
Infrastructure	Fixed broadband subscription rate
	Number of mobile phones per 100 people
	Secure Internet Server
	Percentage of individuals using the internet
	Mobile broadband subscription rate
R&D and Innovation Environment	R&D expenditure proportion
	Higher education enrollment rate
	Urban population share
	Number of resident patent applications
Transaction development momentum	Proportion of high-tech manufactured goods exports
	Proportion of ICT product exports

The calculation method of China's economic development index is as follows:

1) Normalization of indicators:

$$Z_{\lambda ij} = \frac{(X_{\lambda ij} - X_{\lambda \min})}{(X_{\lambda \max} - X_{\lambda \min})} \quad (1)$$

where  $\lambda$  is the year,  $i$  is the country, and  $j$  is the secondary indicator. Let there be  $m$  countries and  $n$  secondary indicators,  $2$  is the  $j$ th secondary indicator of the  $i$ -th country in year  $X_{\lambda ij}$ , and  $Z_{\lambda ij}$  is the dimensionless value of each secondary indicator.  $X_{\lambda \max}$  and  $X_{\lambda \min}$  are the maximum and minimum values of each secondary indicator in year  $A$ , respectively.

(2) Normalization of indicators:

$$P_{\lambda ij} = \frac{Z_{\lambda ij}}{\sum_{i=1}^m Z_{\lambda ij}} \quad (2)$$

3) Calculate the entropy value:

$$e_{\lambda ij} = -k \sum_{j=1}^m (P_{\lambda ij} * \ln P_{\lambda ij}), \quad k = \frac{1}{\ln m} \quad (3)$$

4) Calculate the heterogeneous numbers:

$$g_{\lambda ij} = 1 - e_{\lambda ij} \quad (4)$$

5) Calculate the weights of each indicator:

$$w_{\lambda ij} = \frac{g_{\lambda ij}}{\sum_{j=1}^n g_{\lambda ij}} \quad (5)$$

6) Calculate the evaluation score of individual secondary indicators:

$$S_{\lambda ij} = w_{\lambda ij} * Z_{\lambda ij} \quad (6)$$

7) Calculate the digital economy development index for the country in year  $\lambda$  :

$$H_{\lambda i} = \sum_{j=1}^n S_{\lambda ij} \quad (7)$$

### 3. A TEST ANALYSIS OF THE MECHANISM OF ACTION OF THE IMPACT OF BELT AND ROAD ON CHINA'S REAL ECONOMY

#### 3.1. PARALLEL TREND (NIIT) TEST ANALYSIS

To use the NIIT model the prerequisite assumptions must be satisfied that the covered and non-covered province samples have to have similar trends during the sample period prior to the implementation of the Belt and Road Initiative. The only characteristic difference between covered and non-covered provinces after the implementation of the initiative is that covered provinces are affected by the implementation of the Belt and Road Initiative while non-covered provinces are not affected by the implementation of the Belt and Road Initiative. However, in reality, once the Belt and Road Initiative is implemented, it is not possible to compare whether the trends of the covered and non-covered province samples are the same under the condition that they are not affected by the Belt and Road Initiative.

This paper uses a parallel trend test to analyze whether the FSR (real economy) of covered and non-covered provinces from 2010-2021 satisfy the prerequisites for using the double difference model, and the test results are shown in Figure 1. It can be seen that the change trends of covered and non-covered provinces are basically the same before the implementation of the policy in 2015, which satisfies the parallel trend test and meets the prerequisites of using the NIIT model for empirical testing. Although there is still a gap between the FSR of covered and non-covered provinces after the implementation of the policy in 2015, most of the Belt and Road Initiative covers the central and western regions, whose native financial industry and real economy development environment is weaker than that of the developed eastern regions.

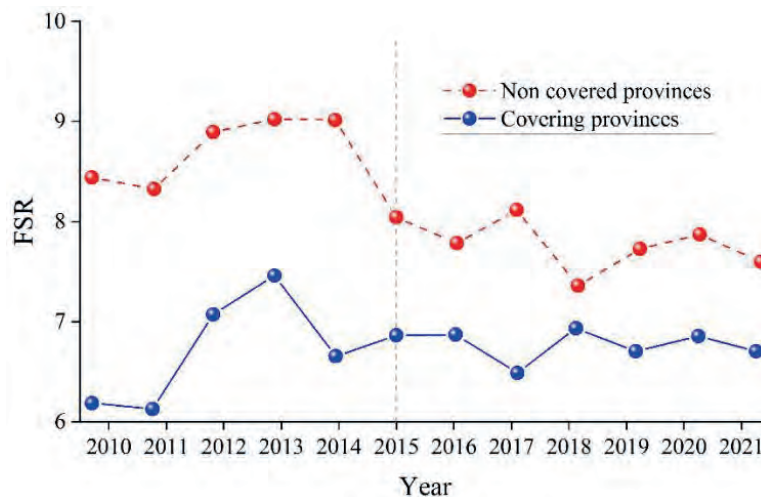
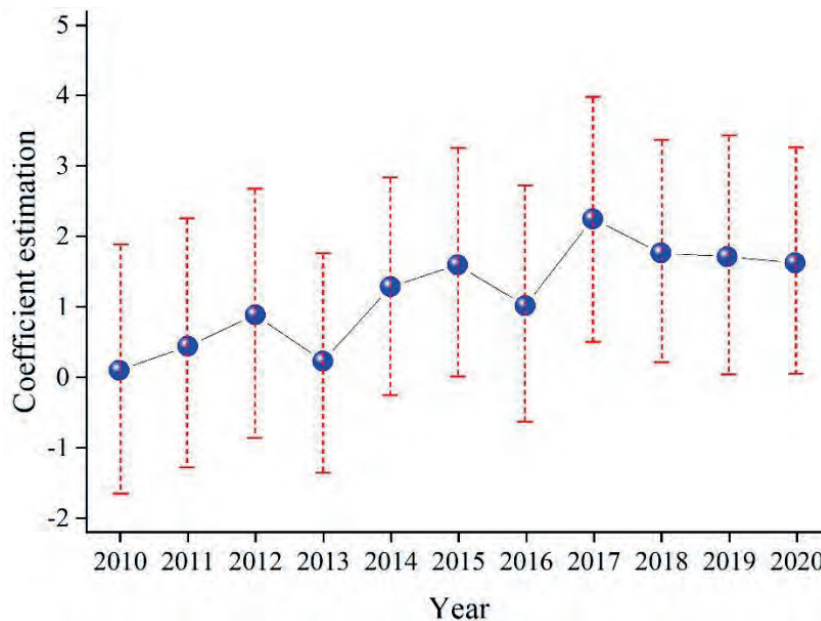


Figure 1. Parallel Trend Test Chart

#### 3.2. EVENT STUDY METHOD TEST ANALYSIS

This paper uses the event study method to further examine the trends of the sample from 2010-2020 from before the implementation of the Belt and Road Initiative to the end. The trend of change using the event study method is shown in Figure 2, where the solid line represents the linear trend of the parametric model fit. It can be seen that the coefficient estimates before

the implementation of the Belt and Road Initiative in 2015 are all below 0.1 and none of the regression results are significant. This indicates that the trends of changes in the samples of covered and non-covered provinces before the implementation of the Belt and Road Initiative in 2015 are similar and no significant differences are seen. In contrast, the coefficient estimates of the interaction term Time\*Treat rise significantly above 0.2 after the implementation of the Belt and Road Initiative in 2015. the coefficient estimates of the interaction term Time\*Treat fluctuate somewhat in the later stages, with the overall trend of change moving upward, further indicating that the results of this paper pass the parallel trend test.



**Figure 2.** Change trend of event study

#### 4. CONCLUSION

The paper reveals the measurement of economic development and the calculation of index measures of economic development in countries along the Belt and Road by exploring the mechanism and impact of NIIT software under the Belt and Road strategy. It is found that the estimated economic development index of the interaction term Time\*Treat of the Belt and Road Initiative rose significantly above 0.2 after the implementation of the initiative in 2015. The interaction term Time\*Treat fluctuated somewhat in the later period, but the overall movement trended upward. It indicates that the Belt and Road strategy has positive effects on China's economic development, including boosting domestic demand to promote employment, expanding exports to export production capacity, and promoting the transformation of industrial structure. It is also found that the Belt and Road strategy, has a positive effect on the development of China's economy. Therefore, relevant departments should continue to promote the implementation of the Belt and Road Strategy to facilitate the sustainable development of China's economy.

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# CHALLENGES AND OPPORTUNITIES FOR FINANCIAL ACCOUNTING IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE

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## **ABSTRACT**

This paper focuses on the challenges and opportunities faced by financial accounting in the context of artificial intelligence, and proposes corresponding response strategies and intelligent financial accounting models. In terms of countermeasures for the development of financial accounting under the application of artificial intelligence, the application and impact of artificial intelligence technology in the field of financial accounting are explored from two perspectives: countermeasures for the development of financial personnel and risks for operators, respectively. The findings show that the application and development of AI technology in the field of financial accounting bring new opportunities and challenges, which require financial practitioners to continuously learn and update their knowledge and skills, as well as actively explore the intelligent financial accounting model to adapt to the new working environment and requirements.

## **KEYWORDS**

Artificial intelligence; Financial accounting; Development response; Operator risk; Financial practitioner

## **1. INTRODUCTION**

With the rapid development of artificial intelligence technology, financial accounting is facing unprecedented challenges and opportunities [1]. The application of artificial intelligence technology has brought new ideas and methods to financial accounting, and also brought unprecedented impact to traditional financial accounting [2-3]. The purpose of this paper is to explore the challenges and opportunities facing financial accounting in the context of artificial intelligence, and to provide some thoughts and insights for financial accountants [4]. Currently, several studies have explored the application and impact of AI technology in the field of financial accounting [5-6]. Some studies point out that AI technology can help financial accounting automate the processing and classification of accounting data and improve the efficiency and accuracy of data processing [7]. Also, AI technology can help financial accounting in risk assessment and decision making through data analysis and prediction [8]. In addition, other studies have reported that the application of AI technology has brought some impact on the traditional financial accounting career development model, and financial practitioners need to continuously learn and update their knowledge and skills to adapt to the new working environment and requirements [9].



## 2. COUNTERMEASURES FOR THE DEVELOPMENT OF FINANCIAL ACCOUNTING UNDER THE APPLICATION OF ARTIFICIAL INTELLIGENCE

### 2.1. COUNTERMEASURES FOR THE DEVELOPMENT OF FINANCIAL PERSONNEL UNDER THE APPLICATION OF ARTIFICIAL INTELLIGENCE

Artificial intelligence technology is with the development of science and technology and economic development, the formation of the inevitable product of history, now accounting artificial intelligence is still in the primary stage, the system still needs to be improved, the aspects involved is not enough. But with the further development of science and technology, accounting artificial intelligence will be applied more and more widely and deeply. The popularity of artificial intelligence will also put forward higher requirements on the level of professional knowledge and skills of financial personnel. But no matter when, human is always the master of the world, facing the challenge, we should correctly understand and actively face the arrival of accounting artificial intelligence.

(1) From basic accounting and other low-end personnel to high-end type of talent change

From the current development of the financial industry in practice, the positions of personnel engaged in basic accounting are saturated, and the reserve of senior talents is seriously insufficient.

(2) Transformation from traditional financial accounting to management accounting talents

Compared with artificial intelligence, human beings have the brain of subjective and active thinking. But artificial intelligence has only passively accept the arrangement given to it by human, it just wins to be more accurate and reduce mistakes.

(3) Become the designer and maintainer of AI accounting system

Accounting AI needs to be maintained and protected at a later stage, and the program is updated to better suit the needs of the company's development.

### 2.2. FINANCIAL ACCOUNTING OPERATOR RISK

Assume that  $X_1^*$  is the basic profit target to be achieved by the operator, and  $X_2^*$  is the profit target at the advanced profit margin level of the domestic counterparts. If the operator actually completes the profit  $X$  equal to  $X_1^*$ , the operator can get the base salary, if the operator actually completes the profit over  $X_1^*$  the operator can get the share of the excess, the share ratio is set to  $\beta_1$ . If the operator actually completes the profit over  $X_2^*$ , the excess is divided by  $\beta_2$ . In order to avoid excessive difference between the operator's annual salary income and the employee's income, generally  $\beta_1 \leq \beta_2$ , i.e., the operator's annual salary has certain marginal compensation decreasing nature. Thus the unadjusted operator's risk income  $S(X)$  is

$$S(X) = \begin{cases} \beta_1 (X - X_1^*) & X_1^* < X, X_2^* \\ \beta_1 (X_2^* - X_1^*) + \beta_2 (X - X_2^*) & X > X_2^* \end{cases} \quad (1)$$

This model is also applicable to loss-making companies, where  $X_1^*$  is zero if the operating objective is to turn around losses. If the operating goal is to reduce losses,  $X_1^*$  is a negative number.

The corresponding completion coefficient (adjustment coefficient) is calculated by the weighted average method, i.e. the weights of each assessment index are set according to their importance, and the weights of each index are  $W_i$ , the target value is  $b_i$  and the actual value is  $a_i$ . The formula for calculating the completion coefficient K of the assessment index is

$$K = \sum_{i=1}^n W_i \cdot \frac{b_i}{a_i} \quad (2)$$

After adjustment, the operator's income at risk was

$$S' = S(X) \cdot K \quad (3)$$

### 3. SMART FINANCIAL ACCOUNTING MODEL

#### 3.1. THE BASIC ELEMENTS OF INTELLIGENT FINANCIAL ACCOUNTING

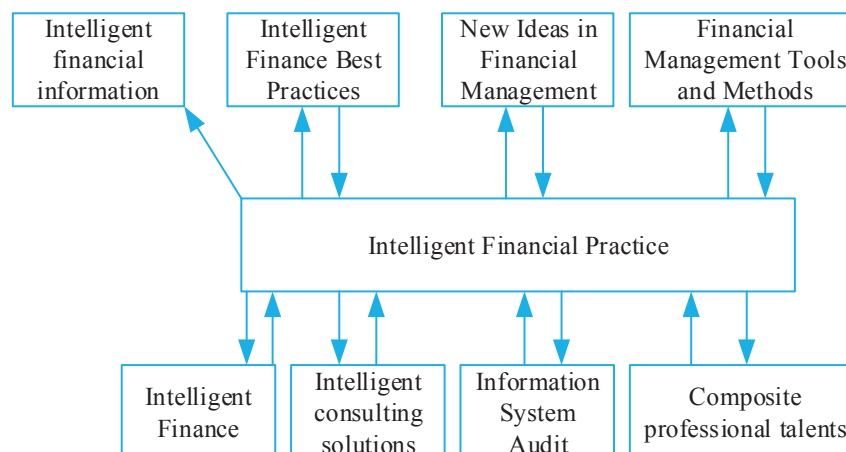
Intelligent financial accounting covers all areas of financial work, including financial work task design, financial work division, financial data measurement, financial scenario-based design, etc. Through intelligent articulation, it realizes budget management, accounting management, fund management, business management and so on. On the whole, there are three core levels of intelligent financial management:

The first is to realize professional in-depth analysis under the financial intelligence sharing mode.

The second is to realize intelligent business BI management based on platform architecture.

The third is the vertical extension based on artificial intelligence.

Figure 1 shows the overall framework of intelligent financial management. From the organizational structure, the basic framework of intelligent finance includes two categories, broad and narrow. The broad includes the application subject of intelligent financial management, industry organization, inner supply chain and so on. Although it adopts intelligence, the external environment still plays a dominant role, such as finance, audit, taxation, customs, industry associations, etc. The narrow sense of intelligent financial management generally includes the practice of intelligent finance in all kinds of enterprises or organizations, the purpose is to describe the financial application subject, and clarify the driving logical relationship that exists within the enterprise or organization.



**Figure 1.** Overall Framework of Intelligent Financial Management

### 3.2. COMPARISON BETWEEN TRADITIONAL FINANCE MODEL AND SMART FINANCE MODEL

With the development of society and changes in the market environment, the content of corporate finance has been expanded and extended, and some uncertainty factors must be included in the scope of internal control. In this way, the organizational objectives of financial management become very complex, resulting in the comprehensive expansion of financial management space and connotation. The financial personnel in this case, often only engaged in a single financial activities, making the efficiency of financial management is low. The intelligent finance through the data cloud platform, the integration of the various processes of financial management grouped together, both in terms of management quality and management efficiency, have a unique advantage. In this paper, the two are compared and the results are shown in Table 1.

**Table 1.** Comparison results between traditional and intelligent financial models

Leading Elements	Traditional Finance	Intelligent Finance
Values	Financial oriented	people oriented
Management philosophy	Specialization and standardization	systematization, specialization, and precision
fundamental theory	Traditional Financial Management Theory	Flexible Financial Management Theory
management system	Hierarchical department management	Diversified integrated managemen
Leading strategy	Low cost strategy	Diversified market leadership strategy
Pattern Method	Human resource led management model	Platformized management mode
organization structure	Hierarchical departmental single structure	The organic structure of multi organization coordination
Organizational kinetic energy	financial management	Financial management, coordination, and innovation
basic task	Establish financial order	Addressing the Development Needs of the Reform Era
Talent quality requirements	Accounting professionals	Comprehensive talents
management style	centralized management	Flexible management
Target structural features	Unilateralism	Organic structure

### 4. CONCLUSION

This paper mainly discusses the challenges and opportunities faced by financial accounting in the context of artificial intelligence, and proposes corresponding response strategies and intelligent financial accounting models. Through analyzing the application and impact of AI technology in the field of financial accounting, we found that the application of AI technology can effectively improve the efficiency and accuracy of financial accounting data processing and analysis, and also bring new ideas and methods to financial accounting. However, the application of AI technology will also bring certain impacts and challenges to the career development of financial accounting practitioners, which requires financial accounting practitioners to constantly update their knowledge and skills to adapt to the new working environment and requirements. In addition, there are certain differences between the traditional financial model and the intelligent financial model, which require financial accounting practitioners to enhance their learning and understanding. In summary, the application and development of artificial intelligence technology brings new opportunities and challenges for financial accounting, and this paper puts forward corresponding thoughts and suggestions to provide some insights for financial accounting practitioners.

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# DESIGN AND IMPLEMENTATION OF A METEOROLOGICAL DISASTER PREVENTION AND MITIGATION SERVICE PLATFORM APPLYING IMPROVED HASHING ALGORITHMS

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## ABSTRACT

In this paper, the overall design of the meteorological disaster prevention and mitigation platform, including the architecture and technical architecture, provides the basis for the subsequent application of the improved hashing algorithm. A storage and transmission scheme for meteorological data based on the improved consistent hash algorithm is proposed, which improves the security and transmission efficiency of meteorological data by equivalence line order division and data grouping. The results show that the optimized storage and transmission of meteorological data by the improved consistent hashing algorithm improves the security and transmission efficiency of meteorological data, and provides more accurate and timely data support for meteorological disaster prediction and warning. The research results of this paper provide some reference and guidance for the construction of meteorological disaster prevention and mitigation service platform.

## KEYWORDS

Disaster prevention and mitigation platform; Architecture; Technical architecture; Hashing algorithm; Meteorological data; Equivalence line order division

## 1. INTRODUCTION

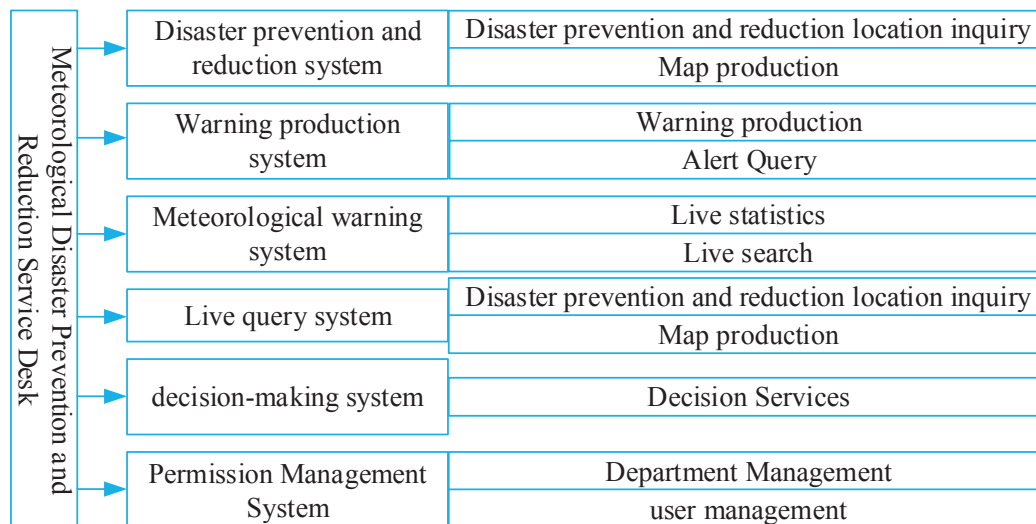
Meteorological disasters often bring huge losses to people's lives and properties due to their sudden and widespread nature. In order to predict and warn meteorological disasters timely and accurately, and prevent and reduce disaster losses, it is important to establish a meteorological disaster prevention and mitigation service platform [1-2]. However, the processing and storage of meteorological data face challenges such as large data volume and high data security requirements, and the traditional data storage and transmission methods can no longer meet the demand [3-4]. Therefore, developing a reliable and efficient data storage and transmission method is an important issue in the design of disaster prevention and mitigation service platforms [5]. Currently, data storage and transmission technology based on hash algorithm has become a research hotspot. As a technology widely used for data encryption and secure transmission, hash algorithm has the advantages of irreversibility, high efficiency, and security [6-7]. In the field of meteorology, some researchers have also applied hash algorithm to the storage and transmission of meteorological data, which improves the security and transmission efficiency of meteorological data [8]. Based on this, the purpose of this paper is to explore the application of data storage and transmission technology applying improved hash algorithm in the design of meteorological disaster prevention and mitigation service platform to improve the accuracy and timeliness of meteorological disaster prediction

and warning and reduce disaster losses.

## 2. OVERALL DESIGN OF METEOROLOGICAL DISASTER PREVENTION AND MITIGATION PLATFORM

The meteorological disaster prevention and mitigation service platform is a comprehensive business management platform to meet the needs of provincial meteorological environment monitoring, comprehensive analysis of data and information, forecast product production, and disaster prevention and decision-making services. It consists of several parts, such as comprehensive weather alarm system, product release system, disaster prevention and mitigation system, and decision service system.

The platform is designed and developed with B/S architecture, using SpringBoot+SpringCloud for the back-end, Ant Design of React for the front-end, and Docker technology system for compilation and release. Each functional subsystem is decomposed and microserviced, and the front-end and back-end are designed separately to finally realize the distributed development and deployment of the whole system. The overall structure of the meteorological disaster prevention and mitigation service platform system is shown in Figure 1.



**Figure 1.** System Structure of Meteorological Disaster Prevention and Reduction Service Platform

### 2.1. SYSTEM ARCHITECTURE

The system architecture of meteorological disaster prevention and mitigation platform is divided into 5 layers, namely, support layer, big data resource layer, application support layer, business application layer and user layer.

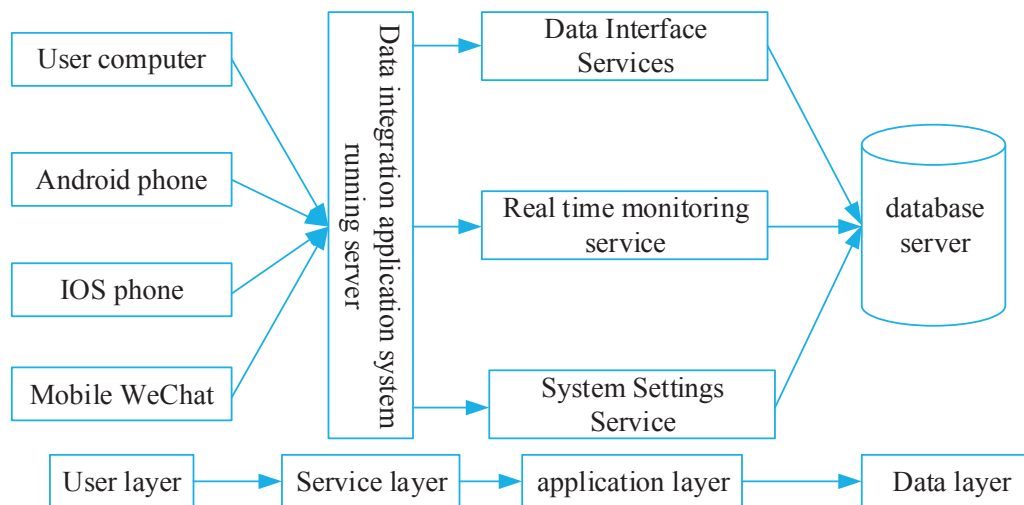
The platform construction mainly includes modules such as home page, data query, product production and release, forecast service products and system management.

Users are the service target of the system, providing various information services and management to administrators, business personnel and decision makers through the meteorological decision service platform.

### 2.2. TECHNICAL ARCHITECTURE

The client side uses browser mode to make the grassroots meteorological disaster prevention and mitigation data integration application system easier to use, without the need to install special software, which greatly reduces the maintenance and operation work of the whole system. The platform has a large number of users, and each software update iteration

will cause software adaptation differences due to different customer operating systems, so the current better solution is to use B/S architecture. Using a browser as an access tool is conducive to business personnel to obtain the business data required by their positions according to their roles. The architecture schematic of the system is shown in Figure 2.



**Figure 2.** Structure of Meteorological Disaster Prevention and Reduction Service Platform

### 3. WEATHER DATA STORAGE TRANSMISSION BASED ON IMPROVED HASH ALGORITHM

The idea of distributed data storage for electric power companies based on improved consistent hashing algorithm includes three steps, firstly dividing the weather distributed data into equivalent line order according to the temporal attribute characteristics of the data. The second uses consistent hashing algorithm to partition and group the meteorological data into appropriate distributed storage nodes. The third uses storage module technology to establish the weather data storage logical structure and physical structure, and allocates the weather data into the corresponding storage space according to the storage logic.

#### 3.1. EQUIVALENT LINE SEQUENCE DIVISION OF METEOROLOGICAL DATA

Meteorological data are closely related to the corresponding time constraints, such as the data produced during seasonal seasonal capturing by meteorological offices, and most of the data are closely related to the time constraints. Therefore, treating the corresponding timestamp of meteorological data as a core attribute of distributed data storage, and storing the data according to timestamp according to the actual needs of meteorological distributed data storage.

Let the binary of meteorological distributed data be temporal data, i.e., the effective time starting point of the data is always less than the effective time ending point. Its effective time period is determined by the starting and ending points of the data timestamp, so the points on the plane from the effective time starting point to the ending point of the meteorological data can be mapped, and the points on this plane are in one-to-one correspondence with the effective time period of the data, and the mapping relationship is expressed by the following equation:

$$u=(VTs, VT e) \quad (1)$$

Where,  $u$  denotes the two-dimensional time point corresponding to the effective time start to end plane of meteorological data,  $VTs$  denotes the effective time start on the

meteorological data time label, and  $VTe$  denotes the effective time end on the meteorological data time label.

It is assumed that there is a temporal mimetic relationship for the meteorological data, which is expressed by the following equation:

$$A_{TCP} = \langle P, W, L, Q \rangle \quad (2)$$

Suppose,  $H$  is the set of line sequence branches on the set of temporal proposed sequences, and the equivalent division of meteorological distributed data line sequences using the division rule is:

$$z = \beta \times \left( \sum_{i=1} \rho / g_{\min} \right) \quad (3)$$

### 3.2. WEATHER DATA GROUPING BASED ON IMPROVED CONSISTENT HASH ALGORITHM

In order to better achieve weather distributed data integrity, the weather data is grouped using a consistent hash algorithm based on data equivalence line order division. Before data grouping, the weather distributed data transmission control protocol connection is first processed to avoid corrupting the data during weather data transmission.

The subintervals of the grouping interval are determined using the improved consistency hashing algorithm and mapped to the corresponding subintervals of each interval according to the computing power of each group of nodes. Mapping each group of nodes to the whole meteorological data hash interval alternately in corresponding proportions, the mapping proportions are tabulated in the following equation:

$$\varepsilon = \rho / \sum_{i=1} \rho \quad (4)$$

Where,  $\varepsilon$  denotes the mapping ratio of the computing power of each group of nodes mapped to the corresponding subinterval of each interval. When there exists a set of meteorological data to be stored, the data hash is mapped to the corresponding subintervals according to the above process, and then the data is grouped to the corresponding nodes, thus realizing the data grouping based on the consistent hashing algorithm.

## 4. CONCLUSION

This paper applies the design and implementation of a meteorological disaster prevention and mitigation service platform with improved consistency hashing algorithm. By optimizing the storage and transmission scheme of meteorological data, it improves the security and transmission efficiency of meteorological data and provides more accurate and timely data support for meteorological disaster prediction and warning. The main conclusions of this paper are as follows:

(1) This paper designs a meteorological disaster prevention and mitigation service platform based on hash algorithm, including the architecture and technical architecture. The platform is efficient, reliable and secure, and provides more accurate and real-time data support for meteorological disaster prediction and warning.

(2) This paper proposes a meteorological data storage and transmission scheme based on improved hashing algorithm, including meteorological data equivalence line sequence partitioning and data grouping by improved causal hashing algorithm. By optimizing the storage and transmission of meteorological data, the data transmission efficiency and security



are greatly improved.

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# RESEARCH ON VISUAL COMMUNICATION DESIGN OF GARDEN LANDSCAPE IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper constructs a comprehensive landscape quality evaluation model based on the principle of hierarchical analysis method index screening, combined with the characteristics of landscape plant landscape, and establishes the landscape quality classification standard, so as to obtain scientific and detailed landscape quality scoring data. The formula of sensory experience of landscape design is summarized according to different sensory experiences, and the weight value of the factor layer of landscape plant landscape evaluation index is analyzed. For the two types of landscape design works, the subjective feelings of users on their sensory experience are explored. For the comprehensive weights of the factor layer, plant vernacularity is 0.550, species richness is 0.502, and plant growth status is 0.327. Therefore, the comprehensive quality evaluation model of landscape constructed in this paper evaluates the quality of visual communication design in landscape in a holistic way.

## KEYWORDS

Hierarchical analysis; Landscape; Quality evaluation model; Factor layer; Comprehensive weights

## 1. INTRODUCTION

With the advent of the information age, the main conflict between people and information has changed from how to get information to how to process it. On the one hand information explosion generates very much information [1-3]. On the other hand access to information has increased dramatically, and having a huge amount of information has become the norm for everyone [4-5]. Landscape is a perceived visual form object formed between people and the environment, a mutual relationship between subjective and objective, i.e., the art of space and

the art of vision, a comprehensive art that covers a variety of art forms [6-8]. Visual communication design is an innovation of graphic design, which is based on the visual beauty of its original form and highlights the expression and presentation of the design theme information [9-11]. The use of visual communication design for landscape effect expression helps to enrich the composition form and formal expression of landscape design and create a multicultural form of landscape design [12-13].

## 2. LANDSCAPE QUALITY EVALUATION MODEL AND SENSORY EXPERIENCE ASSESSMENT

### 2.1. ESTABLISHMENT OF LANDSCAPE QUALITY EVALUATION MODEL

#### 2.1.1. COMPREHENSIVE LANDSCAPE QUALITY EVALUATION MODEL

According to the principles of operability, systematicity, objectivity, representativeness, people-oriented and other AHP hierarchical analysis method index screening, combined with the landscape characteristics of garden landscape plants, from the ecological function, aesthetic function, service function and other 3 aspects of a total of 15 factor layers, the construction of garden plant community landscape effect evaluation model is shown in Table 1.

**Table 1.** Landscape effect evaluation model of garden plant community

Target layer (A)	Criteria layer (B)	Factor layer (C)
Plant landscape evaluation (A)	Ecological function (B1)	Plant Landscape Structure (C1)
		Plant growth status (C2)
		Species Richness (C3)
		Plant Life Type (C4)
		Plant Vernacularity (C5)
		Seasonal phase of plants (C6)
	Aesthetic function (B2)	Plant composition (C7)
		Harmony of plants (C8)
		Plant color (C9)
		Plant ornamental characteristics (C10)
	Service function (B3)	Aromaticity (C11)
		Popularity of science (C12)
		Safety (C13)
		Shade (C14)
		Iconicity (C15)

Let the overall landscape quality of the garden landscape be  $U$ , then:

$$\begin{aligned}
 U = & (X_1C_1 + X_2C_2, \dots, + X_6C_6)B_1 \\
 & + (X_7C_7 + X_8C_8, \dots, + X_{10}C_{10})B_2 \\
 & + (X_{11}C_{11} + X_{12}C_{12}, \dots, + X_{15}C_{15})B_3
 \end{aligned} \tag{1}$$

where  $C_1, C_2, \dots, C_n$  denotes the weight value of the factor layer relative to the criterion layer and  $B_1, B_2, \dots, B_n$  denotes the weight value of the criterion layer.

#### 2.1.2. LANDSCAPE QUALITY LEVEL CLASSIFICATION CRITERIA

In order to obtain scientific and detailed landscape quality scoring data, the results of professional evaluation of landscape quality were analyzed based on big data analysis technology, and the data were analyzed for reliability, and its Cronbach reliability coefficient was 0.982, which was greater than 0.8, indicating that the study was set up reasonably and had a high degree of credibility. The quality grade of each landscape factor and the overall landscape quality grade are divided into the following grades,  $3.5 < X \leq 5.0$  is excellent,  $3.0 < X \leq 4.0$  is good,  $2.5 < X \leq 3.5$  is average, and  $1.5 < X \leq 2.0$  is poor.

## 2.2. SENSORY EXPERIENCE ASSESSMENT

For the assessment of sensory experience of environmental art design, it is currently impossible to obtain an accurate assessment formula, and this section provides subjective measures for different sensory experiences in turn.

$Q$  is used to describe the overall environmental sensory experience assessment value,  $V$  is used to describe the visual,  $A$  is used to describe the auditory,  $F$  is used to describe the tactile,  $S$  is used to describe the olfactory,  $C$  is used to describe the experiencer's background,  $\Delta$  is used to describe the distracting factor, which is a reflection of the user's concentration on the experimental environment, and  $\theta_i$  is used to describe the perceptual weight of each sense with a cumulative value of 1. The maximum threshold of all perceptual weights must not exceed the perception level of that sense in the actual environment. The maximum threshold of all perceptual weights cannot exceed the perception level of the senses in the actual environment. From the background of landscape environment design experience, the following formula for landscape design sensory experience is summarized:

$$Q = \theta_V V(t) + \theta_A A(t) + \theta_F F(t) + \theta_S S(t) + \theta_C C(t) - \theta_\Delta \Delta(t) \quad (2)$$

## 3. LANDSCAPE INTEGRATED WEIGHTING ANALYSIS AND SENSORY EXPERIENCE EXPERIMENT

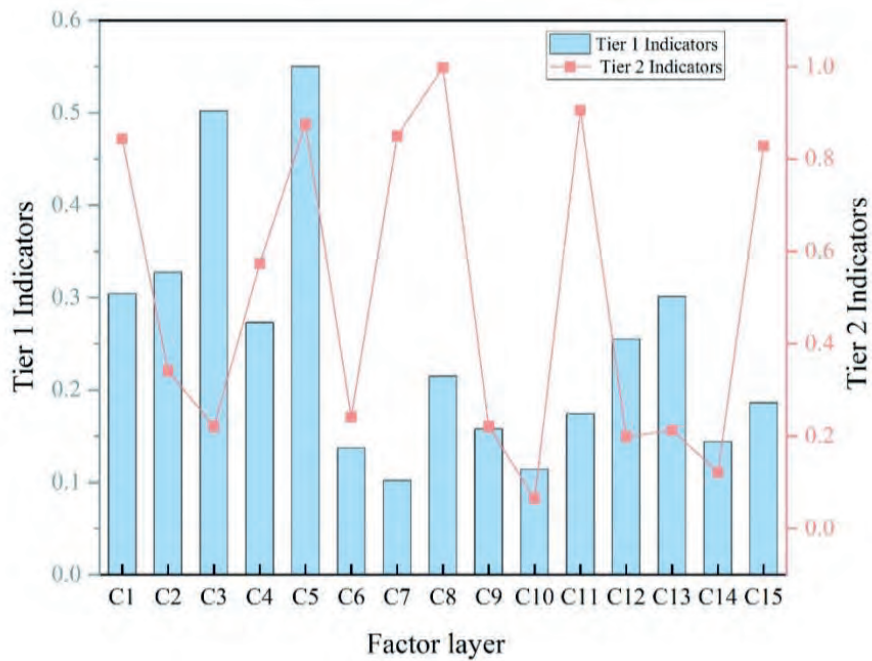
### 3.1. COMPREHENSIVE WEIGHTING ANALYSIS

Using yaahp software, the evaluation index weight data of 20 experts were integrated and their hierarchical total ranking was calculated based on the big data, and the values of the evaluation index weights of the landscape of garden plants are shown in Figure 1. Based on the index layer total ranking weight formula:

$$X_{ij} = W_{Bi} \times W_{ij} \quad (3)$$

Where  $W_{Bi}$  is the weight value of the target layer to the criterion layer,  $W_{ij}$  is the weight value of the criterion layer to the factor layer, and  $X_{ij}$  is the weight value of each indicator layer to the target layer.

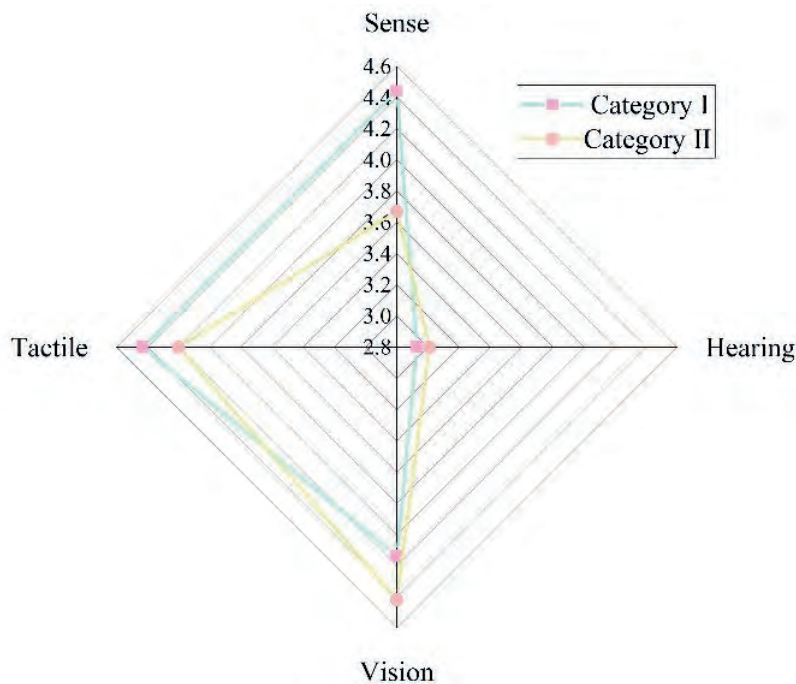
In the evaluation of the plant landscape of the garden, the weight of the criterion layer is 0.4727 for ecological function, 0.3257 for service function and 0.3658 for aesthetic function. The combined weight of the factor layer is 0.550 for plant nativeness, 0.502 for species richness, 0.327 for plant growth state, 0.304 for plant landscape structure, 0.301 for safety, 0.273 for plant life type, 0.255 for science, 0.215 for plant harmony, 0.186 for iconicity, 0.174 for aroma, 0.158 for color, 0.144 for shade. These three factors together indicate that plant species, plant growth condition, and plant hierarchy are the most important factors affecting plant life. And plant hierarchy are the more important factors affecting the quality of plant landscape.



**Figure 1.** Weighting of evaluation indexes in the factor layer

### 3.2. SENSORY EXPERIENCE ASSESSMENT EXPERIMENT

Factors that affect the user's sensory experience of landscape design include user experience, knowledge and occupation. Different senses can also influence each other. For both types of landscaping works, users' subjective perceptions of their sensory experiences were explored. Based on the analysis of 50 visitors' evaluation by big data analysis technology, the average value of evaluation of landscape design is shown in Figure 2. In the sensory experience of landscape art design, for both types of landscape design works, the users' demand for visual, auditory and tactile senses is higher than that of smell.



**Figure 2.** Average value of evaluation of landscape design

## 4. CONCLUSION

Human perception of the outside world is done through vision. In the organization of the

outdoor environment and the shaping of the indoor spatial composition, the design of the landscape is built on the perception of human vision to plan the spatial composition of the landscape, as well as the components. In the comparison of diversity indices, the number of species of community plants, the number or cover of individual species, and the repetition rate of species are important factors that affect the plant diversity index.

Based on the evaluation study of landscape, this paper constructs an index system for landscape quality evaluation, and also uses AHP method and comprehensive index method to derive the ranking weights of each index about landscape quality evaluation system, and finally calculates the comprehensive index of landscape volume of gardens, which provides reference significance to other landscape quality evaluation.

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# A PRELIMINARY STUDY ON THE RELATIONSHIP BETWEEN COLLEGE SPORTS AND SPORTS HUMAN SCIENCE UNDER BIG DATA TECHNOLOGY

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## ABSTRACT

In this paper, a myosotor model was established, and the CMC method was used to calculate the downstream control signal of the central nervous system  $\alpha$  activation and regulate the upstream feedback signal from the myosotor to the central nervous system. Based on the characteristics of smart wearable sports monitoring devices, the sports and fitness smart wearable devices were selected as experimental data collection tools to provide scientifically accurate data for the proprioceptor model. The accuracy of the muscle shuttle model was verified by constructing a sinusoidal stretching experiment, and the results of the knee jerk reflex movement simulation were analyzed. The GmaxV score was greater than 80%, and the GmaxT and CORA scores were greater than 60%, confirming the prevalence of proprioception in motor feedback in the relationship between college sports and sports human science.

## KEYWORDS

Muscle shuttle model; CMC method; Upward feedback signal; Smart wearable device; Sine stretch experiment; Knee jump reflex movement

## 1. INTRODUCTION

With the progress of the times, experimental teaching of sports human science is being reformed and developed continuously. However, it also presents many problems in the middle, the experimental content is not innovative enough, the experimental teaching methods and methods are backward, and the equipment performance is relatively low [1-2]. These factors lead to the inability to meet the needs of sports science personnel training in all aspects [3]. Proprioception is an important sensory feedback means for human to perceive motor state and control autonomous movement [4-5]. In-depth investigation of its working principle and function is important for understanding how the brain controls and interacts with the limbs [6-7]. A neuromuscular motor simulation framework with proprioceptive control circuits was constructed by combining a proprioceptive model of real physiological structures with a model of human lower limb bone muscle dynamics [8].

In this paper, based on the use of big data information platform knowledge sharing to shape the scientific view of sports orientation, the aggregation effect of students' physical exercise

adherence value identity is brought into play to promote college students' exercise adherence under the premise of respecting students' individual behavioral differences [9-10].

## 2. ONTORECEPTOR MODEL BASED ON SPORTS HUMAN SCIENCE

### 2.1. MYOSIN MODEL

#### 2.1.1. MUSCLE SHUTTLE MODELING

The myosin is a proprioceptive organ that is mostly found in skeletal muscle. In typical mammalian lower limb muscles, tens or even hundreds of myosin filaments can be found parallel to extra-sarcomeric fibers. The muscle shuttle varies with muscle length during locomotion and plays an important role in motor sensation and perturbation sensation. The myosin model developed in this paper is based on the physiological structure of the myosin. The muscle shuttle contains three different muscle fibers, two long-nucleated muscle fibers, BAG1 and BAG2, and one short-chain fiber, CHAIN.

Assuming that stretching occurs mainly at the ends, it is possible to directly calculate the tension of the muscle fibers in its shuttle, avoiding the need to solve partial differential equations, and finally normalizing the activation frequency input based on the maximum frequency according to the needs of the Opensim motion simulation environment used, with the following specific mathematical model:

$$T = M^* L'' + \beta^* C^* \left( L - R - L_{sr}^0 * \text{sign}(L')^* \text{abs}(L')^a + K_{pr} * (L - L_{pr}^0 - L_{sr}^0) \right) + P \quad (1)$$

#### 2.1.2. PRIMARY ACTIVATION SIGNAL

The feedback signals transmitted from the muscle shuttle to the central nervous system are mainly primary activation signals  $I_a$ , and the intensity of secondary signals is relatively low. Therefore, the primary signal, which is the change in muscle length, is mainly considered in the feedback loop established in this paper, and the effect of the secondary signal is ignored. The expression of the feedback signal:

$$I_{aPrimary\_fferent} = G^* \left( \frac{1}{K_{sr}} - (L_{sr}^N - L_{sr}^0) \right) \quad (2)$$

The motor control loop framework developed in this paper assumes that their values are equal. The downstream control signal  $\alpha$  activation of the CNS is calculated using the CMC method and is input to the muscle shuttle as  $\gamma$  excitation in the feedback loop for modulating the upstream feedback signal from the muscle shuttle to the CNS.

## 2.2. SMART WEARABLE SPORTS MONITORING DEVICES

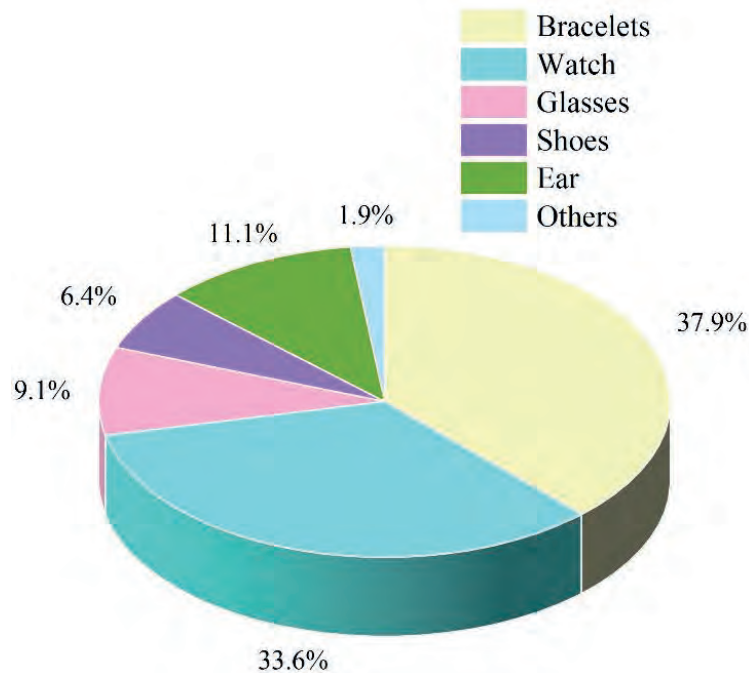
### 2.2.1. SPORTS AND FITNESS SMART WEARABLE DEVICES

With the continuous development of big data technology, intelligent wearable sports monitoring equipment is also under development. In order to obtain more accurate scientific feedback signal data transmitted from the muscle shuttle to the central nervous system, intelligent wearable sports monitoring equipment of the sports fitness category is used to monitor the wearer's sports condition in real time, and the athletes' sports change condition and muscle work degree can be captured more accurately by wearing such equipment. Through data statistics and analysis, the wearer can be guided in terms of exercise content, duration, interval time and exercise intensity.



## 2.2.2. BASIC USAGE BY UNIVERSITY STUDENTS

The common types of smart wearable devices used by college students for physical exercise are shown in Figure 1. Among them, the first and second are smart bracelet and smart watch, accounting for 37.9% and 33.6% respectively, ear-worn devices accounting for 11.1%, smart glasses accounting for 9.1%, smart shoes and socks accounting for 6.4%, and others accounting for 1.9%. According to the above data, we can analyze that smart bracelets and smart watches are the most used among college students' physical exercise population, and the application types have a trend toward ear-worn devices and smart glasses.



**Figure 1.** Types of smart wearable devices used

## 3. VALIDATION OF THE MUSCLE SHUTTLE MODEL

### 3.1. VALIDATION OF THE ACCURACY OF THE MUSCLE SHUTTLE MODEL

For the sinusoidal stretching experiment, the experimental conditions are mainly four as follows.

(1) The dynamic activation frequencies were set to 70, 100, and 125 pps, and the static activation frequencies were set to 0 pps.

(2) The static activation frequency is set to 70, 100, 125pps, and the dynamic activation frequency is set to 0pps.

(3) Static activation frequency is set to 70, 100, 125pps, dynamic activation frequency is set to 100pps.

(4) The dynamic activation frequency is set to 70, 100, 125pps and the static activation frequency is set to 100pps.

One of the typical experimental loading conditions was selected for simulation: dynamic activation frequency was 50pps and static was 0pps, and the CORA scores for proprioceptive muscle shuttle simulation and experimental comparison are shown in Table 1. The GMaxV, GmaxT, and CORA scores of the simulated results obtained in the paper were all greater than 80%, which indicates a good correlation between the experimental and simulated results. By simulating the loading of different activation frequencies and stretch patterns to evaluate the muscle shuttle model comprehensively, the simulation results and experimental results can

match well, and the model can be used to perform the construction of motor control loops.

**Table 1.** CORA scores for proprioceptive muscle shuttle simulations and experimental comparisons

Number	GMaxV	GmaxT	CORA
1	97.64%	94%	95.53%
2	92.08%	83.49%	81.20%
3	81.04%	94.80%	65.71%
4	31.09%	63.81%	74.82%
5	78.27%	89.52%	83.64%
Mean value	81.15%	94.17%	81.37%

### 3.2. ANALYSIS OF KNEE-JERK REFLEX MOVEMENT SIMULATION RESULTS

From the human physiological structure, the middle femoral muscle is located directly below the rectus femoris muscle, and it is more difficult to measure its electromyographic signal by surface EMG. Therefore, in this study, electrode pads were applied to the rectus femoris region of the thigh leg. In the human body, there is a redundant role of muscles, and there are many combinations of muscles firing for the same action. In addition, the position of the rectus femoris and the middle femoris muscles are closer and act synergistically when performing the knee jerk reflex, which has an effect on the distribution of the simulated muscle force and the measured EMG signal of the rectus femoris muscle, resulting in the mean value of the simulated activation before it is more consistent with the measured signal, and the objective assessment of the simulated knee jerk reflex activation and angle curve is shown in Table 2.

It can be seen from the score table that the maximum GmaxV score exceeds 80%, and the GmaxT and CORA scores also exceed 60%, indicating a certain degree of similarity between the two. From the comparison results of the experiment and simulation, the validation results of the motor feedback control loop are accurate and reasonable, while the knee-jerk reflex experiment confirms the prevalence of proprioception in motor feedback.

**Table 2.** Simulated knee-jerk reflex activation and angle curve objective assessment scores

Muscle	GMaxV	GmaxT	CORA
Knee Angle	81.53%	91.7%	71.37%
Rectus femoris activation	75.83%	64.52%	73.26%
Lateral Femoral Muscle Activation	80.23%	84.27%	74.27%
Medial Femoral Muscle Activation	88.92%	85.17%	85.59%

## 4. CONCLUSION

The proprioceptive motor feedback control loop proposed in this paper has a positive effect on further understanding of the human neuromotor control process. The nervous system mainly includes the central nervous system and the peripheral nervous system. The central nervous system, that is, the brain, generates motor control signals. The central nervous system, or the brain, generates motor control signals, which are transmitted through the spinal cord to the skeletal muscle effectors, where the muscles contract and drive the body to move, while the proprioceptors in the muscle tendons generate feedback signals. The feedback signals are transmitted to the brain through the spinal cord, and there are also low-level feedback control loops in the spinal cord that do not go through the brain, and these motor control pathways constitute our body's motor control system.

Therefore, the advantages of smart wearable devices are fully utilized to health college

students' sports condition, to promote fitness and entertainment, and to make sports life scientific. Thus, the purpose of stimulating sports interest, making health consciousness concrete, evaluating exercise effect and making sports goal clear.

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# CLINICAL OBSERVATION OF COMPOUND YIMU ORAL LIQUID ON ARTIFICIAL INTELLIGENCE-ASSISTED POST-ABORTION BLEEDING

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## ABSTRACT

This paper firstly addresses the application of artificial intelligence-assisted technology in clinical decision-making in reproductive medicine, through which ectopic pregnancy can be effectively addressed. Secondly, a comparative analysis of the data of the control and treatment groups was conducted with the example of post-abortion patients in a people's hospital. Finally, the study was conducted by four indicators: postoperative bleeding time, bleeding volume, normal menstrual recovery time, and duration of abdominal pain. The results showed that in the treatment group, the percentage of their postoperative bleeding time  $\leq 5$  days was 48.33%, and the percentage of those with low bleeding volume was 55%. From the comparison of normal postoperative menstrual recovery time, the percentage of the treatment group with  $\leq 20$  days was 51.67%, and the percentage of those with abdominal pain duration  $\leq 3$  days was 35%. This indicates that Compound Yimu Oral Liquid helps in post-abortion recovery.

## KEYWORDS

Compound Yimu Oral Liquid; Artificial intelligence; Abortion; Postoperative recovery

## 1. INTRODUCTION

In recent years, with the development of anesthesiology, infusion, blood transfusion, knowledge of hydropower balance, and measures such as surgical modalities and infection control, the cesarean delivery rate has been on the rise year by year [1-2]. Although it has led to some reduction in perinatal morbidity, patients undergoing cesarean delivery are more prone to bleeding than after normal vaginal delivery and have poorer postpartum uterine regeneration, making them prone to unrelenting malignant dew, abdominal pain, secondary anemia, and infection [3-4]. This is mainly due to the large trauma of the damage caused by the severed smooth muscle fibers of the uterus during surgery, which leads to a significant decrease in uterine contractility, and is also associated with postoperative maternal pain and physical and psychological anxiety [5-6].

Medication abortion is an effective, safe and easy non-surgical treatment commonly used today, but the main adverse effects of medication abortion are incomplete medication abortion,

prolonged vaginal bleeding and heavy bleeding after abortion [7-8]. The causes of this problem are poor uterine contraction and impaired endometrial repair leading to intrauterine residues, and Chinese medicine has unique advantages in promoting the discharge of uterine cavity residues and endometrial repair after medication abortion to achieve hemostasis [9-10].

This paper analyzes the application of artificial intelligence assistive technology in clinical decision making in reproductive medicine as an entry point to solve the problem of ectopic pregnancy. Clinical observation of postoperative bleeding was carried out in two groups, control and treatment, using post-abortion patients from the S City People's Hospital as an example. The data were quantitatively analyzed in terms of four indicators: postoperative bleeding time, bleeding volume, normal menstrual recovery time, and duration of abdominal pain, respectively. The results showed that Compound Yimu Oral Liquid could effectively help post-abortion patients reduce intrauterine bleeding, shorten the duration of abdominal pain, and promote faster physical recovery ability of post-abortion patients.

## **2. APPLICATION OF ARTIFICIAL INTELLIGENCE IN CLINICAL DECISION MAKING IN REPRODUCTIVE MEDICINE**

Artificial intelligence technology is widely used in the medical field, medical clinical decision-making from personal experience-oriented, to based on evidence-based medical evidence, and then gradually change to a reliable decision-making model based on clinical data. AI can dig deeper into the correlation between medical data, and with the help of machine learning to parse past medical information can establish a model of disease occurrence, diagnosis and prognosis assessment, to assist clinical decision-making.

Artificial intelligence technology applied various machine algorithms and combined with the consultation data of ectopic pregnancy patients to construct a clinical decision system for ectopic pregnancy treatment, which gives individualized treatment decision suggestions based on the disease characteristics of ectopic pregnancy patients. The results showed that the decision accuracy was 98.26%, and the sensitivity and specificity were 96.54% and 98.17%, respectively. The use of this system assists clinicians in developing treatment plans for patients with ectopic pregnancy, which can effectively avoid outcomes such as death and infertility caused by inappropriate treatment. The use of artificial intelligence technology to assist in optimizing the timing of trigger injections may significantly increase the number of 2PNs obtained in 1 IVF stimulation cycle and the total number of available blastocysts, ensuring the safety of life for patients with ectopic pregnancy.

## **3. SELECTION OF RESEARCH SUBJECTS AND METHODS**

### **3.1. SELECTION OF RESEARCH SUBJECTS**

Patients who underwent medication abortion from October 2020 to May 2022 in S City People's Hospital were selected. Age 20-35 years, 35-50 days of menopause, pregnancy confirmed by urinalysis and B-ultrasound, consent to medication abortion and no contraindications. There were no other complications after medication abortion and further curettage after medication abortion was excluded. Patients were randomly divided into treatment and control groups of 60 cases each, with no significant differences in age, pregnancy, gestational sac size and days of menopause between the groups. The number of cases in each group that were finally not excluded from the study and were able to follow up and receive follow-up on time. The study was approved by the hospital ethics committee, and the cases selected as well as the study process met the ethical research requirements.

### **3.2. INCLUSION AND EXCLUSION CRITERIA**

Inclusion criteria:

(1) Women aged 20-35 years. (2) Days of menopause 35-50 days. (3) Women with intrauterine pregnancy confirmed by gynecologic ultrasound. (4) Voluntary request for medication to terminate pregnancy. (5) Normal menstrual cycle in the first trimester of pregnancy. (6) Not using steroid hormones for contraception. (7) Voluntarily participated in this study and were able to make timely follow-up and medical visits.

Exclusion criteria:

(1) Those with bleeding for more than 20 days after miscarriage or incomplete miscarriage requiring surgical removal. (2) Those with intrauterine residues detected by ultrasound. (3) Acute and chronic liver and kidney diseases, cardiovascular system, respiratory system, digestive system diseases. (4) Endocrine and hematological system diseases. (5) Breast and reproductive system tumors, combined with uterine fibroids or complications due to trophoblastic tumors. (6) Allergic or allergic to various drugs. (7) Contraindications to prostaglandin drugs. (8) Those with severe pregnancy vomiting. (9) Combined with anemia.

### **3.3. RESEARCH METHODOLOGY**

On the first day of abortion, patients were given mifepristone tablets 50 mg and 25 mg with warm water at 7 a.m. and 7 p.m., respectively, for 2 days, and came to the hospital on the morning of the third day to take misoprostol tablets 0.6 mg, with fasting and abstaining from food and water for 2 hours before and after taking the drug. After the embryo sac was expelled, the medication was administered according to the following groups. The experimental group was given Compound Yimu Oral Liquid (Henan Tai Long Co., LTD) twice a day, 20ml each time, for 7 days. In the control group, after the embryo sacs were expelled, 10 U of indocin was injected intramuscularly three times a day. Patients were followed up on day 7 and day 14 after medication abortion, and menstrual status was followed up one month after medication abortion. All patients recorded the number of days of vaginal bleeding, the amount of bleeding, the time from embryo sac expulsion to menstrual resumption, the duration and amount of menstruation, and the duration of abdominal pain. In addition, the Chinese medicine symptom efficacy criteria were formulated with reference to the Clinical Research Guidelines for New Chinese Medicines for the Treatment of Unrelenting Postpartum Dew, and the Chinese medicine evidence was observed.

In this study, SPSS software was applied for statistical analysis, and the measurement data were expressed by  $\bar{x} \pm S$ , and the difference between groups was tested by t-test, and the count data were tested by chi-square test, with  $P < 0.05$  indicating statistical significance.

## **4. EXPERIMENTAL RESULTS AND ANALYSIS**

### **4.1. COMPARISON OF POSTOPERATIVE BLEEDING TIME AND BLEEDING VOLUME BETWEEN TWO GROUPS OF PATIENTS**

The postoperative bleeding time and bleeding volume were compared for both groups of patients, and the results were obtained as shown in Table 1.

**Table 1.** Comparison of bleeding time and bleeding volume

Group	≤5d	6~10d	≥11d	Mean bleeding time(d)
Control group	7(11.66%)	31(51.67%)	22(36.67%)	8.52±1.31
Treatment group	29(48.33%)	25(41.67%)	6(10.00%)	5.36±0.83
<b>Group</b>				
Group	N	High	Medium	Low
Control group	60	28(46.67%)	21(35.00%)	11(18.33%)
Treatment group	60	7(11.67%)	20(33.33%)	33(55.00%)

From the comparison results of postoperative bleeding time between the two groups, the mean postoperative bleeding time of patients in the treatment group was significantly lower than that in the control group, and the difference was statistically significant ( $P<0.05$ ), and there were significantly more patients with uterine bleeding time  $\leq 5$  d in the treatment group than in the control group, and the difference was statistically significant ( $P<0.05$ ). From the comparison results of postoperative bleeding volume between the two groups, compared with the usual menstrual volume, the number of cases with less uterine bleeding in the treatment group was significantly more than that in the control group, and the number of cases with more volume was significantly less than that in the control group, and the difference was statistically significant ( $P<0.05$ ), and the difference in the number of cases with medium volume was not statistically significant ( $P>0.05$ ). Because motherwort contains alkaloids and flavonoids, which can effectively strengthen contractions and can regulate clotting factors in both directions. This indicates that by Compound Yimu Oral Liquid can effectively accelerate the repair of endometrium, effectively shorten the uterine bleeding time and reduce the bleeding volume after abortion.

#### 4.2. COMPARISON OF THE RETURN OF NORMAL MENSTRUATION AND DURATION OF ABDOMINAL PAIN AFTER SURGERY BETWEEN THE TWO GROUPS

In addition to the verification of the indexes of the patients' post-abortion bleeding time and bleeding volume, this section also aims at comparing the patients' post-abortion normal menstrual recovery time and the duration of abdominal pain as a way to verify the effectiveness of Compound Yimu Oral Liquid in post-abortion bleeding recovery. The results of their comparison were obtained as shown in Table 2.

**Table 2.** Normal menstrual resumption and duration of abdominal pain

Group	≤20d	21~40d	≥40d	Normal menstrual recovery time (d)
Control group	9(15.00%)	23(38.33%)	28(46.67%)	40.28±2.63
Treatment group	31(51.67%)	22(36.67%)	7(11.66%)	22.52±3.15
<b>Group</b>				
Group	≤3d	4~7d	≥7d	Duration of abdominal pain (d)
Control group	6(10.00%)	30(50.00%)	24(40.00%)	5.18±1.29
Treatment group	21(35.00%)	35(58.33%)	4(6.67%)	2.14±0.27

From the comparison of normal menstrual recovery time after abortion between the two groups, the patients in the treatment group had significantly shorter normal menstrual recovery time after abortion than the control group, and the difference was statistically significant ( $P<0.05$ ). For patients with normal menstrual recovery time  $\leq 20$  d, there were significantly more patients in the treatment group than in the control group, and the difference was statistically significant ( $P<0.05$ ). In terms of the duration of postoperative abdominal pain in the two groups, the duration of postoperative abdominal pain in the treatment group was significantly shorter

than that in the control group, and the difference was statistically significant ( $P < 0.05$ ). For patients with abdominal pain lasting  $\leq 3$  d, there were significantly more patients in the treatment group than in the control group, and the difference was statistically significant ( $P < 0.05$ ). This indicates that the oral application of compound Yimoucao can effectively help post-abortion patients to reduce the duration of contractions and abdominal pain.

According to traditional Chinese medicine, abortion belongs to the category of abortion. The abortion can directly damage the ramus and uterus, resulting in blood flow disorder, overflowing out of the veins, stagnant blood, and the new blood does not follow the normal path. Therefore, after abortion, we should eliminate stasis and create new blood, regulate menstruation and relieve pain. Compound Yimu Oral Liquid has the therapeutic effect of clearing heat and cooling blood, reducing uterine bleeding and stopping bleeding. The results of this study showed that the treatment group was better than the control group in shortening the duration of uterine bleeding, reducing the amount of bleeding, restoring normal menstruation and shortening the duration of abdominal pain. Also, because it is a pure natural drug with high safety, no adverse reactions were observed in all cases in this study.

## 5. CONCLUSION

In this paper, the application of artificial intelligence-assisted technology in clinical decision making in reproductive medicine was used as an entry point, and patients who underwent medication abortion from October 2020 to May 2022 in the People's Hospital of S. were selected for example analysis. Quantitative analysis of the data was performed by developing inclusion and exclusion criteria in two groups, the control group and the treatment group. The results showed that there was a significant difference in the postoperative bleeding time and bleeding volume between the two groups, with 48.33% of the treatment group using Compound Yimu Oral Liquid having less than or equal to 5 days of postoperative bleeding and 55% of those with less bleeding. In terms of the comparison of normal postoperative menstrual recovery time, the percentage of the treatment group with less than or equal to 20 days was 51.67%, and the percentage of those with abdominal pain lasting less than or equal to 3 days was 35%.

In conclusion, the administration of Compound Yimu Oral Liquid after abortion can effectively reduce vaginal bleeding, promote uterine regeneration, improve anemia, shorten the duration of uterine bleeding and abdominal pain, and accelerate the recovery of normal menstruation. It can also speed up the recovery of normal menstruation. Moreover, Compound Yimu Oral Liquid is made of traditional Chinese medicine, which has good safety and can better help patients recover after abortion.

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# RESEARCH ON THE INNOVATION SYSTEM OF CORPORATE BUSINESS ADMINISTRATION BASED ON THE NEW ECONOMIC NORMAL IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE

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## ABSTRACT

In this paper, firstly, we use MVC model to build a business administration platform for the new economic normal in the context of artificial intelligence, and analyze each module of the platform system architecture. Secondly, the K-nearest neighbor algorithm is used to classify and analyze the business administration data, so as to visualize the business administration data. Finally, in order to verify the effectiveness of the platform constructed in this paper, the timeliness and security tests are conducted. The results show that the service loading time of this platform is 1221.4ms, which is 14.87% and 17.73% lower than that of Kunpeng and Shenwei platforms respectively. With the increase of the number of users, the number of failures of this platform is 27 and 44 times less than that of Kunpeng and Shenwei respectively.

## KEYWORDS

Artificial intelligence; New economic normal; Business administration platform; K-nearest neighbor algorithm; Timeliness; security

## 1. INTRODUCTION

With the rapid development of social economy, China has entered the new economic normal, in this case, enterprises need to keep up with the times and innovate in order to achieve stable development. And it also needs to keep in line with the economic characteristics after the economic transformation and development, and combine with the actual situation of the enterprise itself, and then achieve sustainable and stable development [1-2]. Under the new economic normal, business administration personnel of enterprises need to consider the characteristics of market development, continuously optimize and reform the functions of business administration, innovate the content and form of work, solve the economic problems within the enterprise, relieve economic pressure, and promote the sustainable development of the enterprise [3-5].

The development of artificial intelligence can reasonably assess the existing foundation of current corporate business administration and seek strategic alliances for the innovation of corporate business administration system [6-8]. To a certain extent, this is conducive to the analysis of corporate business administration in the development of artificial intelligence to achieve reasonable resource allocation such as data and information sharing and complementary advantages. With the development of artificial intelligence, the content resources of corporate business administration analysis have a limited nature and are difficult

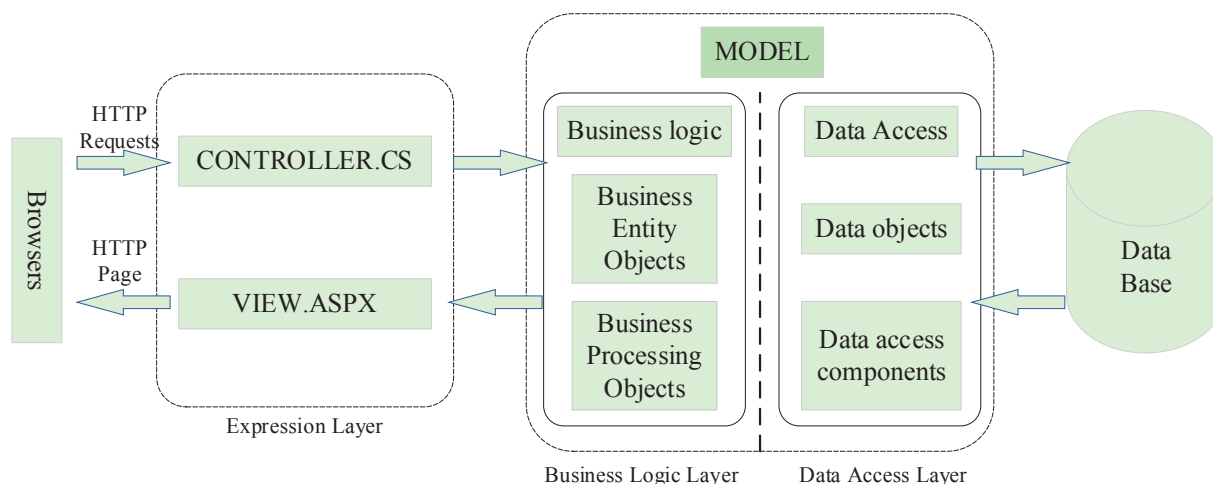
to replicate. The development of artificial intelligence has led to the rapid development of related industrial services, which has become an important trend in the future development of corporate business administration, and then realize the maximum benefits of corporate social economy [9-10].

## 2. ENTERPRISE BUSINESS ADMINISTRATION PLATFORM ARCHITECTURE BASED ON MVC MODEL

### 2.1. CONSTRUCTION OF ENTERPRISE BUSINESS ADMINISTRATION PLATFORM BASED ON MVC MODEL

The MVC pattern refers to Model-View-Controller, and its principle is to separate the input, logic processing, and output of the application by Model, View, and Controller, thus making the application be divided into three layers, namely Model, View, and Control.

The model layer is the main body of the application and is mainly responsible for the business data of the application. The view refers to the user interaction interface of the system. The controller is mainly responsible for receiving input and feeding data back to the interface to display and update the state of the model objects. The MVC design pattern is a widely used design pattern, and the application model of the enterprise business administration platform built by the MVC design pattern is shown in Figure 1.



**Figure 1.** Enterprise business administration platform based on the MVC model

### 2.2. PLATFORM SYSTEM ARCHITECTURE MODULE DESIGN

According to the actual business needs, the main functions of the business administration business service level built based on MVC model are enterprise registration management, administrative law enforcement case management, market supervision and management, trademark management, contract management and other basic functions. Through these functions, it provides easy, reasonable and professional solutions for business administration departments.

The system architecture is based on the MVC model, i.e. data access layer, business logic layer and presentation layer. The design implementation of each layer of the architecture can be described as follows:

(1) The presentation layer is to accept requests and return data results, and display the corresponding page with View.

(2) The business logic layer is responsible for processing the data obtained from the database and returning the results to the presentation layer.

(3) The data access layer is responsible for interacting with the database, making connections and other operations to the database, and returning the results to the business logic layer, which processes the data and cannot interact directly with the presentation layer.

### 2.3. CLASSIFICATION ANALYSIS OF INDUSTRIAL AND COMMERCIAL DATA BASED ON K-NEAREST NEIGHBOR ALGORITHM

Enterprise business administration platforms need to classify various business administration data, which in turn enables managers to make management decisions by visualizing the data. Classification methods are usually based on input data sets to construct a classification model that fits the input data well and correctly predicts the class labels of unknown samples. Therefore, the reason why the algorithm is trained by data, the goal is to use the process of model training to complete the construction of a model with good generalization ability. In this paper, the K-nearest neighbor algorithm is used for the classification analysis of the business administration data.

The nearest neighbor is a training set divided into several classes, and then in each class a number of points with representative properties are solved. The distance between point  $x$  and each representative point at prediction time, and the final predicted point  $x$  belongs to the class with the smallest distance from that representative point.

Let the industrial and commercial data be a classification problem with the number of categories  $m$  of  $w_1, w_2, \dots, w_m$ , with  $N_i$  representative points of each category and  $i = 1, 2, \dots, m$ , then the classification function is

$$g_i(x) = \min_k \|x - x_i^k\|, k = 1, 2, \dots, N_i \quad (1)$$

Where the corner of  $x_i^k$  is labeled  $i$  for category  $w_i$  and  $k$  for category  $w_i$  the  $K$ th of the  $N_i$  representative points.

The K nearest neighbor algorithm belongs to the generalization of NN, by calculating which class the majority of the  $k$  minimum distances of the predicted point  $x$  belongs to, and which class the predicted point  $x$  belongs to, when  $k = 1$ , the K nearest neighbor method is the nearest neighbor method.

In summary, the MVC-based business administration platform can effectively integrate business administration data and classify business administration data through K-nearest neighbors. It provides managers with visualization of business administration data, which enables them to understand business administration situation and make management decisions more intuitively.

## 3. TEST ANALYSIS OF ENTERPRISE BUSINESS ADMINISTRATION PLATFORM

### 3.1. PLATFORM TEST ENVIRONMENT

This section provides a brief introduction to this test environment to verify the performance of the enterprise business administration platform built on the MVC pattern in this paper.

The experimental test part of this paper is mainly in three different hardware architecture platforms for comparison, where the platform built in this paper in the choice of Dell OptiPlex 6080 small machine, ARM64 processor platform to choose Kunpeng server, domestic processor platform to choose Shenwei server. The specific configuration is shown in Table 1.

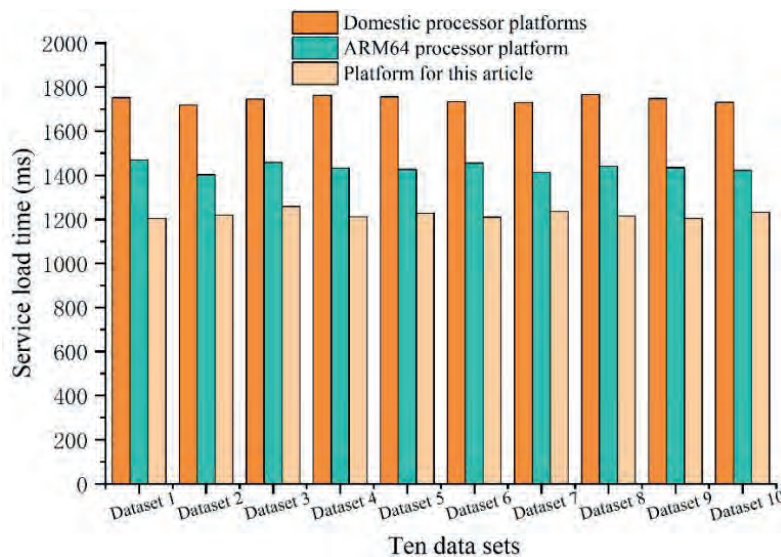
**Table 1. Hardware Testing Environment**

Platform	Host configuration	
Platform for this article	CPU Model	CPU Intel(R) Core™ i3-10300 CPU
	Number of CPU cores	4core CPU@2.4GHz
	Memory size	16G DDR4-2080
	Disk size	1.5TB
	Operating system version	Windows 10 21H2
ARM64 processor platform	CPU Model	Kun Peng 910
	Number of CPU cores	44 coreCPU@3.2GHz
	Memory size	256G
	Disk size	2.2TB
	Operating system version	Linux version 4.15.2-arm64-server
Domestic processor platforms	CPU Model	SW1528
	Number of CPU cores	8 coreCPU@2.4GHz
	Memory size	64G
	Disk size	2.8TB
	Operating system version	Linux node119 4.3.15-deepin-aere+

**3.2. ANALYSIS OF TIME-SENSITIVE PERFORMANCE TEST RESULTS**

This section takes the business administration data of a large enterprise as an example, and divides the data into ten data sets as a whole. Under the three different platforms given in the previous section, the service loading time of the three platforms under the ten data sets is counted and analyzed, and the results of the timeliness performance test are shown in Figure 2.

From the results of the three platforms, the average service loading time of the MVC-based enterprise business administration platform is 1221.4ms, which is 14.87% and 17.73% lower than that of the Kunpeng and Shenwei platforms respectively. This also shows that the enterprise business administration platform given in this paper can better realize the integration of enterprise business and industry business data, provide efficient work efficiency with faster access speed, and promote the efficient development of enterprise business administration. It can also provide managers with fast and reliable decision data, making enterprise business administration more in line with the development path of the new economic business model.



**Figure 2.** Time-sensitive performance test results

### 3.3. ANALYSIS OF SAFETY PERFORMANCE TEST RESULTS

Different numbers of abnormal users are set in the platform running environment and the number of simultaneous online users of the platform is adjusted to verify the security of the platform through the statistics of the number of failures of the platform running, and the experimental statistics are shown in Table 3.

**Table 3.** Platform Security Performance Test Data Sheet

Number of simultaneous online users	Exception User Settings	Shen Wei Platform	Kun Peng Platform	This article platform
300	10	1	0	0
	20	2	1	0
	30	4	2	0
600	10	2	1	0
	20	6	3	0
	30	9	5	1
900	10	3	3	0
	20	8	7	1
	30	13	9	2

From the security performance test results of the platform, it can be intuitively seen that as the number of simultaneous online users and the number of abnormal users increase, the more likely the platform will fail. After comparing with the Shenwei platform, it is found that the number of failures of the enterprise business administration platform built based on the MVC pattern in this paper is reduced by 44, and the number of failures is reduced by 27 compared with the Kunpeng platform. This shows that the MVC-based enterprise business administration platform can realize multi-user development and application, which can effectively improve the security of platform operation. And through the multi-user collaboration, it can further improve the efficiency of enterprise business administration.

### 4. CONCLUSION

In this paper, we built an enterprise business administration platform based on the MVC model and used the K-nearest neighbor algorithm to classify business data. In order to test the effectiveness of the enterprise business administration platform, a test analysis of the platform was conducted. From the results of the timing performance test, the average service loading time of the enterprise business administration platform built based on the MVC pattern is 1221.4ms, which is 14.87% and 17.73% lower than that of the Kunpeng and Shenwei platforms respectively. From the security performance test results, the number of failures of the platform in this paper is 44 and 27 times less than that of the Sunway platform and the Kunpeng platform, respectively. This shows that the enterprise business administration platform built in this paper helps innovation of enterprise business administration and improves its efficiency.

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# RESEARCH ON THE THEORY AND PRACTICE OF CULTIVATING TALENTS OF RECREATIONAL SPORTS IN HIGHER EDUCATION UNDER THE BACKGROUND OF “SPORTS POWER + BIG DATA ANALYSIS”

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## ABSTRACT

This paper analyzes the construction objectives and basic characteristics of the positioning of leisure sports majors, and constructs the “one body and three wings” talent training model of leisure sports majors based on them. The evaluation index system is carried out for the effectiveness of the model, and the Delphi method is used to assign the importance degree and calculate the index weights. In order to illustrate the effectiveness of the “One Body, Three Wings” leisure sports personnel training model, data analysis was conducted by using examples. The results showed that the scores of talent training characteristics, teaching evaluation and practical courses were 9.9, 9.9 and 8.3 respectively. This shows that the “one body, three wings” talent cultivation model can effectively promote the cultivation of talent characteristics and the diversification of teaching evaluation.

## KEYWORDS

Sports power; Leisure sports profession; Talent training; Delphi method; Index weights; One and three wings

## 1. INTRODUCTION

With the continuous development of China's social economy, leisure sports are facing new opportunities and challenges, especially the demand for leisure sports professionals is also on the rise [1-2]. At present, the number of colleges and universities offering undergraduate programs in leisure sports is increasing year by year, and the colleges and universities are trying to explore the cultivation of leisure sports professionals that match the needs of society [3-4]. Scholars at home and abroad have made systematic researches on the curriculum structure, objectives, talent training and practical teaching about the cultivation of leisure sports majors, but there are still shortages in the cultivation combined with local and regional characteristics.

Higher undergraduate schools are the gathering place of youth, leisure physical education courses have the irreplaceable role of other courses, leisure physical education majors are the only path to cultivate excellent sports talents, and the quality of teaching in leisure physical education majors is directly related to the physical quality level of the next generation [5-6]. School recreational sports as an important part of a strong sports country, as part of school sports, the recreational sports education majors should reflect the historical responsibility and establish a sense of mission. Strengthening their basic skills, striving to learn the latest knowledge and improving their teaching practice is the requirement given to physical education



majors in the new era, as well as the guarantee for the future physical health development of youth [7-8].

## 2. CONSTRUCTION AND BASIC CHARACTERISTICS OF SENIOR UNDERGRADUATE LEISURE SPORTS MAJORS

### 2.1. RECREATIONAL SPORTS PROFESSIONAL POSITIONING CONSTRUCTION GOALS

Recreational Sports is a specialization in Physical Education under the category of Education. It is a profession with the main goal of cultivating the all-round development of human beings, requiring practitioners to be a composite talent with various abilities such as management, planning, promotion, publicity, operation and design. It is an application-oriented talent training in the fields of fitness and leisure, sports training, competition performance, as well as sports tourism and stadium operation. The focus includes outdoor sports, experiential education, and the planning and operation of various sports events. The positioning of the leisure sports major is shown in Figure 1.

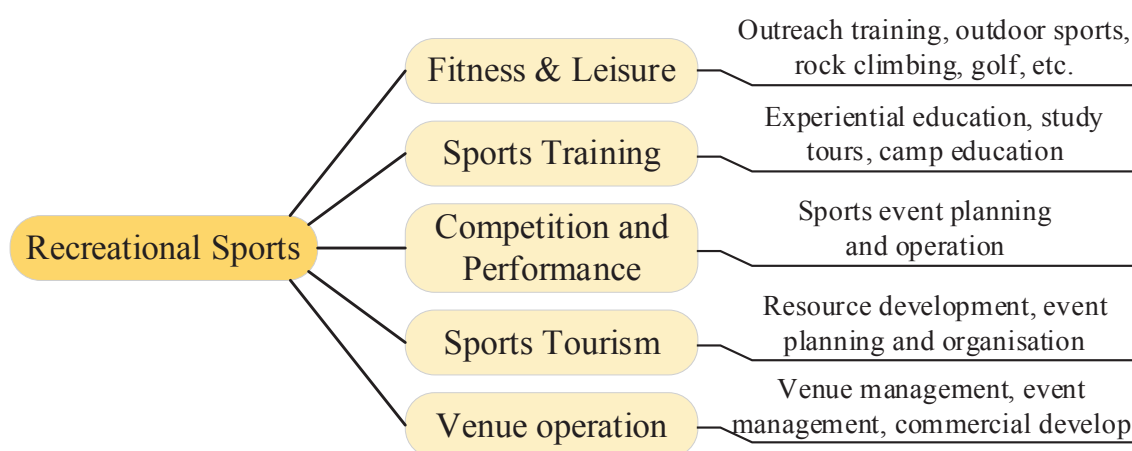


Figure 1. Recreational Sports Professional Positioning

### 2.2. BASIC CHARACTERISTICS OF TALENT TRAINING FOR LEISURE SPORTS PROFESSIONALS

On the basis of drawing on the characteristics of the cultivation of leisure sports professionals in colleges and universities in developed countries and regions such as the United States, the United Kingdom, Japan and Taiwan and understanding and analyzing the current situation of the cultivation of leisure sports professionals in China, this study mainly summarizes the characteristics of the cultivation of senior undergraduate leisure sports talents in terms of cultivation objectives, curriculum, teaching practices and evaluation subjects. Its specific characteristics are shown in Figure 2.

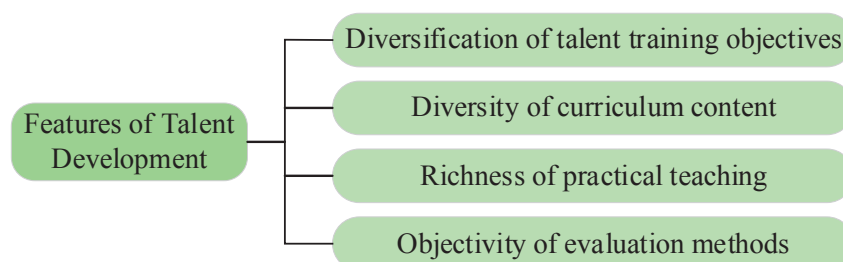


Figure 2. Basic features of the training of recreational sports professionals

(1) Diversification of talent cultivation objectives

The cultivation of talents in leisure sports should highlight the leisure nature, and emphasize

more on the cultivation of “general talents” and set the professional cultivation goal in the direction of sports and leisure management and promotion, consultation and planning, business management, social guidance and academic research.

(2) Diversity of curriculum content

The curriculum of leisure sports is organized in the mode of combining compulsory courses and elective courses, and penetrating general education courses and professional teaching courses.

(3) Richness of practical teaching

Recreational sports majors pay more attention to practical teaching and vocational teaching forms, pay more attention to cultivating students’ hands-on ability, and supplement the teaching of knowledge with rich and diverse practical teaching links.

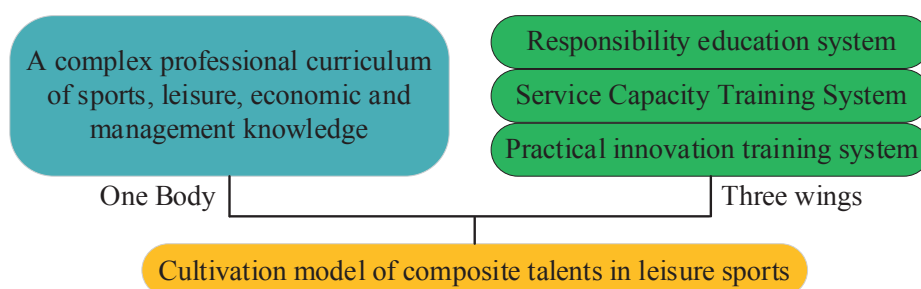
(4) Objectivity of evaluation method

The talent evaluation system of leisure sports majors is more objective and scientific, and the evaluation subjects are more diversified. We ask qualified and authoritative professional institutions to issue professional qualification certificates, and evaluate students as a whole by combining performance recognition and certificate recognition, which can not only stimulate students’ learning enthusiasm, but also help them grow and become successful.

### 3. SENIOR UNDERGRADUATE RECREATIONAL SPORTS TALENTS TRAINING MODE AND EVALUATION INDEX SYSTEM

#### 3.1. CONSTRUCTING “ONE BODY AND THREE WINGS” TALENT TRAINING MODE FOR LEISURE SPORTS PROFESSIONALS

With the rapid development of higher physical education, it is the key to accelerate the integration of educational resources from all parties, actively organize and implement the teaching practice of leisure physical education, and make efforts to build a complex talent cultivation model for leisure physical education majors. Based on the existing research, this paper proposes the construction of “one body and three wings” talent cultivation model for leisure sports majors. The framework of this talent cultivation model is shown in Figure 3.



**Figure 3** The “Three Wings” model for training talents in leisure sports

The “one body, three wings” leisure sports professional composite talent cultivation mode refers to the leisure sports professional composite talent cultivation mode with the body, leisure, economy and management knowledge composite as the main body, and the strong sense of social responsibility, innovation ability and service ability as the three wings.

#### 3.2. EVALUATION INDEX SYSTEM OF “ONE BODY, THREE WINGS” LEISURE SPORTS PROFESSIONAL TALENT TRAINING MODE

Based on the analysis of the training mode of leisure sports professionals, the “one body, three wings” training mode of leisure sports professionals is constructed. In this section, in order to better analyze the effectiveness of this model, the evaluation index system of “one

body, three wings” leisure sports professional talent cultivation model for higher education undergraduates is constructed as shown in Table 1.

**Table 1.** Evaluation Indicator System for the “One Body, Three Wings” Model

Primary Indicators	Secondary indicators	Coding
Training Objectives	Specific orientation of the training objectives	0.721
	Talent development characteristics	0.893
	Humanities and moral character	0.804
Curriculum and Teaching	Professional core courses	0.795
	Practical courses	0.553
	Variety of teaching methods	0.752
Quality Assurance	Effective assessment of teaching quality	0.579
	Innovation in teaching structure	0.693
	Diversity in teaching evaluation	0.616

In order to be able to analyze the indicators rationally, this section first uses the Delphi method to assign values to the indicators and then obtain the mean importance of each indicator. To find the weight of each assessment indicator in the first level of indicators, the corresponding mean value of importance is brought into the formula. That is:

$$w_1 = V / \sum V \quad (1)$$

Where  $w$  is the indicator weight and  $V$  is the average of the assigned importance of indicators determined by Delphi method.

#### 4. EMPIRICAL ANALYSIS OF “ONE BODY, THREE WINGS” LEISURE SPORTS PROFESSIONAL TALENT TRAINING MODEL

In order to test the effectiveness of the “one body, three wings” talent cultivation model for leisure sports majors, this chapter uses the evaluation index system to assess whether the scale is practical and whether the designed indexes are reasonable, and the training plan designated by the leisure teaching and research department of WH Sports College and the current situation of professional construction, and uses the evaluation standard scale to conduct a comprehensive assessment of the leisure sports majors in WH Sports College. The comprehensive assessment of the major was conducted, and the scores of each index were obtained as shown in Table 2.

This round of assessment adopts a 100-point system, with 0~59 being unqualified, 60~69 being qualified, 70~79 being good, 80~89 being excellent, and 90~100 being outstanding.

**Table 2.** Score for each indicator

Secondary indicators	Total score	Score	Missing points
Specific orientation of the training objectives	10	9.8	0.2
Talent development characteristics	10	9.9	0.1
Humanities and moral character	10	9.5	0.5
Professional core courses	10	9.6	0.4
Practical courses	10	8.2	1.8
Variety of teaching methods	10	9.3	0.7
Effective assessment of teaching quality	10	9.7	0.3
Innovation in teaching structure	10	9.5	0.5
Diversity in teaching evaluation	10	9.9	0.1

From the scores of each index, the total score of talent cultivation of leisure sports majors in WH Sports College is 85.4, and the result is excellent. This shows that the evaluation index system constructed in this paper can effectively analyze the effectiveness of the “one body, three wings” talent cultivation model, and also shows that the “one body, three wings” talent cultivation model can effectively promote the development of higher education undergraduate leisure sports professionals and provide high-quality talents for the promotion of a strong sports country. It also shows that the “one body, three wings” talent cultivation model can effectively promote the development of senior undergraduate leisure sports professionals and provide high-quality talents for the promotion of a strong country. The score of 9.9 for the cultivation of talents’ characteristics and diversification of teaching evaluation shows that the “one body, three wings” talent cultivation mode can effectively promote the development of leisure sports professionals’ characteristics and make the teaching evaluation more diversified. However, the evaluation score of the practical course is only 8.2, which indicates that although the teaching characteristics of the “one body, three wings” talent training model are good, the concept of practical course is not deeply implemented, which makes students have some concerns about the practical course of leisure sports. Therefore, the development of practical courses should be further strengthened in the subsequent reform process to promote the synergistic development of students’ theoretical knowledge and practical ability.

## **5. CONCLUSION**

With the continuous development of the era of big data, big data analysis has become an indispensable data analysis tool. In order to improve the quality of talent cultivation of senior undergraduate leisure sports majors, we must determine a scientific and suitable talent cultivation model. In this paper, starting from the construction and basic characteristics of senior undergraduate leisure majors, the “one body, three wings” talent cultivation model of leisure sports majors is constructed and its index evaluation system is given. In order to verify the effectiveness of this talent cultivation model, the quantitative analysis of the data was carried out with WH Sports College as an example. The results show that the “one body, three wings” talent cultivation model can effectively promote the characteristics of talent development and diversification of teaching evaluation methods, but there is still a need to further strengthen the optimization of teaching practice courses. The results show that the “One Three Wings” talent training model can effectively promote the characteristics of talent development and diversify teaching evaluation methods, but there is still a need to further strengthen the optimization of teaching practice courses.

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# ARTIFICIAL INTELLIGENCE TECHNOLOGY DRIVES THE INFORMATIVE TEACHING OF SPOKEN ENGLISH IN COLLEGES AND UNIVERSITIES

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## ABSTRACT

This paper constructs a framework for learning English speaking in colleges and universities driven by artificial intelligence technology. Adaptive strategies are introduced to analyze the teaching effectiveness of the English speaking learning framework in colleges and universities. The quantitative analysis of the data from the control and experimental classes was conducted in terms of the interest and initiative of students in learning spoken English. The results showed that the experimental class students' learning interest score was 9.65 greater than the control class' score of 4.82, and the learning initiative score was 9.92 greater than the control class' score of 5.05. This indicates that artificial intelligence technology can effectively promote the development of English speaking teaching.

## KEYWORDS

Artificial intelligence; College spoken English; Informatization; Adaptive strategy; BP neural network; Teaching effectiveness

## 1. INTRODUCTION

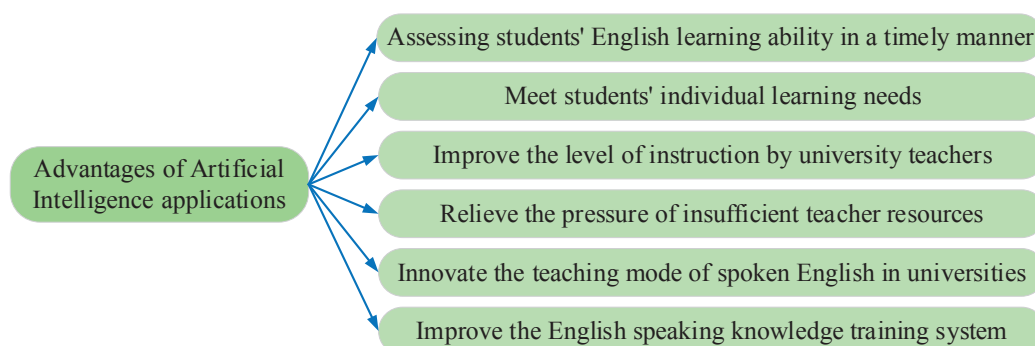
From the viewpoint of the goal and mode of talent cultivation in colleges and universities, it is mainly to cultivate skilled and quality talents to help students achieve better employment, so English, as a traditional basic subject, also mainly serves for students' employment [1-2]. Oral language teaching occupies a rather important position in the whole system of teaching Chinese as a foreign language or Chinese language education. Firstly, it is a basic course; secondly, it is a bridge between students' textbook knowledge and concrete practical application, which has a strong practical meaning and utilitarian color, but sometimes it is neglected. It is thought that high scores in exams and the ability to write good essays are the ultimate goal of teaching, but this is not really the case. In order to learn and use a language well, whether it is a native language or a second foreign language, the traditional teaching model of "early childhood linguistics" and passive learning habits are no longer enough. As a result, the teaching of oral language has been paid less attention, and the phenomenon of "deaf English" has long been found in English teaching, which is not conducive to the cultivation of students' comprehensive ability and hinders students' employment. The integration of AI-related technologies into teaching and learning has effectively improved the quality and level of teaching and learning and accelerated teaching and learning reform [3-4].

The blended teaching mode in the information-based environment has been continuously innovated in the teaching of spoken English in colleges and universities and has become a new teaching norm. Colleges and universities should tap and give full play to the potential of AI to make teachers become the guides of learning, enhance students' English learning

experience, change their learning mode, effectively improve teaching quality, and promote the reform of college English speaking teaching [5-6]. Nevertheless, AI products cannot replace teachers after all, and teachers should improve and innovate their teaching methods and strategies in the process of the continuous development of AI, perfect their teacher skills, follow the trend of the information era, and continuously integrate with AI in practical teaching [7-8]. Students should also cognize themselves scientifically according to the actual situation, make learning plans, and continuously improve their learning ability and English speaking skills with the aid of AI's learning functions, teacher teaching and online independent learning [9-10].

## 2. ADVANTAGES OF ARTIFICIAL INTELLIGENCE TECHNOLOGY

As an important platform for talent cultivation, colleges and universities must continuously improve their teaching level so that they can meet the demand for talents in social construction and development. As an important support for teaching innovation in colleges and universities, the fit between colleges and universities and artificial intelligence in the information technology environment has been increasing. Figure 1 shows the advantages of the application of AI in the teaching of spoken English in colleges and universities.

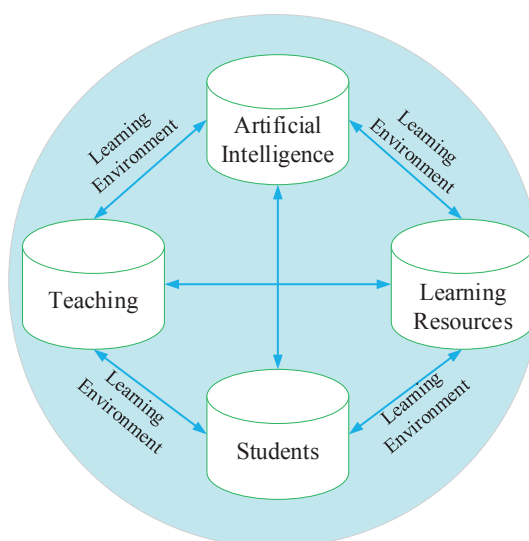


**Figure 1.** Advantages of Artificial Intelligence applications

## 3. ARTIFICIAL INTELLIGENCE-BASED TEACHING AND LEARNING FRAMEWORK

### 3.1. LEARNING FRAMEWORK

The core elements of AI-based college English speaking learning include teachers, students, learning resources and AI-technology supported learning environment, which are interconnected and interact with each other, and together constitute the conceptual framework of college English speaking learning as shown in Figure 2.



**Figure 2.** Conceptual framework for learning spoken English

In an AI-enabled learning environment, the role of teachers has changed, as they are no longer the sole source of knowledge or the sole presenter. Instead, they use AI technology to understand students' individual learning needs, personalize instructional design, and provide students with personalized learning assistance, transforming the old "indoctrination" teaching into individualized instruction. The role of students has also changed, as they no longer passively receive knowledge. Instead, they choose learning resources and learning paths that suit their needs in a personalized learning environment, and actively learn. Therefore, AI-based college English speaking learning is characterized by intelligence, personalization, diversity, collaboration and precision.

### 3.2. TEACHING EFFECTIVENESS EVALUATION BASED ON ADAPTIVE BP NEURAL NETWORK

In order to improve the speed of convergence of neural networks and reduce the complexity of the training process, this paper introduces momentum on the basis of general BP neural networks, so that the weights are updated by leaving the adjustment experience accumulated in the previous iteration without causing the divergence of the learning process. The gradient descent method of BP neural networks always accelerates the amount of correction in the same gradient direction, and when the correction is too much, momentum can make the correction decrease to keep the correction direction toward convergence, which acts as a damping effect. When the error surface shows abrupt ups and downs, it can reduce the oscillation trend and improve the training speed.

$$w_{ij}(t+1) = w_{ij}(t) - \Delta w_{ij}(t) - \alpha \Delta w_{ij}(t-1) \quad (1)$$

$$w_{ij}(t+1) = w_{ij}(t) - \eta(t+1) \frac{\partial C(t)}{\partial w_{ij}(t)} - \alpha \left( \eta(t) \frac{\partial C(t-1)}{\partial w_{ij}(t-1)} \right) \quad (2)$$

In addition, in general BP neural networks, the learning rate is taken to be constant by default, and too large or too small a learning rate is not well suited to the whole learning process of the network, so an adaptive learning strategy is introduced in this paper to improve it and ensure that the network is trained at an acceptable maximum learning rate. The learning rate is adaptively adjusted as:

$$\eta(t+1) = \begin{cases} \beta \cdot \eta(t), & C(t) > C(t-1) \\ \theta \cdot \eta(t), & C(t) < C(t-1) \\ \eta(t), & C(t) = C(t-1) \end{cases} \quad (3)$$

where  $\alpha$  is the momentum factor,  $\Delta w_{ij}(t-1)$  is the momentum term, which is also the weight correction of the previous iteration,  $\beta, \theta$  are constants and  $0 < \beta < 1 < \theta$ .

## 4. AN EMPIRICAL ANALYSIS OF INFORMATION-BASED TEACHING OF SPOKEN ENGLISH IN COLLEGES AND UNIVERSITIES

In order to verify the effectiveness of the application of the AI technology-driven informational teaching framework for spoken English in colleges and universities given in this paper, this chapter uses freshman students of a college English course in Guangdong Province as an example to conduct quantitative analysis of data on interest and learning initiative in spoken English.

### 4.1. EFFECTS ON STUDENTS' INTEREST IN LEARNING SPOKEN ENGLISH

In this study, adaptive BP neural network was used to derive the results of the effects of



students' interest in learning spoken English as shown in Table 1.

**Table 1.** The influence of students' interest in oral English learning

Class and grade	Before	After	T value	P value
Comparison class	4.82	4.82	0.0001	$\infty$
Experimental class	4.83	9.65	-12.18	0.0001
T-value	0.0001	-12.18		
P-value	$\infty$	0.0001		

In terms of the effect on students' interest in learning spoken English, before the experiment, the difference between the scale scores of the experimental and control classes was only 0.01, i.e., the two classes' students' interest in learning English was comparable and met the experimental requirements. After the experiment,  $P=0.0001 < 0.05$  for the experimental and control classes, which means the difference is significant. Moreover, the post-experimental learning interest scale score of students in the experimental class was 9.65 significantly greater than that of the control class, which was 4.82. Meanwhile, the  $p=0 < 0.05$  before and after the experiment in the experimental class, which means the difference is significant, implies that the students' interest in learning spoken English in the experimental class is significantly higher after the experiment.

#### 4.2. EFFECTS ON STUDENTS' INITIATIVE IN LEARNING SPOKEN ENGLISH

Before and after the teaching experiment, this study made a questionnaire survey on the students' English speaking learning initiative in the experimental and control classes. After the adaptive BP neural network was used to analyze and process the data of their scales, the results of the influence of students' English speaking learning initiative were obtained as shown in Table 2.

**Table 2.** The influence of initiative in oral English learning

Class and grade	Before	After	T value	P value
Comparison class	5.02	5.05	-0.31	0.724
Experimental class	5.04	9.92	-0.98	0.0001
T-value	-0.61	-10.03		
P-value	0.618	0.0001		

From the results of the influence of learning initiative, before the experiment, the experimental class and the control class  $P=0.54 > 0.05$  after t-test, which means the difference is not significant, i.e. the difference between the two classes' students' learning attitude initiative towards spoken English is not significant and meets the experimental requirements. After the experiment,  $P=0.0001 < 0.05$  for the experimental class and the control class, which means the difference is very significant. Meanwhile, the scale score of 9.92 in the experimental class was significantly greater than that of 5.05 in the control class, indicating that after the experiment, students in the experimental class had significantly more active and positive attitudes toward learning spoken English than those in the control class. This shows that with the drive of artificial intelligence technology, the information-based teaching of spoken English in colleges and universities can achieve good results.

## 5. CONCLUSION

In this paper, starting from the advantages of artificial intelligence technology in the informative teaching of spoken English in colleges and universities, we constructed a framework for learning spoken English in colleges and universities using artificial intelligence

technology, and introduced an adaptive strategy to optimize the BP neural network in order to analyze the teaching effect of this learning framework. In order to further verify the effectiveness of the college English speaking learning framework, data analysis was conducted with the freshman students of a university in Guangdong Province as an example. The results showed that the post-experimental learning interest scale score of the students in the experimental class was 9.65 significantly larger than that of the control class, which was 4.82. The learning initiative scale score of 9.92 for the experimental class was significantly greater than that of 5.05 for the control class. This shows that the AI technology-driven college English speaking informational teaching can effectively promote students' learning interest and learning initiative and realize the development of college English speaking informational teaching.

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# THE DILEMMA AND THE PATH OF CULTIVATING “DUAL-TEACHER” TEACHERS IN THE CONTEXT OF DEEP LEARNING IN UNIVERSITIES

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## ABSTRACT

This paper takes the dilemma of “dual-teacher” teacher training mode in colleges and universities as the starting point and analyzes the specific reasons for the dilemma. In order to solve the dilemma, the evaluation index system of “dual-teacher” teacher training mode in colleges and universities is constructed, and the judgment matrix is constructed and tested for consistency by using hierarchical analysis. The quantitative analysis of the data was also carried out to verify the effectiveness of the evaluation index system. The results showed that the average percentages of very small, average and very large impact of the evaluation index system in this paper were 7.42%, 41.29% and 51.29%, respectively. This indicates that the index system of this paper can effectively promote the innovation construction of “double-teacher” teachers in universities.

## KEYWORDS

Dual-teacher; Teacher training; Hierarchical analysis; Judgment matrix; Consistency test; Evaluation index

## 1. INTRODUCTION

Teachers are the foundation of education and the source of education, and they are the key factor to determine the success or failure of national higher education reform in the new era. Since its reform and opening up, China has taken a series of measures to accelerate the modernization of higher education [1-2]. Nowadays, China’s higher education teacher training system has been basically constructed, and thanks to the improvement of the management system, the quality of teachers has been significantly improved, which provides a strong talent support for the reform and development of higher education. However, there are still many structural contradictions in the process of building the higher education teaching force in China, especially the lack of specialization and the shortage of high-quality “dual-teacher” teachers, which have become bottlenecks to the reform and development of higher education in the new era [3-4].

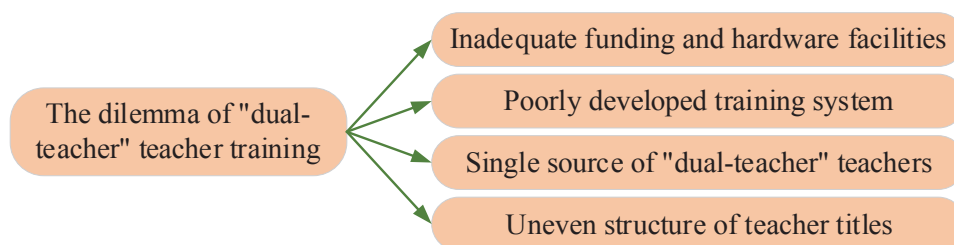
The construction of “double-teacher” team in colleges and universities is the key to reflect the direction of higher education reform and to cultivate students’ innovation and improve their practical ability. Therefore, the comprehensive promotion of the construction of “double-teacher” team in colleges and universities is a matter of the future development of education in colleges and universities, and it is also necessary to cultivate high-quality talents [5-6]. From the present stage, the strength of “double-teacher” teachers in colleges and universities is still not strong enough and their overall quality is not very high, which is a big gap with the

philosophy of running colleges and universities [7-8]. Moreover, students' deep learning needs the guidance of teachers' deep teaching, and the cultivation of teachers' deep teaching ability is an inevitable demand to effectively promote students' deep learning. Under the background of deep learning, how to get out of the dilemma of developing and cultivating "double-teacher" teachers in colleges and universities, and then better promote the innovative development of "double-teacher" teachers in colleges and universities is a problem that must be faced [9-10].

## 2. THE DILEMMA OF "DUAL-TEACHER" TEACHER TRAINING MODE IN COLLEGES AND UNIVERSITIES AND THE REASONS FOR ITS FORMATION

### 2.1. ANALYSIS OF THE DILEMMA OF "DUAL-TEACHER" TEACHER TRAINING MODE IN COLLEGES AND UNIVERSITIES

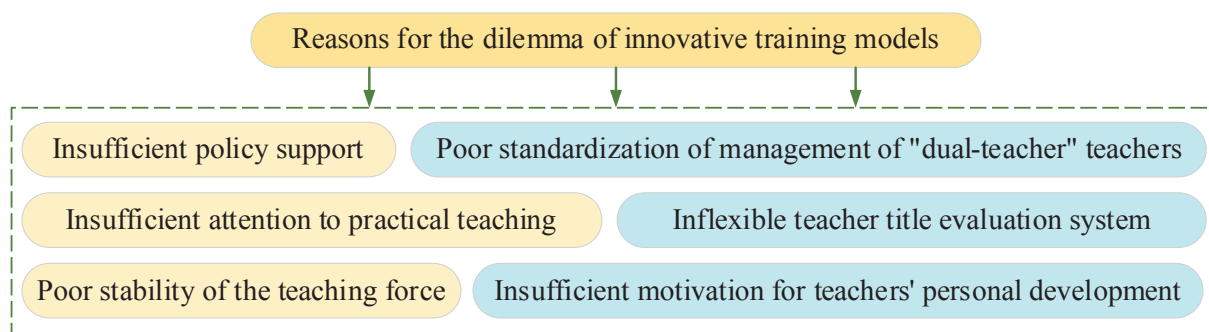
The development of "dual-teacher" teacher training mode to promote education innovation and reform is the trend of the country, and it is also the inevitable requirement to enhance the quality of college teachers. The innovative attempt to improve the effect of education in colleges and universities is the necessity of the innovation of "dual-teacher" teacher training mode in the background of deep learning. With the continuous development of university education, although the saying of "dual-teacher" teacher training is constantly put forward, there are still some problems that cannot be implemented, as shown in Figure 1.



**Figure 1.** The dilemma of "dual-teacher" teacher training model in higher education

### 2.2. REASONS FOR THE DILEMMA OF FORMING THE "DUAL-TEACHER" TEACHER TRAINING MODE IN UNIVERSITIES

At present, there are many problems in the construction of "dual-teacher" teachers in colleges and universities, the reasons of which mainly lie in the lack of necessary normal support from the state, the irregular management of "dual-teacher" teachers in colleges and universities, and the unstable evaluation system of titles of teachers in colleges and universities. The main reasons are that the state lacks the necessary normal support for teachers in colleges and universities, the management of "dual-teacher" teachers in colleges and universities is not standardized, the "dual-teacher" teachers in colleges and universities is not stable, and the evaluation system of titles of teachers in colleges and universities by education management departments is not sound. The specific performance is shown in Figure 2.



**Figure 2.** Causes of the dilemma of the training model

In view of the current problems of “dual-teacher” teacher training mode in colleges and universities, it is necessary to further strengthen the reform of “dual-teacher” teacher training mode in colleges and universities, promote the innovative development of “dual-teacher” teachers in colleges and universities, and provide guarantee for the improvement of students’ learning quality in the context of deep learning.

### 3. EVALUATION INDEX SYSTEM OF “DUAL-TEACHER” TEACHER TRAINING MODE IN COLLEGES AND UNIVERSITIES

#### 3.1. CONSTRUCTION OF THE EVALUATION INDEX SYSTEM OF “DUAL-TEACHER” TEACHER TRAINING MODE IN HIGHER EDUCATION

In order to further understand the strengths and weaknesses of the “dual-teacher” teacher training mode in colleges and universities, this section constructs an evaluation index system based on the existing research on the “dual-teacher” teacher training mode in colleges and universities. The evaluation index system is used to verify the effectiveness of the “dual-teacher” teacher training mode in colleges and universities and to provide a basis for its innovation and reform. The evaluation index system of “double-teacher” teacher training mode in colleges and universities is shown in Table 1.

**Table 1.** Evaluation index system of “dual-teacher” teacher training mode in higher education

Primary Indicators	Secondary indicators	Coding
Teacher Training	Teacher participation in the practice market	X1
	Practice Process Evaluation	X2
Teaching Evaluation	Standardisation of practice teaching	X3
	Overall teaching satisfaction	X4
	The proportion of practical teaching	X5
Overall satisfaction	Satisfaction of talent cultivation	X6
	Adaptability of talents to jobs	X7
	Suitability of teaching system	X8
Teaching Assurance Activities	Innovation of teaching contents	X9
	The degree of guarantee of teaching conditions	X10

The analysis of “dual-teacher” teacher training mode in colleges and universities through four aspects, such as teacher training, teaching evaluation, overall satisfaction and teaching guarantee activities, can include the influence of several factors on the construction of “dual-teacher” teachers to a greater extent, and promote the innovative development of college teacher team construction.

#### 3.2. CONSTRUCTING JUDGMENT MATRIX AND CONSISTENCY TEST

Ten experts with profound experience in university faculty development were invited to make a two-by-two comparison of the indicators at the same level and assign values to them. Due to the different roles, experiences, and perspectives of consideration, each expert compared the importance of each index differently. The mean values of different experts’ assignments between each index were taken by arithmetic averaging method, and all judgment matrices were assembled, and the final judgment matrix of mean values was obtained as

$$P = (a_{ij})_{n \times n} \quad (1)$$

where  $a_{ij}$  indicates the importance of factor  $i$  compared with factor  $j$ .

On the basis of the established weight judgment matrix, the eigenvectors of matrix  $P$  are calculated and normalized to obtain the weight vector of evaluation index  $i$  as

$$W_i = W_i / \sum_{i=1}^n W_i (i = 1, 2, \dots, n) \quad (2)$$

Since the subjective judgments of experts may be self-contradictory, resulting in inconsistencies in the judgment matrix. Therefore, in order to verify the validity of the expert-assigned data and ensure the accuracy and reasonableness of the calculation structure, it is necessary to conduct consistency test on each judgment matrix. If the consistency ratio is less than 0.1, it means that the judgment matrix meets the consistency requirement and the weight distribution of indicators at all levels is reasonable, otherwise, the expert needs to re-assign the questionnaire or discard the questionnaire.

#### 4. EMPIRICAL ANALYSIS OF “DUAL-TEACHER” TEACHER TRAINING MODEL IN UNIVERSITIES

##### 4.1. TEACHERS’ OVERALL EVALUATION OF THE “DUAL-TEACHER” TEACHER TRAINING INDEX SYSTEM

The author collected data by questionnaire from 200 teachers in School H using the “dual-teacher” teacher training evaluation index system, and analyzed the overall evaluation of teachers, and the results are shown in Table 2.

**Table 2.** Teachers’ overall assessment of the indicator system

Meeting the level of demand	Number of people	Percentage/%
Very high	14	7.00%
Relatively high	102	51.00%
Relatively low	79	39.50%
Very low	5	2.50%

In terms of the overall evaluation of the teacher training index system, the teachers surveyed were generally satisfied with the teacher training measures of School H. 58% of the teachers thought that the training measures implemented by the school met the teachers’ needs to a high or very high degree, while 39.50% thought that the teacher training measures met the teachers’ needs to a low degree. Among them, 58% of the teachers thought that the training measures implemented by the school met the teachers’ needs to a high or very high degree, 39.50% of the teachers thought that the training measures met the teachers’ needs to a low degree, and only 2.5% of the teachers thought that the school’s “dual-teacher” training measures were very low. Only 2.5% of the teachers thought that the school’s “dual-teacher” teacher training measures were very low. This indicates that the “dual-teacher” teacher training index system can effectively obtain the teachers’ expectations of the training mode, and then carry out targeted innovation and reform.

##### 4.2. TEACHERS’ SPECIFIC EVALUATION OF THE “DUAL-TEACHER” TEACHER TRAINING INDEX SYSTEM

Based on the index evaluation system constructed in the previous section, the weights of each index were determined by using hierarchical analysis, and the quantitative analysis of the data was carried out with three evaluation criteria: very small, average and very large.

**Table 3.** Teachers' specific evaluation of the indicator system

Coding	Very small	Fair	Very large	Coding	Very small	Fair	Very large
X1	0.63%	48.75%	50.62%	X6	5.45%	32.14%	62.41%
X2	10.64%	55.41%	33.95%	X7	8.95%	44.62%	46.43%
X3	8.64%	41.63%	49.73%	X8	12.13%	38.64%	49.23%
X4	2.17%	32.56%	65.27%	X9	1.96%	22.15%	75.89%
X5	18.65%	55.97%	25.38%	X10	4.98%	41.07%	53.95%

In terms of teachers' specific evaluations of the index system, the average percentages of very little, average, and very much influence were 7.42%, 41.29%, and 51.29%, respectively. Among them, the highest evaluation of the "dual-teacher" teacher training model is the overall teaching satisfaction, which accounts for 65.27%. This indicates that the evaluation system of "dual-teacher" teacher training mode constructed in this paper is reasonable and can cover all the factors of "dual-teacher" teacher training mode in colleges and universities, which can help promote the further development of "dual-teacher" teacher training mode in colleges and universities. It can help promote the further development of "dual-teacher" teacher training mode in colleges and universities.

## 5. CONCLUSION

This paper analyzes the dilemmas and causes of the "dual-teacher" teacher training mode in colleges and universities, constructs an evaluation index system based on it, and uses hierarchical analysis to calculate the index weights. In order to further verify the effectiveness of the evaluation index system in the training mode of "double-teacher" teachers in colleges and universities, data analysis was conducted in School H as an example. The results showed that the teachers in this school were generally satisfied with the "dual-teacher" teacher training measures, and 58% of the teachers thought that the training measures implemented by the school met the teachers' needs to a high or very high degree. In terms of the specific evaluation of the index system, the average percentages of very little, average and very much are 7.42%, 41.29% and 51.29% respectively. Thus, the evaluation index system of "double-teacher" teacher training mode in colleges and universities constructed in this paper can provide a comprehensive analysis of the problems in teacher training in colleges and universities and provide effective theoretical support for "double-teacher" teacher training in colleges and universities.

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# A STUDY ON THE ARTISTIC POPULARIZATION OF CLASSICAL PIANO WORKS BASED ON THE ERA OF HUMAN-COMPUTER SHARING

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## ABSTRACT

With the full development of human-computer sharing technology, it also provides the possibility for the popularization and development of the art of classical piano works. The current social emphasis on art is also an important means to promote the popularization of classical piano art, and on the basis of the analysis of the current situation of the social attitude towards classical piano art, the countermeasures for the popularization of classical piano art works are proposed from the perspective of society as a whole. The popularization of piano art can also play a role in the dissemination of classical art, and at the same time make the classical piano art itself become more full, three-dimensional and heavy, and realize the value of piano art itself.

## KEYWORDS

Human-computer sharing; Classicalism; Piano works; Art popularization

## 1. INTRODUCTION

In recent years, in the popularization stage of art education, the importance of piano art education has become more and more prominent, and more and more people are learning piano and using piano as a carrier to cultivate their musical and artistic qualities, which promotes the inheritance and development of piano art and boosts the popularization of art education [1-3]. As the saying goes, teaching has a method, and for piano teaching, artificial intelligence has been developed continuously, and the education industry has the figure of artificial intelligence. Adding the teaching content of artificial intelligence in the college piano teaching classroom not only can stimulate the interest of piano learners, but also can mobilize the enthusiasm of piano learning and improve the quality of piano art learning [4-5].

Using an artificial intelligence-based approach, the literature [6] investigated the direction of exploration and innovative development of piano performance teaching in universities. The authors studied the current situation and prospects of the application of artificial intelligence in the field of music education, and also explored how to use artificial intelligence technology to improve the efficiency and quality of piano performance teaching. The study is of great significance to promote the innovation and development of music education. The literature [7] investigated the effect of using a hybrid metaheuristic AI model in simulating the water flow process in piano key weirs. The authors studied the principles and applications of the hybrid metaheuristic AI model and analyzed the accuracy and efficiency of the model in simulating the water flow process. The study has important implications for the design of piano key weirs and water flow control, and provides references and insights for the application of hybrid metaheuristic AI models in the field of hydrology. The authors of the literature [8] investigated

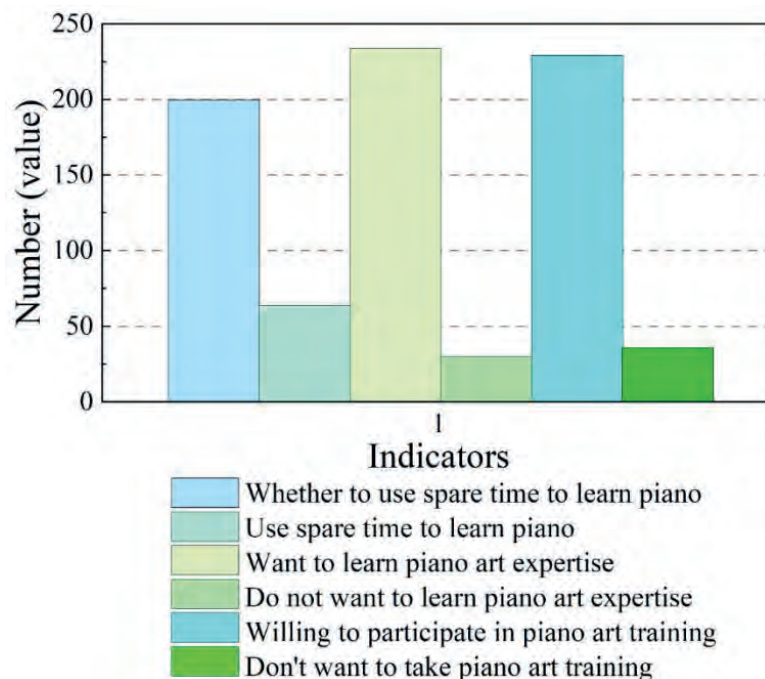
the design principles, technical features and functional modules of the system and discussed its application in piano performance teaching. The study aims to optimize the interaction and feedback mechanism of piano performance teaching by applying artificial intelligence technology to improve students' learning effectiveness and interest. The research is important for promoting the innovation and development of music education.

## 2. THE CURRENT SITUATION OF CHINESE SOCIETY'S LOVE FOR CLASSICAL PIANO ART AND COUNTERMEASURES

### 2.1. THE CURRENT SITUATION OF CHINESE SOCIETY'S LOVE FOR CLASSICAL PIANO ART

Recently more and more piano art researchers focus on implanting classical music into piano art, seeking new piano art feelings and piano creation elements. The popularization of piano art can also play a role in the dissemination of classical art, and at the same time make classical piano art itself become more full, three-dimensional and heavy, realizing the value of piano art itself. In terms of the need to understand the current situation of our society towards piano art, the thesis first sets up a system of indicators and measures them.

The authors conducted a survey on some social personnel, and the analysis of the current situation of the popularization of piano art among social personnel is shown in Figure 1. It can be seen that according to the survey most personnel like music, but just do not have the corresponding conditions. Some people use their spare time to learn the corresponding musical instruments especially piano learning, piano learning still occupies a certain proportion of the surveyed people, especially for students who have more spare time. According to the survey society people still have a certain demand for piano art, there is a majority of people who want to learn piano expertise, and the enthusiasm for learning is also relatively high, most of the people want to attend and participate in learning piano.



**Figure 1.** Analysis of the current situation of the popularization of piano art among social workers

### 2.2. COUNTERMEASURES FOR THE POPULARIZATION OF PIANO ART IN CHINA

Based on the results of the above statistical analysis and combined with relevant experts, industry professionals and the author's practical observations, etc., this thesis proposes

countermeasures for the popularization of piano art in China from the perspective of the needs of social personnel.

(1) There is a need to offer piano courses that are adapted to different levels of social personnel, these courses include basic piano professional courses, piano courses for promotion level, elective courses for improvement level and specific piano courses for specific needs. The learning life of Chinese citizens should be enriched by these different levels of piano courses adapted to the different levels, abilities and levels of social personnel. In particular, it is necessary to control the overall need for musical level in China, and thus achieve the goal of establishing a planned with curriculum.

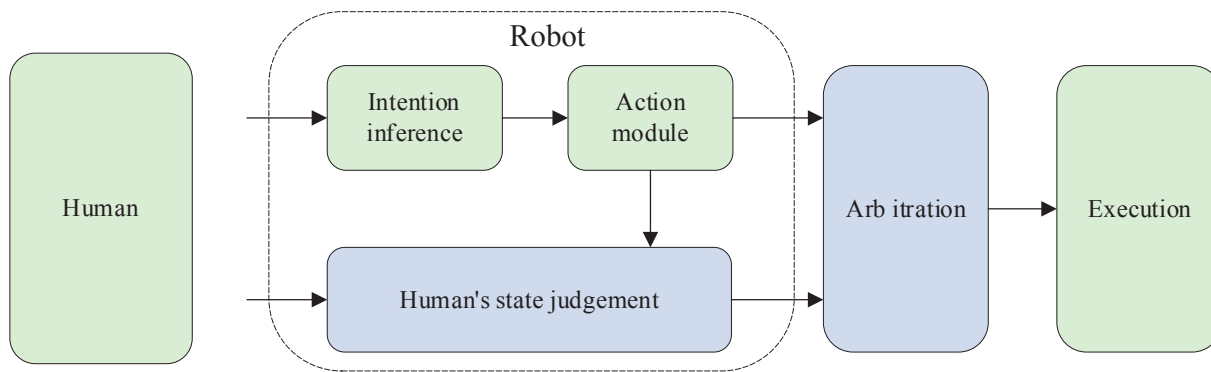
(2) It is necessary to develop, in particular, piano art competitions mainly for non-musical social citizens. The competition should concentrate on improving the piano art level and enhancing the love of piano art among social people of different levels, ages, interests and hobbies, tapping the musical potential of social people through piano performance and appreciation, cultivating their comprehensive quality in piano, and giving social people, especially non-professional social people, a clearer understanding of the art of brass piano.

(3) Need to improve the piano teaching content and piano teaching methods for social workers. For the physiological and psychological characteristics of social personnel, piano lessons that can trigger their interest should be offered. Therefore, it is necessary to focus on the study of the psycho-physiological characteristics of social workers. To find out the content and methods of piano teaching that can adapt to the characteristics of social workers of specific ages and levels, especially to pay attention to the interest of social workers in piano and the cultivation of corresponding piano ability.

### **3. POPULARIZATION OF PIANO ART BASED ON HUMAN-COMPUTER SHARING**

#### **3.1. HUMAN-MACHINE SHARED AUTONOMY**

Many control tasks are difficult for machines due to the partial observability of the environment and the imprecision of system parameters, while it is also difficult for humans to accomplish some human-machine systems alone due to their limited rationality and physical limitations (e.g., lack of multidimensional control capabilities) Some human-machine systems solve such problems by combining human decisions and machine decisions, and refer to this model as human-machine shared autonomy. The human-machine sharing under part-time effective human decision making is shown in Figure 2. The action selection module calculates the adaptive weights for arbitrating human-machine decision making and determines the decision to be made when shared control is taken, the human decision effectiveness judgment module is used to determine whether the human decision is invalid and whether it needs to be switched from shared control of the human and machine to separate control of the machine, and the arbitration module decides the final execution of the controlled system based on all the above information action. The blue area, i.e., the validity judgment module of the human decision and the arbitration module, is the main contribution of the human-machine shared



**Figure 2.** Human-Machine Sharing under Part-Time Effective Human Decision Making

### 3.2. INTRODUCING INTELLIGENT PIANOS TO IMPROVE TEACHING QUALITY

At present, artificially intelligent piano technology is gradually maturing, so music teachers need to introduce artificially intelligent pianos in the classroom according to the teaching content and the basic state of the students, which can have an auxiliary effect on classroom teaching, teachers can mobilize students' learning enthusiasm when using artificially intelligent pianos, and both teachers and students should actively participate in the piano teaching and acting practice process. The teacher needs to act as a supervisor and guide when the students are using the relevant intelligent piano, and can solve the students' problems in the first place when they have problems in learning. Therefore, the premise of introducing intelligent pianos into the classroom among music classroom teaching requires that music teachers first take a basic use course for students to be able to guide them in learning artificial intelligence sex technology products. For example, one of the most important elements of piano teaching in colleges and universities is the teaching of rhythm. In the traditional general music classroom teaching, students tend to improve their sense of rhythm by repeating the exercises many times, but this is less efficient. However, when using artificial intelligence piano, students are able to practice rhythm in different ways through software facilities with the help of artificial intelligence technology, which can effectively improve the teaching efficiency and can use the intelligent piano to achieve the intended music teaching goals.

### 4. CONCLUSION

In the context of the era of human-computer sharing, the content of popular teaching of classical piano art needs to keep pace with the times. In education, it responds to the educational development needs of the era of talent training, plays a pedagogical role in the direction of classroom teaching, and improves the quality of design education and promotes the reform and innovation of the system of design piano art popularization education.

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# RESEARCH ON THE COUPLING DEVELOPMENT OF CIVIC EDUCATION AND LABOR EDUCATION FOR COLLEGE STUDENTS BASED ON BIG DATA ANALYSIS

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## ABSTRACT

This paper combines big data technology, analyzes the research of coupling innovation of Civic Education and labor education under the vision of big data analysis, the important role of labor education in promoting the formation of values of Civic Education, the cultivation of Civic spirit and Civic consciousness, and the improvement of Civic skills in colleges and universities, and the labor skills in the era of artificial intelligence to realize the combination of physical and mental labor. And targeted to put forward the value and strategy of integrating labor education into Civic Education in the new era, so as to have a positive impact and cultivate socialist builders and successors with comprehensive development of moral, intellectual, physical, social and aesthetic skills.

## KEYWORDS

Civic education; Labor education; Coupling innovation; Teaching strategy; Value

## 1. INTRODUCTION

In the era of artificial intelligence, higher vocational labor education keeps an open attitude, pays attention to the changing labor forms, closely combines with social and economic development, and is given a new definition of connotation [1]. Labor education is an important part of socialist education system, and the purpose of labor education in colleges and universities is to cultivate students' labor quality, habits and spirit, lead them into labor practice, cultivate their spirit of hard work and hardship, take effective measures to strengthen labor education, and incorporate labor education into the whole process of student education and talent training [2-3]. Civic education in colleges and universities is an important carrier for students to grow and become successful and develop their habits [4]. Promoting the integration of labor education and teaching of Civics and Political Science is the focus of implementing the task of moral education in colleges and universities can manifest the contemporary value of labor education [5].

The literature [6] examines the history, content, and educational philosophy of the adult and labor education movement in Sweden. The authors review the movement's origins, development, and influence, and analyze its curriculum, teaching methods, and educational goals. The study aims to provide references and insights for adult and labor education in other countries and regions by understanding the history and experiences of the adult and labor education movement in Sweden. The literature [7] investigated the management mechanism of university ideological and political education in an international educational cooperation model. The authors discussed the challenges and opportunities facing university ideological

and political education in the context of internationalization and analyzed the current problems and shortcomings in the management of university ideological and political education. The study aims to propose a more effective and adaptive management mechanism of university ideological and political education in order to strengthen the ideological and political education and international exchange ability of university students. The literature [8] analyzed the influence of the marriage market on individuals' education and labor supply decisions, and explored the influence of factors such as the ratio of the number of men and women in the marriage market and the income gap on individuals' education and labor choices. The study aims to gain insight into the link between the marriage market and the labor market, and provide useful references and suggestions for individuals' education and career development.

## **2. RESEARCH ON COUPLING INNOVATION OF CIVIC EDUCATION AND LABOR EDUCATION UNDER THE PERSPECTIVE OF BIG DATA ANALYSIS**

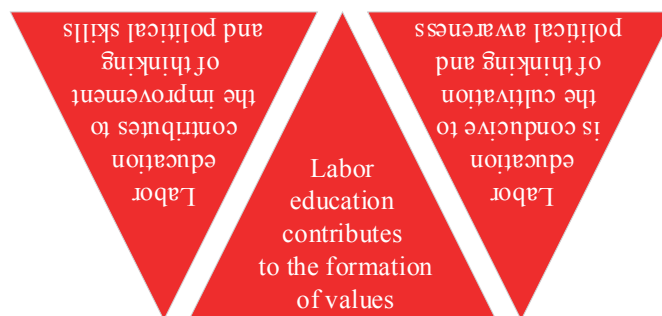
### **2.1. THE IMPORTANT ROLE OF LABOR EDUCATION IN ADVANCING CIVIC EDUCATION IN COLLEGES AND UNIVERSITIES**

Civic education coupled with labor education and combined with course content has an important influence on college students to establish correct labor values, and labor education applied to college Civic Education is shown in Figure 1.

(1) To improve the comprehensive quality of college students in labor exercise, so as to promote the overall development of college students in labor education. In building the curriculum system of colleges and universities, the construction of the curriculum can be led by the curriculum thinking and politics, which can effectively combine theory and practice, and realize labor education in the curriculum practice while cultivating both moral and technical skills, so as to have a positive impact and cultivate moral, intellectual, physical, aesthetic and social development. In the construction of the curriculum system of colleges and universities, the construction of the curriculum is led by the curriculum thinking politics.

(2) In the construction of professional courses, the university curriculum Civics always insists on running through the concept of moral education, takes professional practicality as the entrance, takes labor education as the carrier to implicitly cultivate the labor spirit and labor consciousness of university students in professional courses, couples the labor practice in professional courses effectively with the four education of moral, intellectual, physical and aesthetic, and truly cultivates the new era workers with comprehensive development.

(3) The coupling of Civic Education and Labor Education in colleges and universities in the era of artificial intelligence can make students understand the social division of labor scientifically and establish the concept of labor equality. Improve students' labor skills to serve the needs of social and economic development. Labor skills in the era of artificial intelligence realize the combination of physical and mental labor. In the process of solving the cross-border work problems and contradictions brought about by the era of artificial intelligence, the labor work and methods in the era of artificial intelligence are used to encourage students to actively innovate and start their own businesses and spontaneously participate in the construction of socialism with Chinese characteristics in the new era.



**Figure 1.** Labor Education Applied to Civic Education in Universities

## 2.2. RESEARCH ON COUPLING INNOVATION OF CIVIC EDUCATION AND LABOR EDUCATION IN UNIVERSITIES

In the personnel training program of digital media technology in Guangxi National Vocational College, the coupling of civic education and labor education its body curriculum is shown in Table 1. In the process of combining college Civic Education with practical courses, the digital media technology major has been emphasizing on enhancing the practical ability of digital media professional college students as the core construction goal of the major, holding tightly to the Civic attitude and Civic skills education into the professional course experiments and professional comprehensive practical courses, motivating students to participate in various types of digital media technology professional class competitions at all levels with professional ideals, strictly requiring students with professional norms in the three-year In the process of study, students are strictly required to obtain certificates related to digital media technology, cultivate the spirit of thinking and politics in the training conducted by the school-enterprise cooperation, and enhance the sense of professional responsibility through job shadowing practice in enterprises and institutions related to the profession.

**Table 1.** Civic education and labor education integration of its body curriculum

Course Name	Opening semester	Course Nature
Civic Education	Semester 1, 2, 3, 4	Required public course
Design Composition	Second Semester	Professional Foundation Courses
Digital Graphic Design	Third semester	Professional Foundation Courses
Web Design and Production	Third semester	Professional Foundation Courses
Information Layout Design	Fourth semester	Professional Foundation Courses
3D model and material	trimester	Professional Core Courses
Non-linear editing	3rd semester	Professional Core Courses
Web special effects production	4th semester	Professional Elective Courses
Stereoscopic Creative Composition	Fifth semester	Professional Elective Courses

## 3. RESEARCH ON THE INTEGRATION OF LABOR EDUCATION INTO THE CIVIC EDUCATION OF COLLEGES AND UNIVERSITIES IN THE NEW ERA

### 3.1. THE VALUE OF INTEGRATING LABOR EDUCATION INTO THE TEACHING OF CIVICS IN COLLEGES AND UNIVERSITIES

The coupling of labor education and the teaching of Civics is an important carrier for students to grow and develop their talents and habits, and promoting the coupling of labor education and the teaching of Civics is a focus point for colleges and universities to implement the task of establishing moral education can highlight the contemporary value of labor education, and the value of integrating labor education into the Civics class of colleges and universities is reflected as shown in Figure 2.

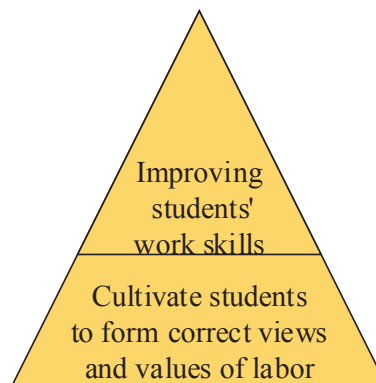


(1) Cultivate students to form correct concept and value of labor

Strengthening labor education can cultivate students to form correct labor concept and value, which is the proper meaning of moral education in colleges and universities. The coupling of labor education and teaching of Civics can make students further establish labor consciousness and enhance labor concept. (2) To improve students' labor skills

(2) Improving students' labor skills

Labor education has significant practical properties, and its organizational activities include not only theoretical lectures and theoretical analysis, but also planned and purposeful practical activities, which allow students to get exercise and improve their labor skills in production labor.



**Figure 2.** The value of integrating labor education into college Civics courses

### **3.2. STRATEGIES FOR INTEGRATING LABOR EDUCATION INTO TEACHING CIVICS IN THE NEW ERA**

To promote the integration of labor education into the teaching of Civics and Political Science class, we must respect the law of education, make efforts in “integration mechanism”, “education system” and “education content”, and consciously explore the synergistic path of labor education and Civics and Political Science class teaching, but in the practice of labor education, colleges and universities still face many problems, which seriously affect the effect of labor education, and propose the strategy of integrating labor education into Civics and Political Science class teaching in the new era as shown in Figure 3.

(1) Establishing the concept of labor

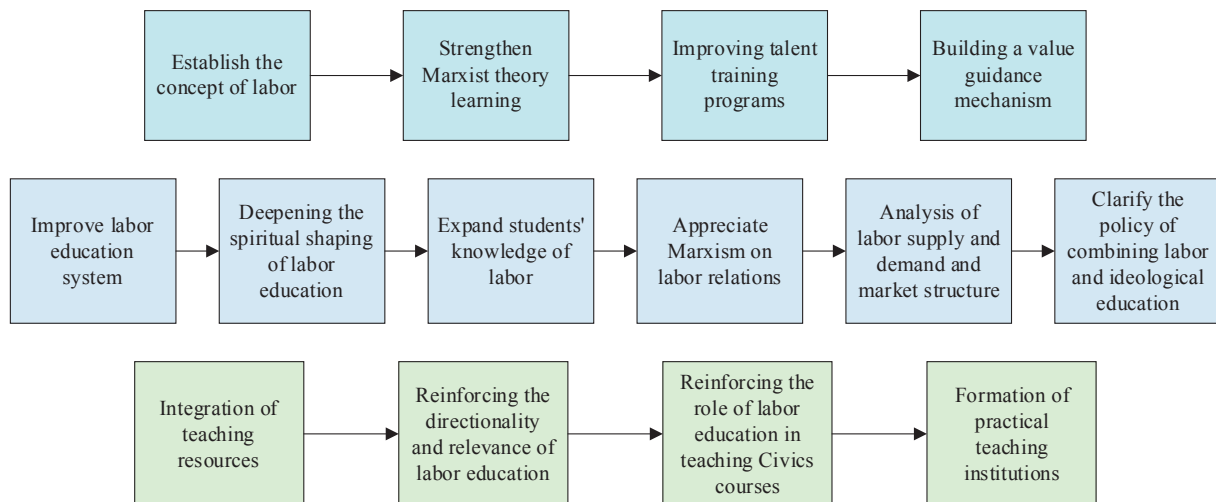
Only by continuously strengthening the study of Marxist theory and Xi Jinping’s socialist thought of the new era can college students appreciate the meaning of “labor creates value” and “labor creates itself”. Only by continuously strengthening the study of Marxist theory and the socialist ideology of Chinese characteristics in the new era of Xi Ping can college students appreciate the connotation of “labor creates value” and “labor creates itself” and truly understand the practical significance and value of labor education.

(2) Improving labor education system

In the context of the new era, to strengthen labor education, it is necessary to combine the development rules of college students in the new era and the development trend of social labor, and to carry out or design labor education activities through teaching methods such as heuristic inquiry, thematic, and seminar, so as to build a scientific and reasonable education system. In the teaching of Civics and Political Science, teachers should correct students’ cognitive deviations in labor dynamics, labor concepts and labor emotions from the perspective of value identity and emotional identity, lead students to form correct and healthy labor values, and deepen the spiritual shaping and moral guidance of labor education.

### (3) Integration of teaching resources

Although labor education and practical teaching of Civics and Political Science are consistent, it is necessary to take practical teaching resources as the “foundation” of their integration. Only through “resource interchange” and “resource sharing” can colleges and universities realize the organic integration of labor education and Civics class teaching, better play the role of labor education in Civics class teaching, build labor spirit education resources, and strengthen the directionality and target of labor education. In the background of the new era, colleges and universities should actively organize academic exchanges, forums and lectures to promote the spirit of craftsmen and model workers, so as to make students feel the power of role models and make labor spirit become a source of motivation for students’ professional development and academic growth.



**Figure 3.** Strategies for integrating labor education into teaching Civics in the new era

## 4. CONCLUSION

Driven by the integration of new media technology in the era of artificial intelligence, the digital media technology major continues to innovate, develop and improve the quality of talent training. Driven by the whole staff and whole process of education in curriculum thinking and politics, labor education is effectively integrated into the development of moral, intellectual, physical and aesthetic education of professional courses, which has an important role in cultivating well-rounded socialist builders and successors.

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# RESEARCH ON THE EFFICIENCY IMPACT OF GREEN ECONOMY DEVELOPMENT BASED ON OPTIMIZATION DEA MODEL

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## ABSTRACT

As a typical resource province and a key node in the “Belt and Road” initiative, Gansu faces the difficult task of green development and ecological protection. This paper firstly constructs the DEA model of non-expected output based on the data of each prefecture-level city in Gansu from 2008 to 2019, and determines the index system of green economy development efficiency. The results show that government support, tourism development level and energy consumption level play a suppressive role on green economic development efficiency in Xinjiang, and average education level and foreign trade level play a promotional role on green economic development efficiency. This study enriches the green development program in Gansu and has important theoretical guidance.

## KEYWORDS

DEA model; Empirical analysis; Indicator system; Green economy; Development efficiency

## 1. INTRODUCTION

Especially, as sustainable development has received more and more attention from countries around the world, the green economic development model guided by the concept of sustainable development has become a global focus [1]. How to achieve sustainable economic development while improving and protecting the natural environment has become a development challenge for all countries, especially for China, the challenge is even more severe [2]. Although China is a vast country, it has a large population, a serious shortage of resources per capita, a large amount of development resources depend on imports, and a large area of the central and western regions are ecologically fragile and face a serious situation of ecosystem imbalance [3-4]. Therefore, for China, vigorously developing green economy is the inevitable choice for China's economic development, and it is the necessary way to take sustainable development [5]. Scientific assessment of regional green economy development efficiency is not only beneficial to the environmental protection supervision of green economy, but also conducive to the development of differentiated energy conservation and emission reduction policies, which is of great theoretical and practical significance to make the green economy bigger and stronger [6-7].

The authors of the literature [8] studied the concept and importance of green real estate and analyzed the challenges and opportunities faced in the development of green real estate in China. The study aims to promote innovation and sustainability in the development of green real estate in China, and to provide reference and suggestions for the government and related organizations in making decisions. The authors of the literature [9] studied the concept and significance of green economy and analyzed the problems and challenges in green economy

development. The study aims to measure the development capability and effectiveness of the green economy by establishing a sustainable development evaluation system, and provide a scientific basis for the government to formulate relevant policies and measures. The authors of the literature [10] studied the concept and application of industrial Internet of Things and analyzed the prospects of its application in the food industry. The study aims to explore the green development model and the application of industrial IoT technology in the food industry.

## 2. GREEN ECONOMIC DEVELOPMENT EFFICIENCY IMPACT INDEX SYSTEM BASED ON OPTIMIZATION DEA MODEL

### 2.1. OPTIMIZATION OF DEA MODEL

The DEA model for non-expected output was calculated as:

$$\rho^* = \min \frac{1 - \frac{1}{m} \sum_{i=1}^m \frac{s_1^-}{x_{i0}}}{1 + \frac{1}{s_1 + s_2} \left( \sum_{r=1}^{s_1} \frac{s_r^g}{y_{r0}^g} + \sum_{r=1}^{s_2} \frac{s_r^b}{y_{r0}^b} \right)} \begin{cases} x_0 = X\lambda + s^- \\ y_0^g = Y^g\lambda - s^g \\ y_0^b = Y^b\lambda + s^b \\ s^- \geq 0, s^g \geq 0, s^b \geq 0, \lambda \geq 0 \end{cases} \quad (1)$$

The global Moran index expression is shown in equation (2):

$$I = \frac{n \sum_{i=1}^n \sum_{j=1}^n \omega_{ij} (x_i - \bar{x})(x_j - \bar{x})}{n \sum_{i=1}^n \sum_{j=1}^n \omega_{ij} (x_i - \bar{x})^2} \quad (2)$$

The spatial autocorrelation was tested for significance using the standardized statistic  $Z(I)$  with the test formula shown in equation (3):

$$Z(I) = \frac{I - E(I)}{\sqrt{VAR(I)}} \quad (3)$$

Where,  $E(I)$  and  $VAR(I)$  are the expected and variance values of the global Moran index.

The local Moran index is used to do local spatial autocorrelation analysis, which is used to reflect the connection between a region and its surrounding areas, and to analyze whether there is local spatial agglomeration and the magnitude of the degree of association and other related spatial issues, and the local Moran index expression is shown in Equation (4):

$$I_i = \frac{x_i - \bar{x}}{S^2} \sum_{j=1}^n \omega_{ij} (x_j - \bar{x}) \quad (4)$$

### 2.2. GREEN ECONOMIC DEVELOPMENT EFFICIENCY MEASUREMENT INDEX SYSTEM

By comparing the efficiency of green economic development between cities and towns in Gansu, it is found that there is a big difference in the level and trend of green economic development efficiency in each region, and the indicator study affects the level of green development in Gansu with the indicator system shown in Table 1.

**Table 1.** Ideological and political education and labor education

Type	Indicator Name	Indicator Symbols
Indicator System	Government Support	X1
	Economic Development Level	X2
	Current status of industrial structure	X3
	Tourism development level	X4
	Average education level	X5
	Foreign trade level	X6
	Energy consumption level	X7

### 3. EMPIRICAL ANALYSIS OF THE FACTORS INFLUENCING THE EFFICIENCY OF GREEN ECONOMIC DEVELOPMENT

#### 3.1. DESCRIPTIVE STATISTICS

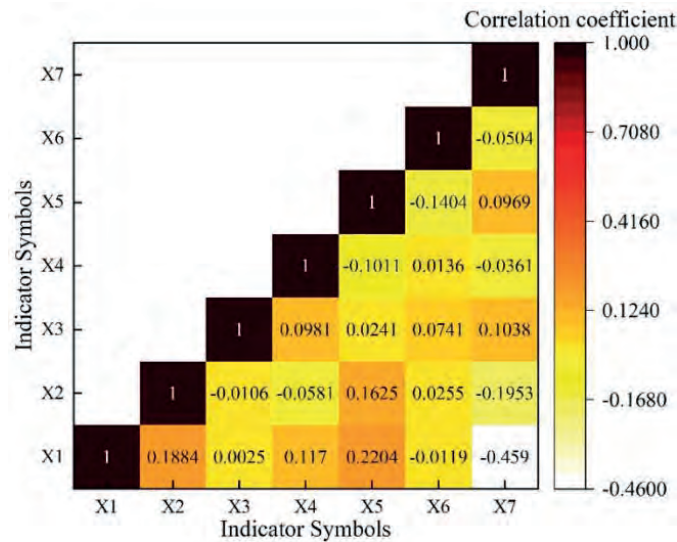
By collating the data of seven influencing factors indicators of green economic development efficiency in Gansu from 2008-2019, the results of descriptive statistics are shown in Table 2.

**Table 2.** Statistical description of impact factor indicators for 2008-2019

Indicator Name	AVG	Max	Min	SD
Government Support	0.3938	1.4242	0.0251	0.3188
Economic Development Level	4.4434	18.8856	0.3927	3.4327
Current status of industrial structure	0.0527	1.1234	-2.1504	0.2433
Tourism development level	0.0842	0.7825	0.0000	0.1078
Average education level	0.1584	0.3818	0.1016	0.0392
Foreign trade level	0.1898	1.7048	0.0004	0.2553
Energy consumption level	1.2341	5.0076	0.0973	1.1474

#### 3.2. CORRELATION ANALYSIS

Before regressing the panel data, correlation analysis and correlation significance test of each explanatory variable are needed to test the closeness of each variable and avoid the problem of multicollinearity among variables. The results of correlation analysis of green economic development efficiency are shown in Figure 1. The correlation analysis results show that although the correlation between two variables is significant, the correlation coefficients between the explanatory variables are small, and the absolute value of the coefficients does not exceed 0.5, which indicates that the possibility of causing multiple cointegration problems among the explanatory variables is not significant.



**Figure 1.** Results of Green Economy Development Efficiency Correlation Analysis

### 3.3. REGRESSION ANALYSIS

The results of regression analysis were carried out as shown in Table 3.

(1) From Gansu as a whole, there is a negative correlation between the proportion of general government budget expenditure, the proportion of tourism income, energy consumption per unit of GDP and green economic development efficiency, while the proportion of school students, the proportion of total import and export and green economic development efficiency values are positively correlated.

(2) From the regional perspective, the green economic development efficiency value of Longbei region is significantly and positively correlated with the proportion of school students and significantly and negatively correlated with energy consumption per unit of GDP. There is a significant negative correlation between the ratio of broad government budget output and income and expenditure to energy consumption per unit of GDP, and the share of total import and export.

**Table 3.** Regression analysis of factors influencing the efficiency of green economy development

Symbols	All Gansu	North Gansu	Southern Gansu	Eastern Gansu
X1	-0.1281**	-0.3993	-0.1381**	-1.7892*
	(0.0585)	(0.1402)	(0.0551)	(0.0027)
X2	-0.0032	-0.0106	0.0033	0.5073*
	(0.5734)	(0.2127)	(0.5994)	(0.0293)
X3	0.0052	-0.3552	0.1578*	0.0376
	(0.9445)	(0.1242)	(0.0248)	(0.7428)
X4	-0.2882**	0.0912	1.2268	0.0237
	(0.0926)	(0.7255)	(0.1991)	(0.9408)
X5	0.8974**	2.3485*	0.0185	-0.3553
	(0.0757)	(0.0118)	(0.9713)	(0.4146)
X6	0.1226**	0.0192	0.2972	-2.9944*
	(0.0908)	(0.8288)	(0.1006)	(0.0103)
X7	-0.0987*	-0.0866*	-0.1238*	-0.0463
	(0.0000)	(0.0012)	(0.0002)	(0.1056)
Remarks	Parentheses represent the corresponding P values, where * indicates a 5% level of significance and ** indicates a 10% level of significance			

#### 4. CONCLUSION

In this paper, we read a large number of references, collected a large amount of data, and established a model of optimized DEA to study the factors influencing the efficiency of overall and regional green economic development in Gansu. The efficiency value of green economy development in Xinjiang is significantly and positively correlated with the percentage of school students and the percentage of total import and export, the percentage of tourism income, and the energy consumption per unit of GDP. In the future development, we will not only consider the economic growth, but also pay attention to the protection of the environment, so that the economy, environment and society can develop in a coordinated way, and promote the improvement of the efficiency of green economic development in Gansu and even in the whole country.

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# RESEARCH ON THE DESIGN OF INTELLIGENT PARKING GUIDANCE SYSTEM CONSIDERING REAL-TIME TRAFFIC FLOW AND PARKING SPACE DATA UPDATE

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## ABSTRACT

The construction of parking facilities lags far behind the growth rate of automobiles, resulting in a huge gap between the supply and demand of parking spaces and making parking difficult to become another problem in the development of urban road traffic. Intelligent parking guidance system is proposed, which is mainly composed of functional modules and database. The cell phone client provides users with real-time traffic flow path planning, parking lot navigation, parking space data update, parking space navigation, reverse car finding and other functions, realizing an intelligent parking guidance system integrating indoor and outdoor. Finally, simulation tests are conducted to verify the feasibility and stability of the intelligent parking guidance system functions. This study can provide numerous experiences and references for many researchers, and it is also hoped that the design can be proposed to continuously optimize the design of parking lots in China, so that many people can alleviate the burden of difficult parking.

## KEYWORDS

Intelligent parking; Guidance system; Real-time traffic flow; Parking space data update

## 1. INTRODUCTION

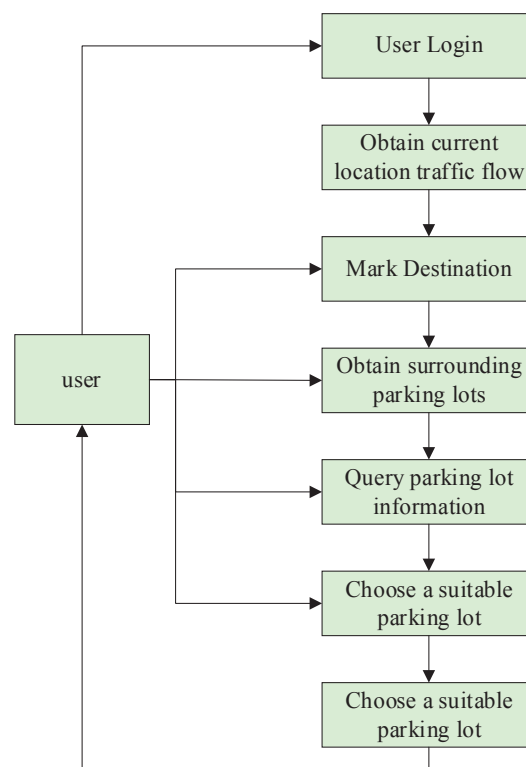
Currently, China's urban motor vehicle holdings are increasing and so is the demand for parking spaces [1]. Due to various reasons, insufficient attention has long been paid to the urban parking problem, making it increasingly prominent after accelerated urbanization and a key factor in the urban traffic congestion problem [2-3]. In addition to the restrained regulation of urban parking management problems at the level of policies and regulations, it is also gradually recognized that in the absence of the possibility of rapid large-scale expansion of parking facilities, advanced parking information management systems need to be established using information technology to alleviate the current parking problems [4-5]. Through some practice of parking management in developed countries, it is proved that the establishment of urban parking information management system, reasonable distribution of traffic flow and giving full play to the existing road network capacity can organize urban traffic scientifically, effectively solve the problem of urban parking difficulties and improve the level of urban parking management [6-7].

The authors of the literature [8] studied the severity of urban parking problems and the limitations of existing solutions, and proposed an urban parking guidance system based on deep data mining techniques. The study aims to improve the accuracy and efficiency of urban parking guidance system through limited perception and deep data mining techniques, and provide a more intelligent and convenient solution for urban parking management. The authors of the literature [9] studied the concept and application of intelligent parking information systems and analyzed their impact on drivers and urban traffic management. The study aims to inform and advise the government and related agencies for decision making by evaluating the benefits drivers get from smart parking information systems, while contributing to the realization of smart cities and sustainable development. The authors of the literature [10] studied the concept and application of smart parking system and discussed in detail the role and application of wireless modules in this system. The study aims to improve the efficiency and reliability of the smart parking system by using modern technologies such as wireless modules to provide a more intelligent and convenient solution for urban traffic management.

## 2. RESEARCH ON REAL-TIME TRAFFIC FLOW PATH PLANNING AND PARKING SPACE DATA UPDATE

### 2.1. REAL-TIME TRAFFIC FLOW PATH PLANNING

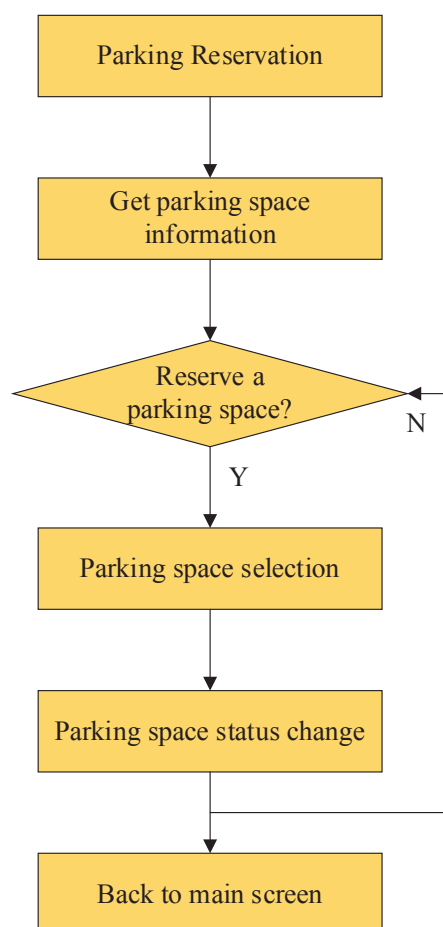
The real-time traffic flow path planning module is used to display real-time traffic flow and locate to the current location, and get the parking information and real-time traffic flow around the current location or the specified destination on the map. The logic of real-time traffic flow path planning function is shown in Figure 1. The secondary development is realized on the external interface of Gaode Map navigation. Download the SDK of Gaode Map, put the relevant files into the corresponding location, and in the layout file, add the layout control of Gaode Map for the secondary development of the relevant functions on Gaode Map. Gaode Map and Android smartphones provide users with GPS positioning, electronic maps and other functions. Using these functions, the main interface of the system client is selected to view the real-time traffic flow around the destination, as well as the optimal path planning to reach the parking lot.



**Figure 1.** Real time vehicle flow path planning functional logic

## 2.2. CAR PARKING DATA UPDATE

The function of the parking space data update module is to facilitate the parking user to get the specific parking space information, and then can choose a free parking space for the scheduled parking function, this function is mainly to solve the parking guidance process, the possibility of changes in the status of the parking space, to prevent the parking user after layers of guidance to reach the parking space, the parking space has been parked phenomenon. Parking data update logic function diagram as shown in Figure 2, parking users can drive into the parking lot to obtain the overall information of the current parking lot, set the parking interface inside the four components TextView components indicate the parking lot, the location of the parking lot, the number of parking spaces remaining in the parking lot and parking fee information. The parking user can select the appropriate parking lot and view the empty parking space. The physical structure is given in the form of a floor plan, which gives the approximate parking situation of the parking lot. Then it is refined to select the preferred parking space for reservation or direct parking function.



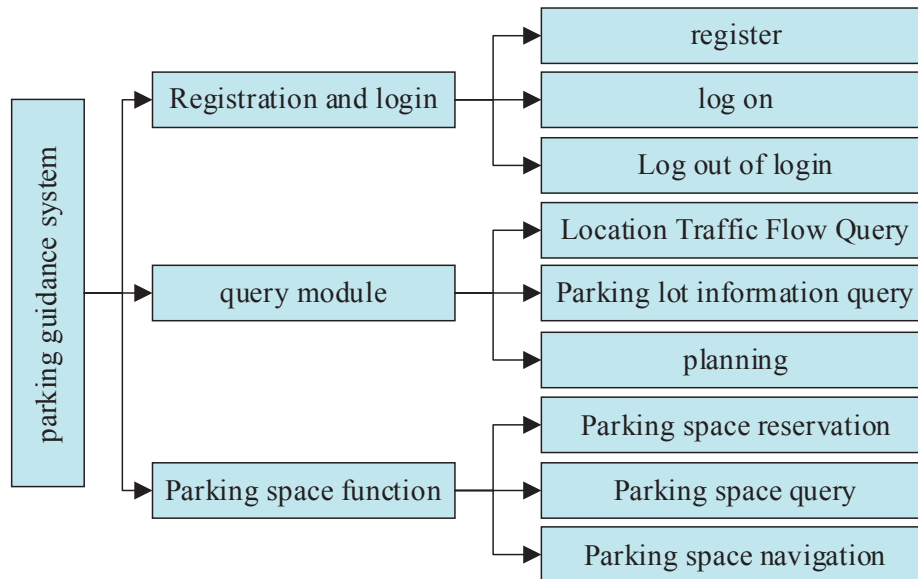
**Figure 2.** Parking space data update logic function

## 3. INTELLIGENT PARKING GUIDANCE SYSTEM DESIGN RESEARCH

### 3.1. SYSTEM FUNCTIONAL MODULE DESIGN

Through the previous analysis of the parking guidance system requirements, the functional requirements of the system are clarified, and the system mainly solves several key problems encountered by users in the parking process: First, users can obtain the current positioning and the surrounding parking information through the system, including the fee, the number of remaining parking spaces and other information, and can position the user to carry out parking lot navigation functions. Secondly, users can view the specific parking information and reserve parking spaces after selecting a parking lot. Third, the user can obtain the current indoor

location after selecting a parking space, and provide the user with the path planning and navigation to the specific parking space. Fourth, users can quickly find their cars through the reverse car search function, and fifth, users can self-service in the process of querying parking lots, reserving parking spaces, and navigating parking spaces. Based on the analysis of the above requirements, the functional design of the intelligent parking guidance system based on Android platform is obtained as shown in Figure 3.



**Figure 3.** Functional Design of Intelligent Parking Guidance System on Android Platform

### 3.2. DATABASE STORAGE MODULE DESIGN

Database module is mainly to achieve the storage of system data, the system is through the MySQL database for data storage, mainly because MySQL database occupies less memory, free and open source and easy to use, suitable for small and medium-sized enterprise system development of data storage. The functions of the whole intelligent parking guidance system should be fully open to the manager, so that the manager can update the parking information more conveniently and timely to achieve more effective parking space guidance for the client users.

### 3.3. INTELLIGENT PARKING GUIDANCE SYSTEM TESTING

The system test is mainly for the parking management platform and cell phone client. The test uses Navicat tool to manually input relevant data into MySgl database to verify the relevant functions of the parking management platform and cell phone client, and the test environment is shown in Table 1.

**Table 1.** Intelligent parking guidance system testing

type	model
CPU	Intel Skylake Xeon Platinum 8163 25GHz 4 pit
Memory	16GB
operating system	Window7 32 position
database	MYSQL 5.7
development tool	Notepad, GCC

After successful login, it enters the main interface of the system. The main interface shows the simple attempt of parking lot and the usage of parking resources, and the administrator switches between the main interface, user information management interface, parking space

information management interface, parking lot information interface and user parking record inquiry interface through buttons to view, inquire and modify the corresponding information. The test process is as follows:

(1) Enter a user name in the search box of the user information interface and check the search results

(2) Delete a parking space in the parking information management interface, and check the results displayed on the interface

(3) Enter a parking space number in the parking record management interface to view the parking record information.

The mobile client provides users with parking space guidance and information viewing services. Users can enter the main interface of the service by entering their account number and password on the login screen, and perform corresponding services by clicking the corresponding buttons. The testing process of the mobile client is as follows:

(1) Login to the system with the registered account and password to enter the main interface of the client service.

(2) Click Personal Center in the service main interface to view personal information display.

(3) Go back to the main interface, click Parking Information View, and check the parking information display.

(4) Back to the main interface, click the parking space guide button, select the walking exit and parking lot entrance in the parking space allocation interface, and then click OK to view the parking space guide path display.

#### **4. CONCLUSION**

The design of the intelligent parking guidance system improves the security and operational efficiency of the parking lot, the implementation of the system effectively reduces the burden of the staff, and also reduces the burden of the driver, and can meet the requirements of various large and small parking lots, in the future development process, the system must be able to be better promoted, the current design has a strong reference value and practical value, also has a strong social significance, in the future, I hope the system can be applied to various parking lots, so as to better meet the needs of the people.

#### **FUNDING**

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# DYNAMIC LOAD BALANCING ALGORITHM FOR COMMUNICATION TRAFFIC CONSIDERING NODE PRIORITY

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## ABSTRACT

In this paper, we firstly determine the communication nodes based on DLAPGF algorithm and use the improved interactive information feedback to obtain the information of communication nodes, then propose the performance gain factor based on the final completion time of communication nodes, and use the task exchange and task migration operation to realize the dynamic adjustment strategy based on the gain factor, which improves the node priority, then the load dynamic balancing DLAPGF algorithm is analyzed. The results show that the distribution of the final NLCT is still relatively concentrated when there are working nodes joining and exiting, which indicates that DLAPGF can make good handling of the load dynamic balancing of communication traffic.

## KEYWORDS

DLAPGF algorithm, Gain factor; Dynamic load balancing; Node priority

## 1. INTRODUCTION

With the continuous improvement of computer performance and the development of high-speed computer networks, distributed systems have a powerful computing capability, and an excellent load-balancing strategy is necessary to make reasonable use of this capability [1]. Load balancing is one of the core problems to be solved by distributed systems and has significant theoretical and practical significance [2]. As the system operates, certain nodes are assigned many tasks while others have relatively few tasks, producing a system load imbalance [3-4]. The goal of load balancing is to rationally and transparently redistribute the system load among the nodes to achieve the optimal overall system performance [5].

The authors of literature [6] studied the concept and application of dynamic planning, and analyzed how to balance the economic interests of network operators and energy interests of

mobile users in dynamic planning, to achieve energy efficiency balance between network operators and mobile users, and to provide technical support and guarantee for sustainable development. The authors of literature [7] studied the concept and application of multi-core embedded systems and analyzed how to achieve dynamic application allocation and resource balancing in multi-core embedded systems to achieve resource balancing and dynamic application allocation in multi-core embedded systems to improve the performance and efficiency of the system. The authors of the literature [8] studied the concept and application of dynamic load balancing and proposed a heuristic technique to achieve the goal of improving energy efficiency in the presence of dynamic load balancing, which aims to achieve a balance between dynamic load balancing and energy efficiency by designing suitable algorithms and strategies.

## 2. NODE PRIORITY-BASED DYNAMIC LOAD BALANCING DLAPGF ALGORITHM

### 2.1. LOAD BALANCING OBJECTIVES

Most studies do not consider the tasks that need to process data, so the communication overhead of transmitting data is not addressed, and very few studies address job migration costs. Most of them consider that the ideal state of the system is to distribute the tasks equally according to the computational capacity of each working node, then the most ideal load for

each working node  $i$  is  $deservedLoad_i = A * i, I, A = \frac{\sum_{i=0}^{n-1} i,load}{\sum_{j=0}^{n-1} j, I}$ ,  $A$  the load of the

computational capacity and when  $i,load > (1 + \varepsilon_1) * deservedLoad_i$ , this working node will be a heavy load node and when  $i,load < (1 - \varepsilon_2) * deservedLoad_i$  this working node will be called a light load node. Their final goal so that each node can obtain a load of  $deservedLoad_i$ , considering node priority and error, minimizing  $|deservedLoad_i - i,load|$  as the goal of the load balancing problem. Since the tasks involve purely computational tasks and tasks that require data processing, the uncertainty of the nodes where the data to be read by the same tasks that require data processing makes this balancing objective not applicable to the environment mentioned in this paper. The final completion time of all tasks of each working node has been mentioned in the task allocation process as the sum of the computation time of all tasks assigned to it, the transmission time of data, the transmission time of the last task result and the local time of the working node, i.e:

$$NLCT = \sum CT + TT_{data} + TT_{result} + LT \quad (1)$$

Minimizing  $NLCT$  as much as possible can improve the performance of communication traffic. Since the existence of errors does not guarantee the absolute minimum of  $NLCT$  and the absolute equality of all  $NLCT$ , the communication traffic load balancing algorithm can be achieved by minimizing the variance of  $\max(NLCT)$  and  $NLCT$ , which is expressed as

$$s^2 = \frac{1}{n} * \sum_{i=0}^{n-1} (\overline{NLCT} - NLCT_i)^2 \quad (2)$$

It is difficult to obtain the minimum value of  $s^2$  in practice, and obtaining non-minimum  $s^2$  does not necessarily guarantee the balance between working nodes  $NLCT$ , while it is easier to understand the load balance condition between working nodes by calculating the distribution



of each  $NLCT$ . Therefore, the concentration of  $NLCT$  distribution is used as a judgment of the load balance between working nodes.

## 2.2. PERFORMANCE GAIN FACTOR

Whether making task migration operation, or task exchange operation, will cause some communication cost, all comprehensive consideration of communication node priority and other issues, through the calculation to determine whether there is a performance gain before the corresponding operation, this paper will be the gain value is called the performance gain factor.

The final completion time  $NLCT_j$  from the start of the transmission of task  $t_i$  at information collection node  $i$  to the completion of task  $t_i$  at work node  $j$  that receives task  $t_i$  cannot exceed the final completion time  $NLCT_i'$  when node  $i$  does not migrate task  $t_i$ , i.e:

$$NLCT_j < NLCT_i' \quad (3)$$

$$NLCT_j = CT_{ij} + TT_{kj} + (NLCT_j' > (LT_j + TT_{ij}) ? NLCT_j' : (LT_j + TT_{ij})) \quad (4)$$

## 2.3. DYNAMIC BALANCING OPERATION

Assuming that working node  $i$  satisfies the start condition of load balancing operation, it will get the information of partner nodes according to the acquisition method of task exchange operation and store it in  $S$ . Then it will achieve dynamic balancing according to the communication load gain factor.

### (1) Task exchange operation

Work node  $i$  first fetches the tasks in task list  $L$  that need to process data and they satisfy that the data to be read is on a work node in  $S$ . Then, the tasks that need to process data on these worker nodes are found, and they also need to satisfy that the data to be read is located on worker node  $i$ . Finally, swap operations are performed on these tasks according to whether they satisfy the performance gain factor or not. That is, the tasks whose data to be processed are on the corresponding work nodes are selected for the task swapping operation. If there are multiple tasks that can be swapped with a single task, then the one with the largest performance gain factor is selected for swapping.

### (2) Task migration operation

For the task migration operation, it only involves sending tasks from work node  $i$  to a work node  $NCLT$  smaller than itself. This is not considering the task that needs to process data that satisfies the following condition, which reads data located on work node  $i$ , i.e. both task and data are on work node  $i$ .

## 3. COMMUNICATION TRAFFIC LOAD DYNAMIC BALANCE EMPIRICAL ANALYSIS

### 3.1. EXPERIMENTAL ENVIRONMENT

This chapter presents a simulation implementation of the algorithm execution process on a PC using JAVA language. The homogeneous system is no longer verified in the simulation process, and the heterogeneous system is directly considered, including the heterogeneity of the working nodes and the heterogeneity of the network, i.e., the computational capacity of each working node varies, and the network bandwidth and delay at each standard network distance also vary. The main parameters used in the simulation include the working node parameters, task parameters and network parameters, and the working node parameters are

shown in Table 1 and the task parameters are shown in Table 2.

**Table 1.** Work node parameter table

Parameters	Description
$N$	Number of working nodes 300 working nodes
$C$	Maximum processing capacity, the time range for processing unit tasks is [0.2, 1], i.e., [1, 5] unit tasks per second
$\mu_1$	Strong node smell value, 0.9
$\mu_2$	Weak node queue value, 0.6
$tp$	The working nodes record the computational power with a period of 30s
$cn$	Each work node records the 5 most recent historical values of its own computational power setting the work node computational power history impact factor to 0.2
$\alpha$	Number of working nodes 300 working nodes
$\beta$	$\alpha + \beta = 1$ , Then the current impact factor of the computational power of the working node $\beta$ is 0.8

**Table 2.** Task Parameters

Parameters	Description
TN	Number of tasks to be assigned 1000
Task size	That is, the number of tasks per unit is included, assuming that the size varies in the range [50, 400].
Task td size	Assume that each task takes up the same space, 1MB
Task fn	Because of the data placement policy involved in the actual environment, a random approach is used here, i.e., a work node with id [0,N-1] is randomly selected
Task file	According to the normal distribution, $\mu = 100MB$ , $\alpha = 10MB$

### 3.2. PERFORMANCE INDICATORS

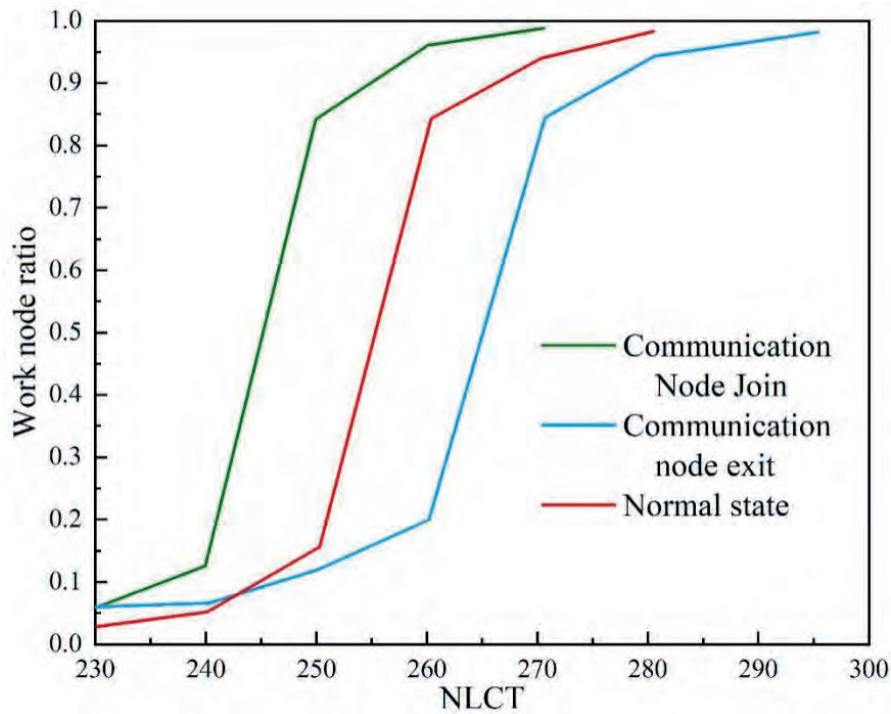
The balance between communication nodes refers to the difference in the completion time of each node for a set of submitted tasks, and the balance between communication nodes is analyzed by analyzing the distribution of each  $NLCT$ . If more  $NLCT$  are concentrated in a smaller range, it means that the load between working nodes is more balanced, and it is also considered that this load balancing algorithm is more efficient.

$$NLCT = \sum CT + TT_{data} + TT_{result} + LT \quad (5)$$

This includes the computation time for all tasks, the time to read the data, the time to transmit the results and the local time of the working node.

### 3.3. RESULTS AND ANALYSIS

Figure 1 depicts the effect of joining and withdrawing of communication nodes on the balance between each communication node. From the figure, it can be seen that the distribution of the final  $NLCT$  remains more concentrated in the presence of communication nodes joining and withdrawing, which can indicate a better balance between communication nodes. By observing the effects of communication node joining and withdrawing on the completion time of load dynamics balancing and system balancing, it can be seen that DLAPGF can make good handling of load dynamics balancing.



**Figure 1.** The effect of joining and dropping communication nodes on balance

#### 4. CONCLUSION

Along with the development of computer technology and network technology, the volume of data and services has been growing, promoting the development of distributed parallel computing. An important issue in distributed parallel computing is the load balancing problem. Based on the above problems, this paper proposes an efficient load balancing algorithm, which obtains information with high accuracy and low communication overhead, and fully considers the node priority problem. DLAPGF handles the dynamic load balancing of communication traffic, and the experimental results verify that DLAPGF can make good handling of load dynamic balancing.

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# NUMERICAL SIMULATION AND PROCESS OPTIMIZATION IN THE PREPARATION OF BIMETALLIC COMPOSITE BLANKS

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## ABSTRACT

In this paper, the preparation of bimetallic composite blanks is studied by finite element simulation method. Then the focus is on the density distribution of carbon steel chips in the pressing process, and the density distribution map of carbon steel chips is obtained by numerical simulation of the pressing process, and the corresponding analysis is carried out. The results show that the distribution of carbon steel chip density in the embryo preparation is relatively uniform throughout the stainless steel shell, and the difference between the maximum and minimum density is only 0.003%. In the range of pressing force 0-45 kN, the relative density of carbon steel chips from the finite element simulation is greater than the actual experimental measured value, while after the pressing force is greater than 45 kN, the experimental measured value starts to be greater than the finite element simulation again, but the difference between them is not significant. Therefore, these findings provide a strong reference for further process optimization.

## KEYWORDS

Bimetallic composite blanks; Finite element analysis; Carbon steel chips; Process optimization; Stainless steel

## 1. INTRODUCTION

Bimetallic composite blanks are a composite structure composed of two different materials with the advantage of having different properties in different parts, and they are widely used in

many fields in manufacturing, such as aerospace, automotive, and energy [1-2]. Numerical simulation and process optimization play an important role in the preparation of bimetallic composite blanks [3]. Numerical simulation is a method of virtual simulation of the material preparation process using computer simulation techniques, which can predict and analyze key parameters such as forming behavior, mechanical properties and internal tissue evolution of bimetallic composite blanks [4-5]. Numerical simulations can help researchers to gain insight into the preparation mechanism of composite blanks, optimize the composition and structural design of the material, and improve the efficiency and quality of the preparation process [6].

In the literature [7], the forming process of stainless steel/carbon steel bimetallic composites was analyzed and predicted by numerical simulation methods. They developed a suitable numerical model using the finite element method to analyze and predict the forming process of stainless steel/carbon steel bimetallic composites by numerical simulation methods. Jia, Y et al. prepared 40Cr/Q345B bimetallic blanks using centrifugal casting technique and then studied the mechanical behavior and tissue evolution of 40Cr/ thermal deformation behavior of Q345B bimetallic blanks [8].

## 2. FINITE ELEMENT SIMULATION OF THE PREPARATION PROCESS OF BIMETALLIC COMPOSITE BLANKS

The process of preparing the rolled blanks, especially the effect of carbon steel chip pressing is one of the important factors affecting the composite effect of stainless steel/carbon steel chip core laminate, so it is necessary to study and analyze the pressing process. In this subsection, the finite element simulation was carried out with MARC software to analyze the density distribution of the pressed billet (carbon steel chip) inside the stainless steel tube. MARC software has a special window POWDER for powder material definition in the material properties definition column, and the MARC software uses the Shima model in the treatment of the plastic yield criterion of the powder body, as follows. In the study of the carbon steel swarf pressing process, the carbon steel swarf is considered as an isotropic "compressible continuum" following the principle of mass invariance:

$$F = \frac{1}{\gamma} \left( \frac{3}{2} \sigma^d \sigma^d + \frac{p^2}{\beta^2} \right)^{\frac{1}{2}} - \sigma^y \quad (1)$$

Where  $\sigma^y$  - is the one-way yield stress (MPa).  $\sigma^d$  - is the stress deflection amount (MPa)  $p$  - is the hydrostatic pressure (N).  $\gamma, \beta$  - are material parameters, which are functions related to temperature and relative density, respectively.

When the temperature changes to 0, the value of  $\gamma, \beta$  can be found directly using the following equation:

$$\gamma = \rho^{5.5} \quad (2)$$

$$\beta = [6.25(1 - \rho)]^{-0.5} \quad (3)$$

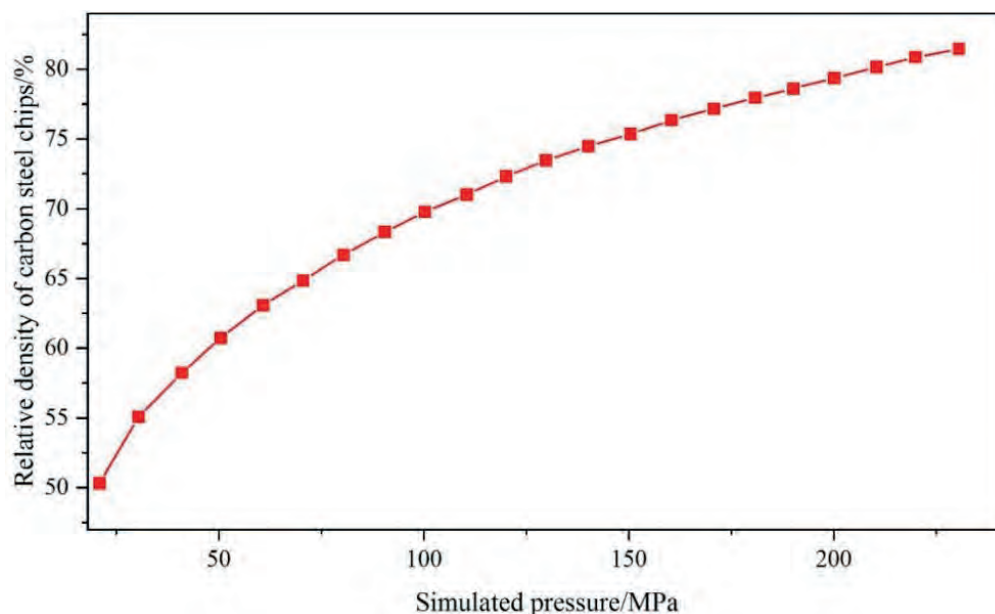
Where  $\rho$  - relative density.

## 3. ANALYSIS OF DENSITY DISTRIBUTION OF CARBON STEEL CHIPS AFTER PRESSING

Different pressing force sizes were set, and the pressing force was gradually increased from 0 to the set value at each pressing, and then maintained. The changes in the cloud diagram of the relative density of Q235 carbon steel chips during the pressing process were observed,

and then the changes in the volume of carbon steel chips and the relative density distribution at the end of pressing were analyzed. With the application of 55 MPa pressure, for example, the closer the location to the press head, that is, the more upward position of the relative density of carbon steel chips is the largest, 53.82%, and the density of carbon steel chips at the bottom of the stainless steel shell is the smallest, 53.74%, but the difference is not large, only 0.1%. This is due to the pressing, the upper part of the carbon steel chips first contact with the indenter, the first force, in the upper part of the deformation before the pressing force is transferred to the lower part, the lower part of the carbon steel chips began to deformation, has been transferred to the bottom of the stainless steel shell carbon steel chips, but because the deformation process is faster, so the bottom of the relative density of carbon steel chips and the top of the difference is not large. The carbon steel chip density in the entire stainless steel shell are relatively uniform distribution, the difference between the maximum and minimum density is only 0.003%, indicating that the density of carbon steel chips in the entire stainless steel shell after the completion of pressing is almost equal. Cross-sectional carbon steel chip density distribution is also relatively uniform, there is no significant difference and distribution pattern. The distribution of the density of carbon steel chips after pressing affects the final composite effect of stainless steel/carbon steel chip composite plate, the more uniform the density distribution of carbon steel chips in the stainless steel shell, the more uniform the composite effect of the composite plate cladding base layer after rolling, so the simulation results can predict the final composite effect of the composite plate after rolling.

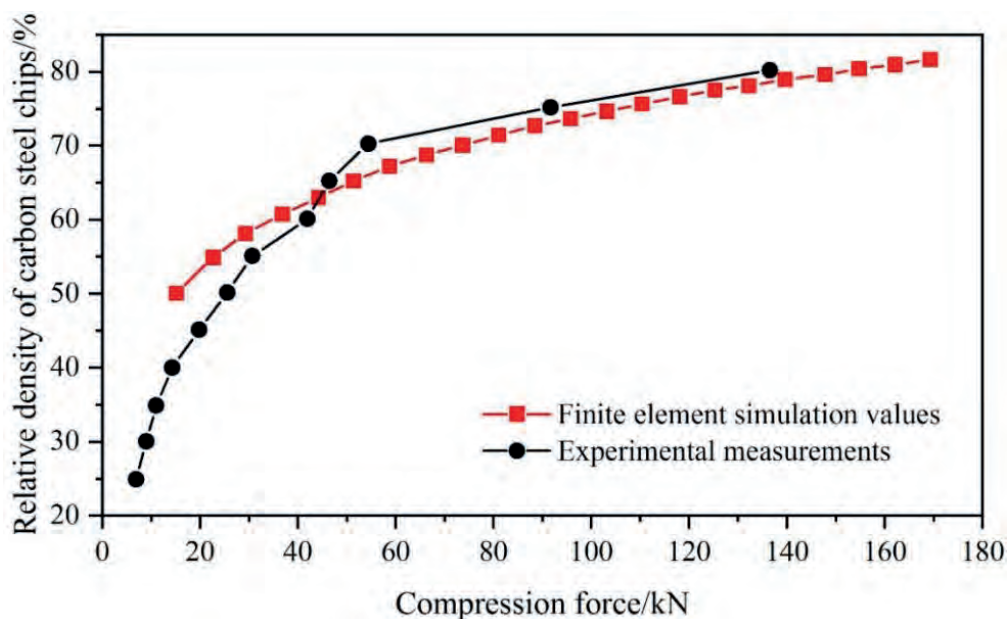
At the end of each simulation of pressing, the average value of the relative density of carbon steel chips under this pressure is extracted and calculated. Figure 1 shows the graph of the relative density of carbon steel chips as a function of pressure for the finite element simulation, and it can be seen that as the pressure setting value increases, the value of the relative density of carbon steel chips increases at the end of the simulation, and after the pressure increases to a certain value, increasing the same pressure, the increased value of the relative density of carbon steel chips begins to decrease and the curve begins to flatten out.



**Figure 1.** Simulated pressure versus relative density of carbon steel chips

To compare the FEM simulation results with the experimental results, it is necessary to multiply the pressure of the FEM simulation with the cross-sectional area of the carbon steel chip to obtain the value of the pressing force, and put the two results into the same coordinate system, and the results of the pressing experiment and the FEM simulation are shown in Figure 2. It can be seen that in the range of pressing force 0-45kN, the relative density of carbon steel

chips from the finite element simulation is greater than the actual measured value from the experiment, and after the pressing force is greater than 45kN, the measured value from the experiment starts to be greater than the value from the finite element simulation again, but the two trends are consistent and the error is not large, which indicates that the finite element simulation value matches well with the experimental measured value, which also proves that the finite element simulation is This also proves that the material parameters used in the finite element simulation are more accurate and match with the actual ones. With this result as the basis, it is possible to establish different sizes of billet models for finite element simulation, to predict the density distribution of carbon steel chips within the large billet during actual production, the relationship between the pressing force and the density of carbon steel chips, and to show that the material parameters used can continue the finite element simulation study for the subsequent rolling experiments.



**Figure 2.** Comparison of pressed experimental and simulated results

#### 4. PROCESS OPTIMIZATION STRATEGY

##### (1) Designing reasonable chip core shape and size

The influence of different chip core shapes and sizes on the quality of bimetallic composite blanks is analyzed by numerical simulation, and the optimal chip core shapes and sizes are selected. Reasonable chip core shape and size can provide good contact area and contact performance, which is conducive to effective cold welding bonding.

##### (2) Control compound temperature and pressure

Through numerical simulation analysis of the composite behavior under different temperature and pressure conditions to determine the best composite process parameters. Reasonable composite temperature and pressure can improve the bond strength and interface quality of bimetallic composite blanks.

##### (3) Optimize the heat treatment process

Optimize the heat treatment process for the stainless steel/carbon steel composite blanks. Simulate the temperature and stress fields during the heat treatment process through numerical simulation to determine the appropriate heat treatment temperature, holding time and cooling mode to obtain the desired structure and properties.

##### (4) Optimization of rolling process



During the rolling of the composite billet, the effect of rolling force and deformation temperature is analyzed by numerical simulation to determine the best rolling process parameters. The optimized rolling process can improve the interfacial bonding performance and overall performance of the bimetallic composite plate.

## 5. CONCLUSION

In this study, the key problems in the preparation process of bimetallic composite blanks are investigated in depth through numerical simulation and process optimization, and effective improvement schemes are proposed. These research results are of great significance to promote the development and application of bimetallic composites. Future research can further explore more accurate simulation methods and more effective process optimization strategies based on the results of this study to achieve a higher level of bimetallic composite blank preparation and application.

## ABOUT THE AUTHOR

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# PARADIGM TRANSFORMATION OF IDEOLOGICAL AND POLITICAL EDUCATION IN COLLEGES AND UNIVERSITIES UNDER THE IMPLEMENTATION OF MORAL EDUCATION FROM THE PERSPECTIVE OF DEEP LEARNING

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## ABSTRACT

The purpose of this paper is to explore the application of deep learning in ideological and political education to help cultivate high quality talents. First, deep learning reflects the orientation of quality education and helps cultivate students' higher-order thinking and innovation ability. In this regard, this paper puts forward the conception of educational paradigm transformation, including the unified analytical method of history and logic, basic theoretical framework, social foundation, multidisciplinary and multi-paradigm transformation research and academic system research paradigm and action system way of thinking. Finally, the paper concludes that it is committed to promoting educational paradigm transformation, so as to better contribute to the implementation of the fundamental task of building moral character and cultivating high-quality talents.

## KEY WORDS

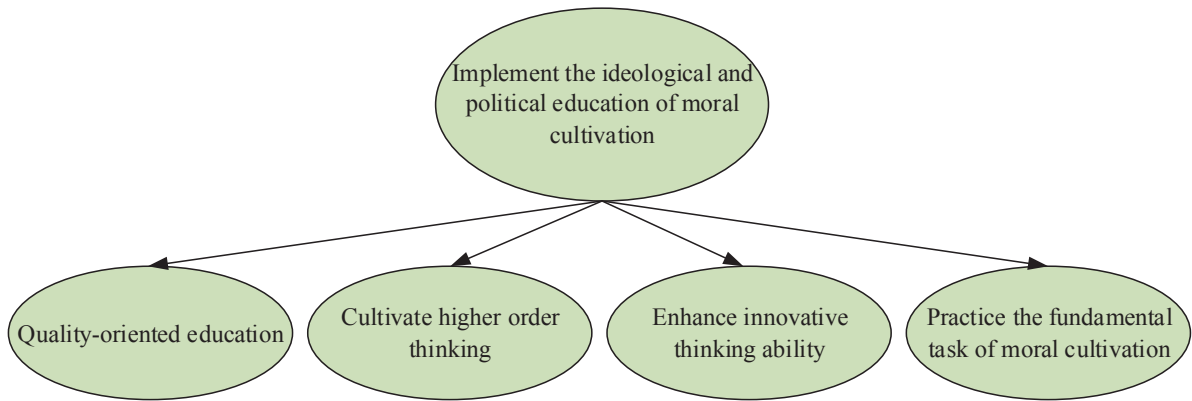
Deep learning; Moral education; Paradigm transformation; Innovative thinking; Quality education

## 1. INTRODUCTION

In recent years, the importance of education such as ideology and political awareness has been increasingly recognized and emphasized, and also gradually become one of the mission tasks of universities [1-2]. Deep learning as an emerging educational tool has also been increasingly emphasized in discipline education and talent training [3-4]. With the help of deep learning technology, education can better implement the fundamental task of establishing moral education and cultivate high quality talents with sensitive thinking and outstanding ability [5-6]. The literature [7] used intelligent technology to study the management system framework of civic thought education, including four aspects: work leadership system, curriculum management system, special activities development system, and level evaluation system. The main part of the study in the literature [8] examines the paradigm of education, and the authors analyze the shortcomings of the traditional model of didactic education and present the need for the transition to a modern educational model.

## 2. THE APPLICATION VALUE OF DEEP LEARNING IN THE TEACHING OF IDEOLOGY AND POLITICS IN COLLEGES AND UNIVERSITIES

In the perspective of deep learning, the goal of ideological and political education is to implement moral education. The methods and techniques of deep learning can be applied to all aspects of ideological and political education, in which the ideological and political education process of implementing moral education is shown in Figure 1.



**Figure 1.** Process of ideological and political education

### **2.1. REFLECTING QUALITY EDUCATION ORIENTATION**

The fundamental task of education includes the focus on nurturing people with moral values, and teachers should clarify the direction of nurturing people accordingly and target core literacy development goals. Quality education aims to promote students' continuous learning so that they can apply their existing knowledge to new situations, which fits with deep learning. Therefore, the application of deep learning in teaching related to cultivating students' moral quality can promote the development of quality education, and quality education can also react to deep learning, and the two can promote each other.

### **2.2. DEVELOP STUDENTS' HIGHER-ORDER THINKING**

In the context of the new college entrance examination, teachers applying the concept of deep learning can cultivate students' higher-order thinking, help improve students' logical reasoning ability, allow students to apply what they have learned flexibly, and promote the improvement of students' ideological and political learning level and academic performance. Teachers apply the concept of deep learning in ideology and politics teaching can enable students to analyze problems comprehensively and propose new ways to solve them in the process of learning. Deep learning meets the requirements of the college entrance examination reform and enables students to transition from shallow learning to deep learning and then achieve the goal of developing higher-order thinking.

### **2.3. ENHANCE STUDENTS' CREATIVE THINKING SKILLS**

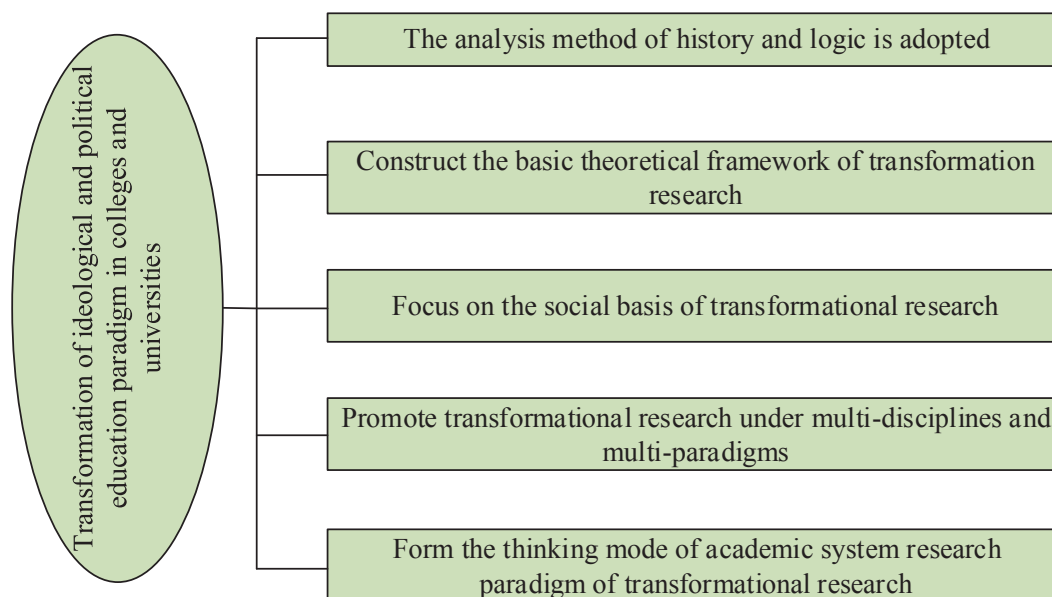
At the present stage of college ideology and politics teaching, there are relatively few teaching activities carried out under the deep learning perspective, which can hardly meet the learning needs of students. Following the law of cognitive development of college students, deep learning activities pointing to innovative development goals can enhance students' innovative thinking ability. Teachers should discuss current news and real cases with students and encourage them to use their ideological and political knowledge to solve problems, so as to enlighten their creative thinking and make them put forward their own ideas through analysis and judgment, which can improve their creative thinking ability.

### **2.4. PRACTICING THE FUNDAMENTAL TASK OF ESTABLISHING MORAL EDUCATION**

To establish moral education, as the name implies, is to take moral education as the first, through positive education to guide, sensitize and inspire people. Teachers should impart efficient methods of learning ideological and political knowledge to students, change the traditional thinking of exam-oriented education, improve students' moral cultivation, let students improve their moral level while learning knowledge, and give full play to the advantages of deep learning to cultivate students' good ideological and moral qualities.

### 3. IDEOLOGICAL AND POLITICAL EDUCATION PARADIGM TRANSFORMATION RESEARCH CONCEPT IN UNIVERSITIES

The paradigm transformation of ideological and political education under the perspective of deep learning is a current issue that needs to be urgently explored, and its steps are divided into five, as shown in Figure 2.



**Figure 2.** Steps of ideological and political education paradigm transformation

#### 3.1. HISTORICAL AND LOGICAL UNIFICATION OF THE ANALYTICAL APPROACH

Using the unified analysis of history and logic to study the modern transformation of education requires following the principle that the historical development of education is consistent with the logical existence, and examining the historical development and modern transformation in the vision of the Party's ideological and political education history. At the same time, logical assumptions and presuppositional reflections are needed to answer key questions such as whether political education is in transformation, the motives and paths of transformation. Finally, it is necessary to pay attention to the logical order of categories and the consistency of temporal order, and to study the elements of transformation of ideological and political education, such as functional orientation, functional role, educational content, carrier methods, institutional mechanisms, etc.

#### 3.2. CONSTRUCTING A BASIC THEORETICAL FRAMEWORK FOR TRANSFORMATION RESEARCH

Transformation of ideological and political education is a major trend in the development of theory and practice in the field of ideological and political education, and the connotation of modern transformation of ideological and political education is a prerequisite issue that needs to be explained in the research on modern transformation of ideological and political education. The diversity of research themes reflects that the academic community has not yet found a point, resulting in more words such as "improve" and "strengthen" in the central documents, while the socialized language uses words such as "innovation" and "development". The study of modern transformation of ideological and political education has not formed an authoritative linguistic expression, as a result, more words such as "innovation" and "development" are used in the central documents, and more words such as "modernization" are used in the social language. The study of modern transformation of ideological and political education is a socio-historical process of the generation of elements, structures and functions of ideological and political education system, which requires the establishment of a theoretical analysis

framework. The transformation of ideological and political education is a general concept and analytical tool, including the transformation of form, the adjustment of structure, the increase of elements, etc., and also includes conversion, change, innovation, improvement, and development.

### **3.3. FOCUS ON THE SOCIAL BASIS OF TRANSFORMATION RESEARCH**

It is very important to pay attention to the social basis of modern transformation of ideological and political education, and only by revealing the modern transformation of education from the social perspective can the academic value and practical significance of the study of modern transformation of education be better enriched and realized. Ideological education needs to interact with society from a sociological perspective and reveal the basic horizon of its modern transformation. At the same time, the current social context of China cannot be ignored. Therefore, it is necessary to combine elements of social environment while examining the modern transformation of society.

### **3.4. PROMOTE TRANSFORMATIVE RESEARCH IN MULTIPLE DISCIPLINES AND PARADIGMS**

Research on ideological and political education needs to be interdisciplinary and comprehensive, drawing on the theoretical achievements of related humanities, such as history, sociology, economics, philosophy, and political science. At the same time, research on ideological and political education needs to establish independent disciplinary consciousness and disciplinary self-awareness, get out of the misconception of simple concept transplantation and method application, and constantly use multidisciplinary thinking methods and cross-disciplinary research paradigms to conduct research, unify experience summary and theory construction, combine academic research with realistic care, and highlight its topicality.

### **3.5. FORMATION OF THE ACADEMIC SYSTEM RESEARCH PARADIGM AND ACTION SYSTEM WAY OF THINKING FOR TRANSFORMATION RESEARCH**

The use of educational systems thinking is a fundamental requirement of educational systems methodology and a fundamental way of thinking for conducting modern transformation research in education. This requires analyzing and studying the interaction between ideological and political education and social systems from a systemic viewpoint and constructing an all-temporal view of educational system research. Under this view, it is necessary to consider the close connection between the educational system and the social environment system and to study the modern transformation of education holistically. In addition, the elements, structure, and functions of the educational system are studied from a holistic perspective using systems thinking, and an academic systems research paradigm and an action systems thinking paradigm accepted and recognized by the academic community is formed so that people can develop a systems way of thinking in order to evoke a new understanding and grasp of the transformation of this educational system.

## **4. CONCLUSION**

This paper puts forward the application value of deep learning in college ideological and political education, including reflecting the orientation of quality education, cultivating students' higher-order thinking ability, enhancing students' innovative thinking ability and practicing the fundamental task of establishing moral education, and further discusses the conception of paradigm transformation of college ideological and political education. Through the analytical method of unifying history and logic, constructing the basic theoretical framework of transformation research, focusing on the social foundation of transformation research, promoting transformation research under multi-disciplinary and multi-paradigm, and forming

the academic system research paradigm and action system way of thinking of transformation research, this paper provides theoretical references and practical paths for promoting the transformation of this educational paradigm. Finally, this paper argues that introducing deep learning into education teaching and combining the ideas of transformation research is expected to stimulate students' thinking ability, improve their innovation ability and ability to deal with complex situations, and thus contribute to the cultivation of high quality talents.

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# THE CURRENT SITUATION OF INTELLIGENT LIBRARY SERVICES AND SERVICE UPGRADING MEASURES IN UNIVERSITIES UNDER “INTERNET+” ENVIRONMENT

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## ABSTRACT

The purpose of this paper is to discuss the current situation and service upgrading measures of university intelligent library service under the environment of “Internet+”. Through sorting out and analyzing the services of university intelligent libraries, the paper proposes four upgrading measures for the intelligent service mode of university libraries in “Internet+”: enhancing user privacy protection, creating subject-specific data information, enhancing digital information service and creating “library+” service mode. The implementation of these measures will further promote the improvement of the service level and mechanism of university intelligent libraries.

## KEYWORDS

Smart library; Internet+; Service upgrade; Privacy protection; Digital informatization

## 1. INTRODUCTION

With the rapid development of information technology, digitalization, networking and intelligence have become the mainstream trend of current social development [1-2]. In this background, intelligent library plays an extremely important role as part of the digital construction of universities [3-4]. Nowadays, university library services in the “Internet+” environment are no longer the functions of simple borrowing and data acquisition in the traditional mode, but need to meet the increasing knowledge needs of readers through more intelligent, personalized and specialized services [5-7]. The literature [8] explored the development of a smart library project that aims to provide information and library services for educational and scientific activities. Pandey, J et al. investigated how to implement a smart library system using Internet of Things (IoT) technology. and explored how sensors and network technologies can be combined to monitor, collect and manage various data in the library, including book locations, circulation records, and environmental temperature and humidity [9].



## **2. INTELLIGENT LIBRARY SERVICE WORK IN UNIVERSITIES**

### **2.1. APPLICATION SERVICES OF INTELLIGENT SPACE CONSTRUCTION AND FACILITIES AND EQUIPMENT**

With the help of modern architectural design aesthetics, the smart space construction of the smart library uses information technology resource facilities and intelligent and convenient equipment to achieve space construction and improvement. Smart building is the core, including smart building, environmental monitoring and purification, lighting system, green ecology, etc. Personalized demand scene space includes virtual reality book library, VR space, intelligent reading kiosk, naked eye 3D space, etc. Facility and equipment applications include mobile terminals, smart wear, sensing, security, special equipment, such as 3D printing equipment, drones, etc.

### **2.2. SMART LIBRARY TECHNOLOGY SERVICES**

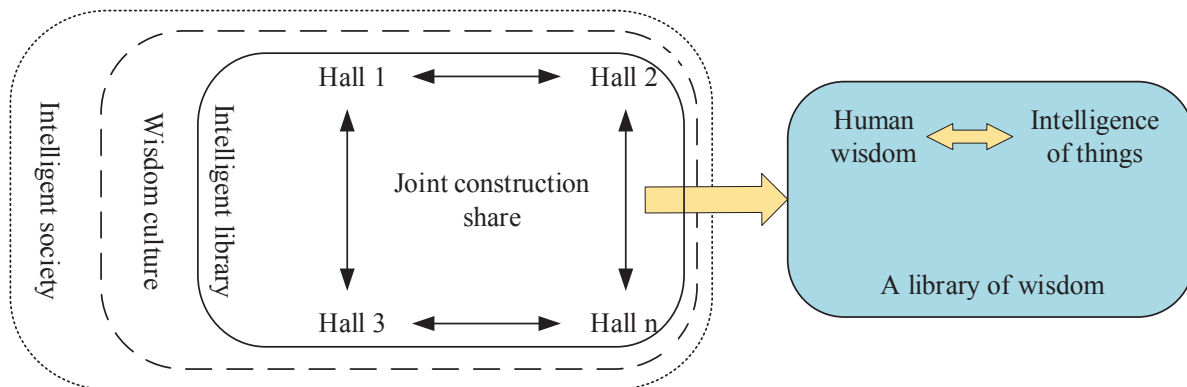
Libraries form the results and products of smart library application level through 5G network technology, AI, IoT, cloud computing, big data, artificial intelligence, blockchain and other new generation information technology. Through these, the technical support of comprehensive perception, ubiquitous interconnection, pervasive computing and convergent application is provided for university smart libraries. 5G network technology can be applied to library smart venue construction, intelligent security, main branch library construction, mobile library, etc. By combining with AI artificial intelligence technology, intelligent inventory robots and online intelligent consultation robots are designed. The combination with blockchain technology can protect intellectual property rights, implement data resource sharing, generate knowledge resources, and protect readers' personal information.

### **2.3. SMART LIBRARY PLATFORM SERVICES**

The Smart Library Platform is an open platform that provides comprehensive services for librarians, patrons and affiliated institutions based on new technologies. The platform includes central knowledge base, cloud computing, virtualization, intelligent interview, librarian wisdom service, reader application service and library service platform. Among them, the central knowledge base, cloud computing and virtualization platform adopts a new generation of Internet microservice technology architecture and supports cloud services, multi-terminal application development and open interface services. The reader application service platform provides convenient, perceptive, fine and fast services for readers. The platform realizes the concept of unified resources, unified services, cross-border integration and open sharing, which is in line with the comprehensive service idea of smart library.

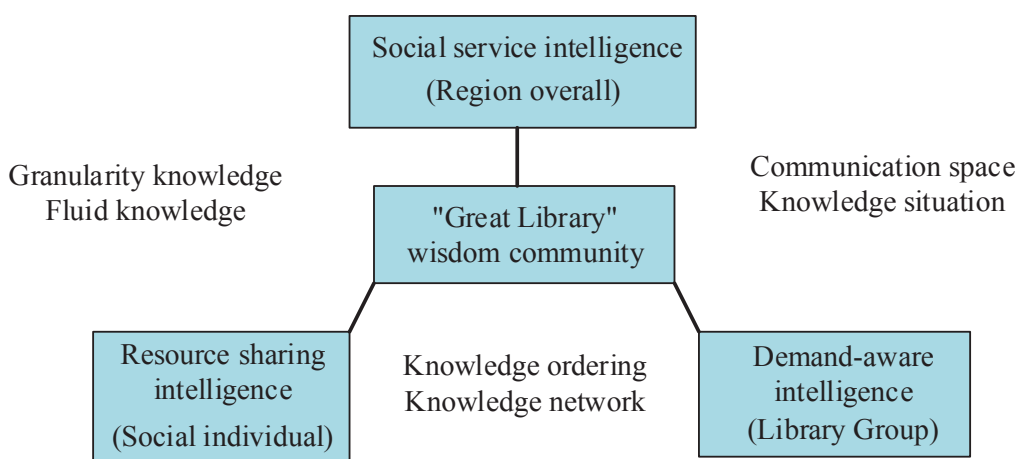
### **2.4. SERVICE MECHANISM OF SMART LIBRARY**

The composition of smart libraries is user-centered, and the services provided are designed to meet the needs of users. In order to meet the needs of users at different levels, targeted services should be provided according to the differences of customers. Specifically, the level of users' needs can be simply divided into general services, deep knowledge services and innovative services. In addition, the main role of smart libraries is to provide resources, and the effectiveness of the services can be further enhanced if the resources can be shared among each other. Therefore, a common sharing atmosphere should be formed within the library industry, and in this process, new technologies such as Internet of Things and blockchain are used to build an open ecology. The smart library service system is shown in Figure 1.



**Figure 1.** Service mechanism of smart library

In terms of service strategy, smart libraries aim to create an intelligent learning environment for users. The core of achieving this goal is to effectively suppress the heuristic cognitive load of users by building a smart environment to achieve a deep integration between “space”, “people” and “resources”. The logical architecture of the strategy of intelligent library services is shown in Figure 2.



**Figure 2.** Intelligent service strategy logic of intelligent library

### 3. UPGRADING MEASURES FOR THE INTELLIGENT SERVICE MODE OF “INTERNET+” UNIVERSITY LIBRARIES

#### 3.1. ENHANCE USER PRIVACY PROTECTION

With the rapid development of smart devices, library mobile services make library smart services more convenient, however, big data and cloud computing bring threats to users’ privacy and security. In order to protect users’ privacy, I suggest adding a login password process when users read online, logging out their login and browsing records after they finish reading, and strengthening security protection and encryption when collecting and organizing data. In this way, the “Internet+” university library intelligent service mode can be truly recognized by users.

#### 3.2. CREATE INFORMATION ON DISCIPLINE SPECIALTY DATA

The “Internet+” college library wisdom service model can enable subject specialized faculty members to create subject specialized data information through the Internet. College libraries can hire professional and technical personnel to manage the data of subject specialties together with subject specialties faculty members. Facing the expanding needs of school students, each subject specialties should be given certain modification authority and modified by each subject leader, so that the data of subject specialties in college libraries can be

constantly updated and improved to meet the needs of school students for subject specialties knowledge. The librarians of universities can provide certain consultation services for students through the thematic tracking and information pushing of disciplines and specialties, provide certain thematic consultation for students' graduation design, and push the data and information resources and reference materials that students need in graduation design directly to students.

### **3.3. ENHANCE DIGITAL INFORMATION SERVICES**

In order to better serve the majority of users, university libraries must increase the construction of digital information services, through the application of "Internet +" technology to provide strong support for the construction of digital information services. For example, cell phone APP, palm library, online reading and other services can be developed. The offline and online services such as paper book inquiry, reservation and renewal can also be launched. It can also promote audio books and multimedia playback, so that users can "read" with their ears and their eyesight is protected.

### **3.4. CREATE A "LIBRARY+" SERVICE MODEL**

Internet technology can provide services for the infrastructure of university libraries and create a "library+" service model. In this model, a large amount of data can be sorted and summarized to make library management smarter, easier and more orderly. For example, university library staff can use "Internet+" technology to provide users with proprietary IDs and cards, so that users can store, borrow, and check out a series of activities for themselves. This will not only enable users to use books, materials and information safely and effectively, but also save relevant information in time, and finally provide comprehensive services for users' work and study.

## **4. CONCLUSION**

This paper analyzes the intelligent library services of universities and proposes four upgrading measures to promote the intelligent service mode of university libraries in the "Internet+" environment. These measures include enhancing user privacy protection, creating subject-specific data information, enhancing digital information services and creating a "library+" service model. The implementation of these measures can improve the service level and mechanism of university libraries to meet the needs of the digital era. In addition, it is also necessary to focus on user privacy protection to ensure information security and to improve the social influence and status of university smart libraries by attracting more users. In conclusion, the upgrading measures proposed in this paper are to meet the development trend of university library services in the digital and intelligent environment in order to better meet the growing information needs and service demands of users.

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# EXPLORING DIGITAL TRANSFORMATION STRATEGIES UNDER INDUSTRIAL RESTRUCTURING IN ECOLOGICAL ECONOMIC ZONES

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## ABSTRACT

This paper first emphasizes the role of digitalization in promoting the advanced industrial structure by analyzing the composition of the industrial structure in the eco-economic zone. Among them, digitalization factors that drive new product development and influence the supply and demand of professionals are considered to be important driving forces for achieving advancedization. A series of digital transformation strategies are then proposed to address the needs of industrial restructuring in the eco-economic zone. These strategies include promoting the construction of digital infrastructure, fostering new digital industry dynamics, strengthening digital technology innovation and application, focusing on the training of digital talents, and increasing policy support. Therefore, by adopting these strategies, the optimization and upgrading of the industrial structure of the eco-economic zone can be promoted to achieve sustainable development goals.

## KEYWORDS

Eco-economic zone; industrial restructuring; Digital transformation; Product development; Infrastructure development

## 1. INTRODUCTION

Digital transformation has become an important trend in global economic development, and for eco-economic zones, digital transformation is also an important means to promote their industrial restructuring [1-2]. In the past few years, China's digital economy has grown faster than the traditional economy, and digital transformation has become a necessary tool to promote economic transformation and upgrading [3]. With the adjustment of industrial structure in the eco-economic zone, digital transformation has also gradually become an important way to promote industrial upgrading and transformation in the eco-economic zone [4]. Therefore, in order to realize digital transformation and promote industrial upgrading in ecological economic zones, the strategies and modes of digital transformation must be explored in order to promote the sustainable development of digital economy and realize the optimization and upgrading of industrial structure in ecological economic zones [5-6]. The literature [7] focuses on the impact of digital transformation in terms of data-driven operations management and organizational management in industrial practices. The authors show that digital transformation offers opportunities for companies in terms of organizational structure, employee training, and technology experimentation, but also brings negative impacts, such as challenges in organizational culture and security and legal issues in the application of technology. The literature [8] focused on the impact of urbanization and industrial structure on carbon emissions in the Huaihe River Basin eco-economic zone. Researchers found that with

the acceleration of urbanization and the optimization and adjustment of industrial structure, the total carbon emissions in the region showed a trend of rising and then falling. Among them, urbanization has a significant positive effect on carbon emissions, while industrial restructuring has a significant negative effect on carbon emissions.

## 2. COMPOSITION OF THE INDUSTRIAL STRUCTURE OF THE ECO-ECONOMIC ZONE

The Yellow River Delta Ecological Economic Zone has developed into an efficient ecological economic zone with resource-based industries as its pillar industries, while focusing on the development of peripheral industries, service industries, etc. The total value of agriculture in the economic zone in 2021 is 29.385 billion yuan, accounting for 6.86% of Shandong Province, a slight decrease compared to last year, and the level of agricultural mechanization is relatively backward compared to other regions, and traditional agriculture still accounts for A large proportion of the. The gross value of the secondary industry was 340.165 billion yuan, accounting for 13.46% of Shandong Province, an increase of 0.4 percentage points, mainly relying on the strong industrial base of petrochemical industry. The gross value of tertiary industry is 172.169 billion yuan, accounting for 8.17% of Shandong Province, basically the same compared with last year, but the low proportion of the situation still needs to be improved. Since the establishment of the Yellow River Delta Efficient Ecological Economic Zone in 2008, the development of the primary industry has been relatively stable, while the secondary and tertiary industries have both increased significantly, as shown in Figure 1. In order to promote the development of regional industrial clusters, rationalize the industrial structure, give full play to the advantages of traditional agricultural base, consolidate the strong strength of industry, encourage the development of new logistics and service industries, and promote the overall economic development.

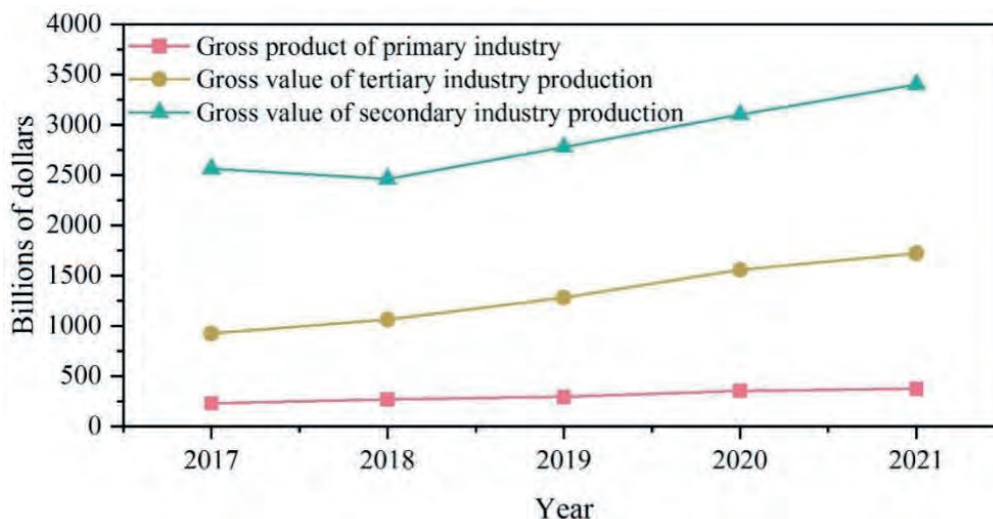


Figure 1. Gross product of the three main industries in the eco-economic zone

## 3. DIGITIZATION OF INDUSTRIES IN ECO-ECONOMIC ZONES FOR ADVANCED INDUSTRIAL STRUCTURE

### 3.1. PROMOTE NEW PRODUCT DEVELOPMENT FOR ADVANCED

Moore's law indicates that the development speed of new products continues to increase over a certain period of time, while the frequency of updates accelerates. As the core of the digital economy, information technology represents the essence of the digital economy and conforms to Moore's Law of information technology. With the development of digitization of industries in the eco-economic zone, the innovation and application of digital technologies

promote the emergence of new goods, which in turn give rise to new industries. As the digitization of industries in the eco-economy zone increases, digital technology innovation and application in enterprises become increasingly mature, and new products are able to meet new needs of people. Companies will take the initiative to improve the productivity of new products and rely on the competitiveness of new products to expand their market share and sales ratio. After a period of competition and elimination, traditional industries that lack competitive advantages will reduce the number of traditional products produced, while some traditional industries in the eco-economic zone will be replaced by new industries that are more competitive. The emergence and development of new industries is conducive to the upgrading of industrial structure. At the same time, in the process of digitization of industries in the eco-economic zone, the development and application of new digital technologies improve the old ones, enhance the quality of similar products or improve the experience of similar services. In this way, the products and services become more competitive in the market and more in line with consumer needs, and to a certain extent, promote the advanced industrial structure.

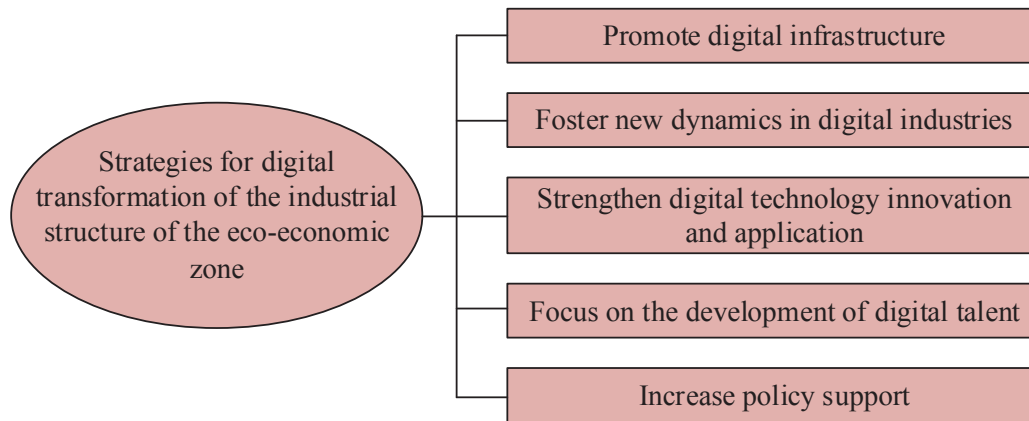
In addition, the in-depth application of digital technology within the eco-economic zone industry can effectively recover idle resources and provide more ways to utilize them. Taking platform technology in digital technology as an example, enterprises can share idle resources to other enterprises to improve resource allocation efficiency. The rich sharing channels provide a quality environment for technological innovation and promote product development.

### **3.2. INFLUENCE THE SUPPLY AND DEMAND OF PROFESSIONALS TO PROMOTE HEIGHTENED**

The deepening application of the twin technologies of the digital economy, such as artificial intelligence, in the primary industry can effectively promote the improvement of productivity in the primary industry. However, the nature of primary industry products determines the stability of its market demand, and the demand quantity remains unchanged while reducing the demand for labor factors related to quantity, which will release a certain degree of labor in the primary industry. The released labor force can be put into the production process of other industries after the corresponding talent training, thus improving the employment structure and thus contributing to the advanced industrial structure of the eco-economic zone. Finally, as the digitization of industries in the eco-economic zone leads to the reorganization of industrial chains, the corresponding division of labor will also undergo certain changes, which in general will make the division of labor more detailed, clearer and more explicit, and the new labor positions will put forward new requirements for the labor force, while the reallocation of labor factors caused by this demand will also have a certain positive impact on the industrial structure of the eco-economic zone.

## **4. STRATEGY OF DIGITAL TRANSFORMATION OF INDUSTRIAL STRUCTURE IN ECOLOGICAL ECONOMIC ZONE**

With the industrial restructuring of the eco-economic zone, digital transformation has become an important tool to promote economic transformation and upgrading. Below are some digital transformation strategies to help eco-economic zones achieve industrial upgrading and transformation. The key steps in the digital transformation process in the Eco-Economic Zone are shown in Figure 2.



**Figure 2.** Key steps in digital transformation

#### **4.1. PROMOTE DIGITAL INFRASTRUCTURE DEVELOPMENT**

Digital infrastructure is the foundation of digital transformation, including high-speed communication networks, data centers, cloud computing, etc. To achieve digital transformation, the eco-economic zone must accelerate the construction of digital infrastructure, including the construction of 5G networks, the promotion and application of technologies such as the Internet of Things and the industrial Internet.

#### **4.2. CULTIVATE NEW DYNAMIC ENERGY OF DIGITAL INDUSTRY**

Eco-economic zones need to cultivate new development drivers in the digital economy, such as the Internet, Internet of Things, smart manufacturing, and artificial intelligence. These new industries can help transform and upgrade the local economy and enhance its development momentum.

#### **4.3. STRENGTHEN DIGITAL TECHNOLOGY INNOVATION AND APPLICATION**

To promote digital transformation, eco-economic zones need to actively develop digital technologies and apply them to actual production and operation. This can include the research and development of digital technologies, the application of new technologies, digital marketing, digital management, etc.

#### **4.4. FOCUS ON THE CULTIVATION OF DIGITAL TALENTS**

To promote digital transformation, the eco-economy needs to strengthen the training and introduction of digital talents. We need to train talents who can handle the importance of data and digitization, train talents with digital technology and digital management skills, and prioritize attracting innovative and high-end talents so that the digital economy can grow and develop.

#### **4.5. INCREASE POLICY SUPPORT**

In order to promote digital transformation, the eco-economic zone needs to increase support for the digital industry. Policies to encourage the development of the digital economy can be formulated, and special financial support, tax incentives and other policy support can be provided to digital enterprises and projects to promote the healthy and rapid development of the digital economy.

In summary, the above five aspects are all important strategies to promote digital transformation, and ecological economic zones can make targeted plans based on their actual conditions to promote economic restructuring and achieve industrial upgrading and transformation through digital transformation.



## 5. CONCLUSION

Digital transformation of the industrial structure of eco-economic zones can promote advanced industrial structure, promote new product development and influence the supply and demand of professionals, thus achieving a higher level of industrial development. Digital transformation plays an important role in the industrial restructuring of eco-economic zones. By making rational use of digital technologies and promoting the implementation of digital transformation strategies, the optimization and upgrading of the industrial structure of eco-economic zones can be achieved, further promoting sustainable economic development.

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# RESEARCH ON THE APPLICATION OF NATURAL ELEMENTS IN MODERN INTERIOR DESIGN UNDER NEW MEDIA ENVIRONMENT

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## ABSTRACT

With the development of society, people are demanding more and more comfort and beauty from their indoor environment. The application of natural elements has received wide attention because of the visual, ecological and cultural effects, as well as the psychological and functional values they bring to human beings. Starting from the analysis of the interior effects of natural elements, this paper discusses the embodiment of the value of natural elements in interior spaces and illustrates the way of applying natural elements in interior hard and soft furnishings through examples of architectural decorative interior design. It is found that the use of natural elements can breathe life and vitality into the interior environment, as well as meet people's psychological needs and practical use needs. In interior design, the application of natural elements has become an important design trend, bringing new thinking and possibilities to modern interior design.

## KEYWORDS

Natural elements; Interior design; Ecological effect; Cultural effect; Psychological value; Functional value

## 1. INTRODUCTION

With the continuous improvement of people's living standard, people's demand for indoor environment has gradually changed, no longer being simple accommodation and workplace, but paying more attention to comfort and aesthetics [1-2]. Meanwhile, with the advent of the new media era, people's desire for natural environment has become stronger [3]. Natural elements have a unique charm and can bring a sense of comfort and relaxation to people [4]. Therefore, the use of natural elements in interior design is receiving more and more attention and research [5-6]. Ling, J showed that the rapid development of the decoration industry has created a good space for interior decoration, and the public pays more attention to the integration of natural elements in the process of interior decoration [7]. The literature [8] explored how to create an interior environment that is beneficial to human health and well-being by incorporating natural elements such as plants, water and rocks and by using natural colors, soft lighting and natural materials.

## 2. THE DESIGN CONCEPT OF NATURAL ELEMENTS IN THE INTERIOR ENVIRONMENT

### 2.1. ANALYSIS OF THE INDOOR EFFECT OF NATURAL ELEMENTS

#### 2.1.1. THE VISUAL AESTHETIC EFFECT OF NATURAL ELEMENTS IN INTERIOR SPACE

Introducing natural elements into the interior space creates a spatial environment that is similar to that of nature. Plants, water features, rocks and other natural elements in the interior space form a sense of space, form, color and sound, etc., which greatly enrich the expressive power of the interior space environment, delighting the eyes and the mood and generating infinite reverie.

#### 2.1.2. ECOLOGICAL EFFECT OF NATURAL ELEMENTS IN THE INTERIOR SPACE

In the indoor space, the ecological function of outdoor natural elements is similar to a mechanized air regulator, which can not only play the role of purifying air and improving climate, but also improve the virtuous cycle of indoor space environment. At the same time, natural elements can be utilized in the building in the way of space constructed in layers, which can play a role in adding greening rate to the current situation of high urban population, tight living land and less public green space environment.

#### 2.1.3. THE CULTURAL EFFECT OF NATURAL ELEMENTS IN INTERIOR SPACE

As we all know, art and design is a kind of culture, and the two are inseparable from each other. The famous British anthropologist Malinowski, taking the functionality of culture as a principle, divided the cultural phenomenon into four main elements: material culture, language, spiritual culture, and social organization. As art design is the creation of material form, it belongs to the material culture phenomenon, and in the social form, cultures have been interpenetrating and influencing each other since the beginning. Therefore, natural elements not only make the interior space closer to nature, but also add to the artistic atmosphere and cultural connotation of the interior environment. The analysis table of the indoor effect of natural elements is shown in Table 1.

**Table 1.** Indoor effects of natural elements

Analysis of the indoor effects of natural elements	Aesthetic effects in the interior	Visual centrality
		Softening the interface
		Contextualising
		Filling the space
	Indoor ecological effect	Purification
		Health promotion
		Local environmental regulation
	Indoor cultural effects	Regional character
		Style
		Cultural context

### 2.2. THE VALUE OF USING NATURAL ELEMENTS IN INTERIOR SPACE

#### 2.2.1. AESTHETIC VALUE OF THE USE OF NATURAL ELEMENTS IN INTERIOR SPACE

Analyzed from the aesthetic point of view of indoor space, natural elements such as plants, water features and rocks have good aesthetic value, such as the image beauty, shape beauty,

color beauty of natural elements, as well as the smell beauty of plant elements, the auditory beauty of water elements, etc., which not only beautify the indoor space environment, but also improve the taste of the overall interior style.

### 2.2.2. THE PSYCHOLOGICAL VALUE OF USING NATURAL ELEMENTS IN INTERIOR SPACE

The appreciation of natural elements in the room can also suppress symptoms of over-excitation of the sympathetic nervous system, such as hypertension. The positive and healthy emotions induced by the natural environment can also greatly enhance people's performance in activities that test creativity and hyperactivity. Viewing the natural environment can lower blood pressure and regulate heart rate, which is a very effective way to relieve mental stress and psychological pressure for the stressed urban population.

### 2.2.3. FUNCTIONAL VALUE OF NATURAL ELEMENTS IN INTERIOR SPACE

Due to the increasing flexibility of modern indoor space, the integration of indoor and outdoor space makes the space penetrate and extend each other, and natural elements act as the connecting piece of the transitional space. Therefore, the configuration of indoor plants should echo the outdoor space, which can produce spatial continuity; the design of water bodies in the transitional space can play the role of connecting the indoor and outdoor spaces. Through the use of glass walls or bay windows, the outdoor scenery is introduced into the indoor space and becomes a part of the indoor spatial environment. The list of indoor values of natural elements is shown in Table 2.

**Table 2.** Indoor values of natural elements

The interior value of natural elements	Aesthetic values	Reflecting artistic beauty
		Enriching interior colour
		Create a sense of mood
	Psychological value	Psychological conditioning
		Satisfies the desire to return to nature
	Functional value	Spatial separation
		Spatial cascading
		Spatial definition
		Spatial buffering

## 3. THE APPLICATION OF NATURAL ELEMENTS IN ARCHITECTURAL DECORATION INTERIOR DESIGN

### 3.1. APPLICATION OF NATURAL ELEMENTS IN INTERIOR HARD DECORATION

#### (1) Top decoration

For the interior space, the top surface decoration is for the ceiling or shed roof decoration. In interior design, the top surface of the space can also be designed and shaped adequately. For example, to renovate and design the roof of some solid wood structures, the beams and columns can be directly displayed by renovating them, followed by decorative materials in the color of the original wood to make the whole decoration more textured and further reshape the interior space so that it can be organically integrated with the natural environment.

#### (2) Interior wall decoration

The walls of the interior space can be divided for the overall interior layout, so that different interior spaces belong to different functions. For the interior wall decoration, when the choice

of wall paving materials, you can also choose masonry for stacking, the color of these masonry has dark and light, and the volume of different sizes, so that the wall design will also be full of changes, showing the natural form, so that people can get a rustic feeling.

### (3) Column decoration

When decorating the column surface, it is usually done by carving, whitewashing, or choosing some decorative items to paste. For example, the main body can be made into the form of a tree trunk, and a paint with imitation bark texture is used on the column. And to make the design style of the column and the overall interior design style has unity, people in such an indoor environment, like walking and wandering in nature, more with a pleasant, relaxed mood.

### (4) Floor decoration

As the most basic indoor space interface, ground decoration can be carried out on the basis of different functional areas and changes in ground design. For example, when arranging the scene, you can also consider a certain theme, for different local areas, carry out the corresponding design, and choose some animal and plant forms into it, and according to the different colors and materials, the collage of patterns, the design of some special patterns of different shapes, to further make the indoor space with better decorative.

## **3.2. APPLICATION OF NATURAL ELEMENTS IN INTERIOR SOFT FURNISHINGS**

### (1) Interior furniture decoration

Furniture, as the main object that sets off the interior environment, is an important aspect of interior decoration. The shape, color, and material of the furniture affect the overall style of the interior space. For example, most of the B&B interior furniture style is relatively rustic, while many of the city's major hotels have more luxurious interiors, and the style of furniture used in the two is completely different.

### (2) Decorative fabrics

In the interior soft decoration, decorative fabrics can also play a very good decorative effect, such as curtains, carpets, dolls, chair cushions, etc. are common decorative fabrics in the interior space. These decorative fabrics made of natural materials are not only soft and comfortable, but also can bring a warm and comfortable feeling to the whole building interior space. Generally speaking, the decorative fabrics used in different architectural spaces will be different, for example, the house used for meeting and talking can use wall carpets and other objects to decorate the walls, so that the decorative effect and the function of the room in harmony, so that people can naturally relax in such an indoor environment.

### (3) The artwork furnished

Artwork can further accentuate the atmosphere of the room, reflecting the taste of the room owner. From the current interior decoration commonly used in decorative items, one is mainly practical, both decorative furnishing supplies, such as utensils, sculptures, etc. Among them, the vessels used to hold things and can be made into leaf shape, as if people in nature with leaves to hold food, as interesting. Another kind is purely for decorative furnishings, such as bionic specimens, handicrafts, etc. For example, in the process of designing an art exhibition hall in Beijing, the designer made specimens of bird feathers and used them as decorations for the hall because of the local white bird festival.

### (4) Lighting fixtures

In the interior decoration, lamps and lanterns not only play the role of lighting, but also the main products to set the atmosphere, with the effect of decorating the interior environment.

Some buildings use lamps and lanterns that are hand-woven, which can reflect the beauty of craftsmanship while inheriting the weaving technology. Some buildings make full use of the light and shadow effect of the lamps to decorate the room, so as to bring out the atmosphere of the room, such as adding some wall wash lamps that can assist the decorations to show the effect of burning flame or water flow.

#### **4. CONCLUSION**

This paper shows that the application of natural elements in modern interior design has become an important design trend by analyzing the design concept and effect of natural elements in the interior environment, and the way they are applied in architectural decoration interior design. The application of natural elements can bring more life and vitality to the interior environment, while satisfying people's needs both psychologically and in terms of practical use. Therefore, in the process of interior design, designers should pay more attention to the application of natural elements in the interior, and create a more comfortable, safe and healthy interior space through clever combination and application.

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# BIG DATA HELPS THE INTEGRATION PATH OF INTELLIGENT PARTY BUILDING AND CIVIC EDUCATION

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## ABSTRACT

Big data provides an innovative path for the integration of intelligent party building and civic education. This paper constructs the structural level of the intelligent party building system based on big data technology, and designs the functions and boundaries of the system from four levels: technology, data, application and users. With the help of big data analysis on the integration of party building and thinking education for nurturing people, the problems and integration effects of collaborative nurturing are discussed. In terms of the guidance of collaborative parenting, 65.42% of the study sample failed to meet the standard. In teaching practice, a larger proportion of teachers are not clear about how to bring into play the integration of intelligent party building and civic education. This study can provide a reference for the integration of party building and thinking education.

## KEYWORDS

Intelligent party building; Civic education; Big data analysis; Collaborative education; Teaching practice

## 1. INTRODUCTION

Wisdom party building in higher education mainly relies on diverse technical means, such as the Internet, to better realize the reliable transmission of information. Moreover, in the actual integration of party building work, it is possible to understand the situation of party building activities and to regulate reliability according to the actual work in order to facilitate the development of targeted measures for better regulation and control, which will reflect the role of wisdom [1-3]. At the same time, in the context of the stable development of big data, students can use the Internet to obtain information without the constraints of time and space [4-5]. Party building in higher education can have a certain understanding of the dynamic situation of party members through the use of a variety of data and information, which helps to scientifically optimize the mode of Civic Education, effectively integrate online and offline forms, and effectively improve the integration effect of intelligent Party building and Civic Education [6-7]. Feng, L et al. proposed a path optimization method based on deep learning for the integration innovation of Civic Education, which helps the Civic transformation of thinking [8]. Wang, N researched that there is a problem of insufficient integration in college Civic Education and used hierarchical analysis to construct a recommended method for Civic Education [9].

## 2. ESTABLISHMENT OF INTELLIGENT PARTY BUILDING SYSTEM IN COLLEGES AND UNIVERSITIES BASED ON BIG DATA

### 2.1. HIERARCHY OF BIG DATA SMART PARTY BUILDING SYSTEM STRUCTURE

The structure of the intelligent party building system of colleges and universities refers to the form of connection between several elements that make up the intelligent party building system of colleges and universities. The intelligent party building system of colleges and universities in the era of big data is a three-dimensional and multi-level network structure covering four layers of technology, data, application and users. The layered structure of big data wisdom party building system is shown in Table 1. At the technical level, with the upgrade and addition of information technology such as big data, cloud computing and artificial intelligence, the optimization of the intelligent party construction system in colleges and universities has a more powerful technical support. At the level of data resources, building a party construction data resource base with massive information is the basis for the construction of intelligent party construction system in colleges and universities, which includes basic information data, decision analysis data, business data and service data of teachers, students and party organizations at all levels. At the application level, the intelligent party construction system of colleges and universities integrates various applications such as talent cultivation, discipline construction, scientific research, social service and cultural construction. At the user level, the party committee of the university, party organizations at the college level, party branches of teachers and students, faculty members and student party members belong to four levels, with intersecting and independent user needs and functional requirements.

**Table 1.** Big Data Smart Party Building System Layered Structure

Levels	Application or object
User Layer	Party organizations at the faculty level, faculty and student awareness branches, staff and student members
Application Layer	Talent cultivation, discipline construction, scientific research, social services
Data Layer	Basic information data, decision analysis data, JUE organization activity data
Technical Layer	Big data, Internet, Internet of things, cloud computing, artificial intelligence

### 2.2. BIG DATA WISDOM PARTY BUILDING SYSTEM BOUNDARY DESIGN

Openness is one of the important features of the system. In the era of big data, the characteristics of information technology determine the openness of university wisdom party building system. Big data focuses on the correlation relationship between things, and the college wisdom party building system in the era of big data is an open system that explores the correlation relationship. It breaks through the limitation of traditional university party construction in time, space and territory, and relies on open network environment and data mining technology to collect and summarize the party construction data scattered in various departments and units. Through the data sharing platform, it realizes the integration between it and the external environment, so that the party construction big data resources gradually move toward open platform and open content.

### 2.3. EVOLUTION OF BIG DATA SMART PARTY BUILDING SYSTEM

The system has dynamic characteristics and evolution marks the movement, change and development of the system. The intelligent party building system of universities in the era of big data has dynamic evolutionary characteristics. The dynamism of the system is expressed by the fact that the external environment and internal conditions of the system are constantly evolving and developing. From the external environment, the core of intelligent party construction in colleges and universities is party construction, and with the development of the



times and changes of party conditions, the party construction work in colleges and universities should also keep pace with the times. From the internal conditions, the intelligent party construction system in colleges and universities is a complex system integrating people, technology and resources. In terms of technical update, the information technology such as big data, Internet of things and cloud computing, which is relied on for the construction of the intelligent party construction system in colleges and universities, is developing at a high speed, and the iterative upgrade of advanced technology forces the construction of the intelligent party construction system in colleges and universities to be updated continuously.

### 3. ANALYSIS OF THE INTEGRATION OF INTELLIGENT PARTY BUILDING AND CIVIC EDUCATION

#### 3.1. ANALYSIS OF THE PROBLEM OF INTEGRATING PARTY BUILDING AND CIVIC EDUCATION TO EDUCATE PEOPLE

Based on the big data analysis of the fusion of intelligent party construction and Civic Education in colleges and universities, the problems of Civic Education in colleges and universities at this stage are shown in Figure 1. The integration problem of party construction and thinking and politics is the most urgent one, accounting for 74.35%. This indicates that the current thinking and political education is often easily detached from party building and fails to bring into play the effect of synergistic education of the two. In terms of the guidance of collaborative education, 65.42% of the study samples failed to meet the standard. In teaching practice, a larger proportion of teachers are not clear about how to bring into play the integration of intelligent party building and civic education.

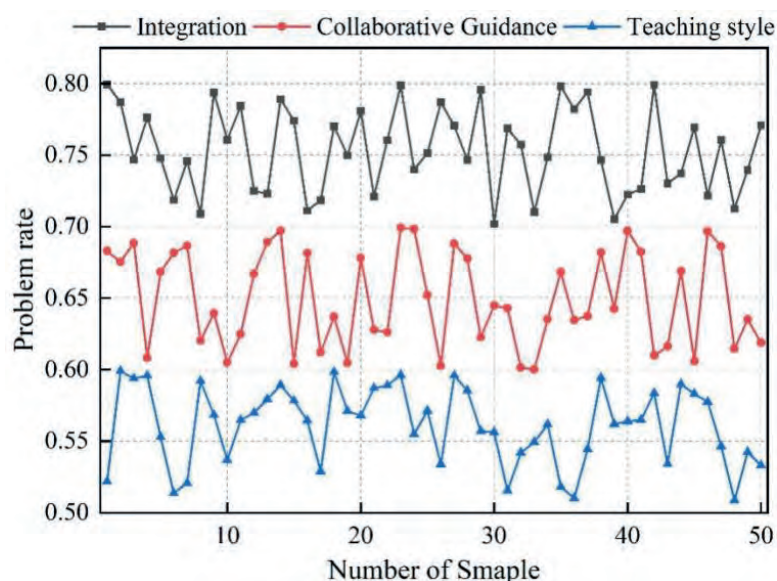
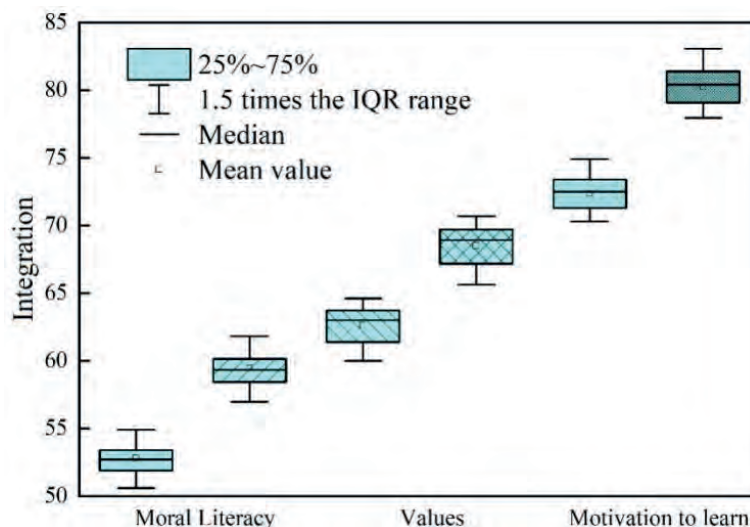


Figure 1. Problems of thinking and educating people in colleges and universities

#### 3.2. ANALYSIS OF THE INTEGRATION EFFECT OF INTELLIGENT PARTY BUILDING AND CIVIC EDUCATION

In the process of party building work, relevant staff actively use modern Internet and computer technology to carry out their work, integrate party building with modern science and technology, and realize the sharing of information resources. In the process of nurturing people in colleges and universities, there are two focuses, one is knowledge nurturing and the other is ideology nurturing. And party construction as the main way of ideological nurturing, colleges and universities should also actively take advantage of the development of the times when carrying out nurturing work with the help of party construction, and use intelligent party construction for education. The synergistic effect of ideological education and intelligent party

construction in colleges and universities is shown in Figure 2. Through the integration of smart party construction and ideological education, students' moral education has improved by 12.6%, the correctness of values has improved by 9.4%, and the motivation of study has improved by 10.9%. The integration of smart party construction and ideological and political education in colleges and universities is helpful to both the formation of correct concepts and the cultivation of moral literacy of students, and also has a positive effect on the improvement of students' comprehensive quality and awareness of maintaining socialist development.



**Figure 2.** Synergistic effect of Civic Education and Smart Party Building

#### 4. THE INTEGRATION PATH OF INTELLIGENT PARTY BUILDING AND CIVIC EDUCATION

The traditional mode of ideological and political education in colleges and universities is mainly based on teachers' oral lectures and ideological and political classroom lectures and college counselors' talks with students, which has certain limitations. Teachers in the front line of party building and ideological and political work in colleges and universities can innovate the carrier and explore new paths, actively use new platforms, such as Learning Power, microblogs, weibo, video open class, offline theme activities, etc., to exchange ideas and information with students and guide them to think deeply about social and current affairs and three attitudes. In actual teaching, teachers should pay attention to the latest data on the Internet that carry positive social energy, analyze and evaluate them, give play to their value, improve the attractiveness of teaching resources, and guide students to internalize their political identity. Party building and ideological and political workers can recommend various kinds of software that help students' political learning and cultural enhancement among student groups, and guide students, especially some party activists and reserve members, to use fragmented time to receive political theoretical knowledge and cultural classics.

#### 5. CONCLUSION

The era of big data provides help for education reform, but is equally laced with implications that need to be widely appreciated. In this paper, the structural level of the smart party building system is constructed based on big data technology, and the system boundary of smart party building is designed. Through the integration of smart party construction and Civic Education, students' moral education has improved by 12.6% and the correctness of values has increased by 9.4%. At the stage of practical teaching in colleges and universities, the integration of intelligent party construction and civic education is an inevitable trend of education reform, and the importance of model innovation should be strengthened and the use of teaching resources should be expanded. With the guidance of cognitive education, we lay the foundation for

intelligent party building and cultivate students' core values.

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# RESEARCH ON THE INFORMATION-BASED ASSESSMENT MECHANISM OF COLLEGE IDEOLOGICAL AND POLITICAL THEORY COURSES COMBINED WITH MULTIPLE DATA CHAIN NETWORKS

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## ABSTRACT

The traditional assessment method of ideological and political theory class in colleges and universities has been unable to meet the requirements of the information technology era. In this paper, based on the exploration of the transformation of informatization of the theory class of college ideological and political education, the teaching information of ideological and political theory class is collected on the multi-data chain network based on the operation records of different user roles. Through the feedback of the learning process, the informatization assessment mechanism of the Civics and Political Science class is established. The indexes of the informatization assessment mechanism increased on average 0.204 in validity compared with the traditional model. The informatization assessment mechanism can effectively develop a comprehensive evaluation of students' level of Civics.

## KEYWORDS

Multiple data chains; Operational records; Teaching information; Learning process feedback; Ideological and political assessment in universities; Information-based assessment

## 1. INTRODUCTION

The goal of higher education is to cultivate socialist builders and successors who develop morally, intellectually, physically and aesthetically in an all-round way, and in order to effectively implement the fundamental task of establishing moral education, colleges and universities need to adapt to the background of the information age are beginning to implement educational teaching reform [1-2]. Assessment and evaluation is a necessary part of ideological and political theory courses in colleges and universities, which connects the two aspects of teachers' teaching and students' learning, and is an important means of teaching and learning for both teachers and students [3-4]. At present, the Internet and education are deeply integrated, the process of education informatization is continuously promoted, traditional teaching methods are undergoing profound changes, and technological innovation in the field of education has promoted the emergence of various informatized teaching tools, which provides new ideas for the assessment and evaluation of Civics and Political Science courses [5-7]. At present, there are still some obvious problems in the evaluation of students' academic assessment in Civics and Political Science courses. Facing the objective problems, colleges and universities must have a keen awareness and firm reform power, actively use the new opportunities and tools given by the informationized teaching environment, explore the optimization strategies of assessment and evaluation of Civics and Political Science courses, and continuously promote the scientificization of the assessment and evaluation process of Civics and Political Science courses [8].

Who should assess and evaluate the Civics course is an important issue. The traditional view is that the lecturer is the ex-officio subject of assessment and the only subject of assessment [9-10]. Nowadays, this old concept is changing, and both teaching management and Civics teachers gradually realize the unscientific nature of the single assessment and evaluation subject. If only the classroom teachers are involved in assessment and evaluation, students can only passively accept the results of teachers' assessment [11-13]. This model makes students just a learner and receiver of knowledge in teaching activities, and they do not participate in teaching management. In this paper, we propose a multi-data chain network assessment mechanism for information-based teaching to address the above problems.

## **2. MULTI-DATA CHAIN NETWORK OF COLLEGE CIVIC EDUCATION**

### **2.1. INFORMATION TRANSFORMATION OF CIVIC EDUCATION THEORY CLASS IN HIGHER EDUCATION**

#### **2.1.1. SMART TEACHING PLATFORM**

With the rapid development of information technology, the Internet and education are being deeply integrated, and college students growing up in the informationized environment have undergone profound changes in both learning habits and cognitive styles, with mobile learning and independent learning becoming the mainstream trend. In line with this learning trend, various smart learning platforms have emerged.

#### **2.1.2. INFORMATION-BASED TEACHING FOR CIVICS TEACHERS**

The development trend of education informatization objectively requires both sides of teaching, especially teachers, to improve their informatization ability. Specifically, informatization ability includes the basic information literacy appropriate to the information age, the ability to master the use of information technology tools and software, the ability to access and manage information resources, the ability to integrate information technology with the curriculum, etc.

#### **2.1.3. FEEDBACK ON THE LEARNING PROCESS**

The science of assessment and evaluation inherently requires that learner information be recorded throughout the process. It is extremely unscientific to focus solely on summative assessment and to use a single test paper to determine grades. It is because it erases students' daily accumulation, ignores their growth process, and tends to emphasize commonalities over individuality when evaluated in a uniform manner. Civics teachers can increase the supply of teaching resources through classroom interactive tools, so that learners can learn anytime and anywhere becomes a reality.

### **2.2. INFORMATION COLLECTION OF CIVIC THEORY CLASSES BASED ON MULTIPLE DATA CHAINS**

The relevant data collection content involved in the management of college Civics courses is based on the operation records of different user roles. Therefore, the sub-module of course management belongs to OLTP. In the OLTP scenario, in order to facilitate the simplification of the data extraction process, a fuzzy data model of student information is established, and it is extracted based on the system logs. The student information space model is shown in Equation (1), and the course information space model is shown in Equation (2).

$$S = \begin{bmatrix} S_{11} & \cdots & S_{1a} \\ \vdots & \ddots & \vdots \\ S_{b1} & \cdots & S_{ab} \end{bmatrix} ab \quad (1)$$

$$T = \begin{bmatrix} t_{11} & \cdots & t_{1a} \\ \vdots & \ddots & \vdots \\ t_{b1} & \cdots & t_{ab} \end{bmatrix} x b \quad (2)$$

Where  $S$  is the student ID number,  $b$  is the course name, and  $x$  is the instructor ID number.

This information is stored in the data table of MySQL database to facilitate the system to use the uniqueness of ID to query the information of students and teachers as the model data basis for establishing the correlation table.

### 2.3. INFORMATION-BASED ASSESSMENT SYSTEM OF THE CIVIC THEORY COURSE IN HIGHER EDUCATION

The analysis and extraction of information data should construct a course evaluation index system according to the teaching objectives of the college Civics course, clarify the assessment content factors, construct weights and account for the evaluation levels. Firstly, the individual factors of each assessment content are assigned the corresponding weights  $a_k (k=1,2,3)$  to meet  $a_k \geq 0$ . Secondly, the fuzzy evaluation matrix of individual factors in the assessment content is established to represent the fuzzy relationship between the evaluation of the set of factors  $R$ :

$$R = \begin{bmatrix} r_1 & \cdots & r_n \\ \vdots & \ddots & \vdots \\ r_3 & \cdots & s_{3n} \end{bmatrix} \quad (3)$$

where  $r_n$  is the  $n$ th term of the selected individual factor and  $s_{3n}$  is the  $3n$ th term of the selected individual factor.

The single-factor fuzzy evaluation only reflects the influence of one factor on the evaluation results, there is one-sided, need to consider the influence of all factors, in order to come up with a more reasonable assessment results.  $R$  of the  $n$  line response  $n$  factors  $U_n$  influence the degree of the evaluation of the evaluation elements. This leads to a fuzzy comprehensive evaluation  $B$ :

$$B = A \square R = [a_1, a_2, a_3] \cdot \begin{bmatrix} r_1 & \cdots & r_n \\ \vdots & \ddots & \vdots \\ r_3 & \cdots & s_{3n} \end{bmatrix} = [b_1, b_2, b_3] \quad (4)$$

Where,  $A$  is the value of weights taken. The assessment content, i.e., attendance, daily assessment, and stage formative assessment results, are taken as three evaluation indexes, and the results of the evaluation indexes are calculated using the weighted average method. The results of the evaluation indexes are calculated by using the weighted average method. First, they are normalized to the weights of each item, and then multiplied by their corresponding percentage scores for a weighted average, which is the final score of the course for students.

### 3. ANALYSIS OF THE APPLICATION OF INFORMATIZATION ASSESSMENT OF COLLEGE CIVIC THEORY COURSE

#### 3.1. ANALYSIS OF THE REASONABLENESS OF THE INFORMATION ASSESSMENT MECHANISM

In order to explore the effectiveness of the information-based assessment mechanism of college ideological and political education theory class based on multi-data chain network, it is compared with the traditional assessment methods. The comparison of different assessment methods of ideological and political science classes is shown in Figure 1. According to the feedback from different classes, compared with the traditional assessment mechanism, the informatization assessment method is more scientific, and the rationality is increased by 14.52% on average. The information-based assessment mechanism is a developmental assessment made by continuous observation and recording of the whole process of student learning, which can effectively motivate students to learn to help them regulate their own learning process and give them a sense of accomplishment to enhance their confidence, thus transforming them from passive recipients of assessment to active participants of the assessment subject.

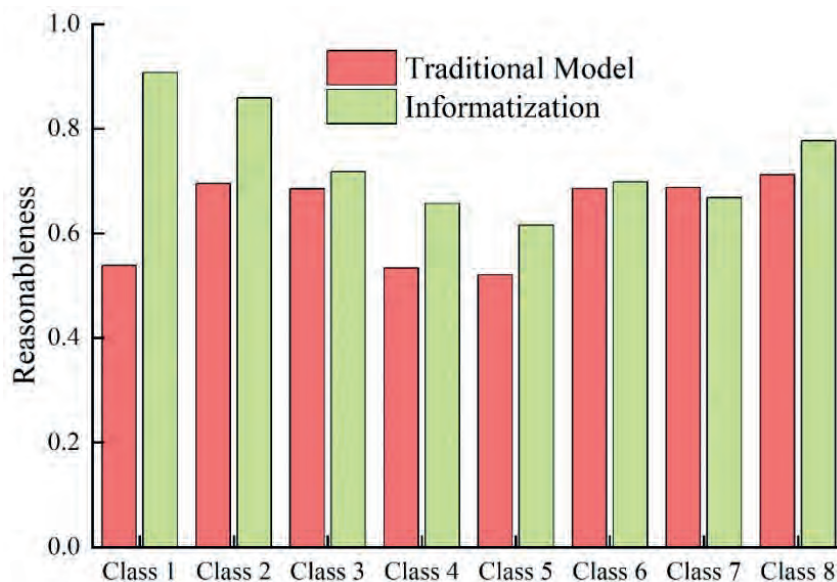
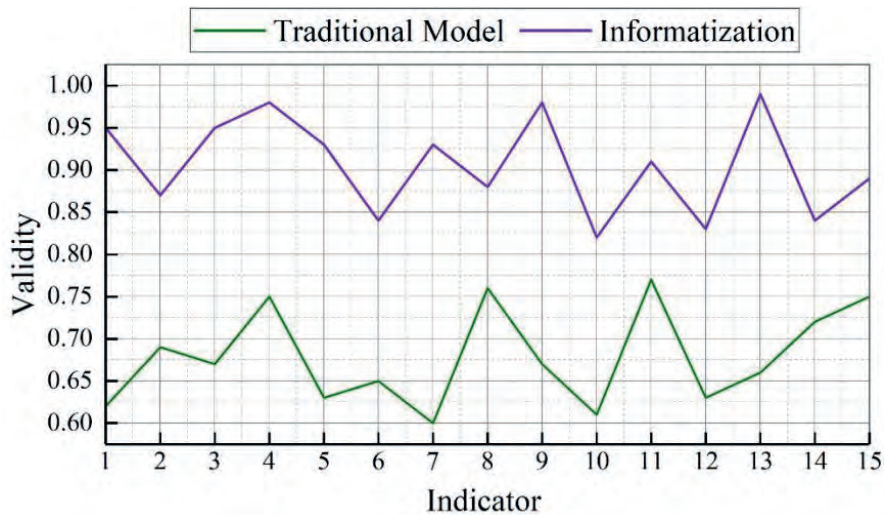


Figure 1. A comparison of different assessment methods for Civics courses

#### 3.2. ANALYSIS OF THE EFFECTIVENESS OF THE INFORMATION ASSESSMENT MECHANISM

In order to determine whether the information assessment mechanism of Civic Education theory class combined with multivariate data chain network can truly and effectively reflect the actual level of students, this paper uses fuzzy comprehensive evaluation to comprehensively verify the assessment indexes. The validity of the assessment indexes of the Civic Education theory course is shown in Figure 2. The indicators of the information assessment mechanism relative to the traditional model in terms of validity increased on average by 0.204. The traditional teaching and evaluation of ideological and political courses are too one-sided and do not really explain the ideological and political course performance of the education students, which is not conducive to the background information of the ideological and political course teaching reform education.



**Figure 2.** Validity of assessment index of Civic Theory course

#### **4. THE REFORM PATH OF INFORMATIZATION ASSESSMENT OF COLLEGE CIVIC THEORY COURSE**

With the advancement of information technology, it is possible to make effective adjustments based on the previous grading standards, and then to achieve comprehensiveness, as well as to carry out targeted reform of teaching evaluation with the advantage of information sharing. The teaching evaluation of ideology and politics in colleges and universities can be completed with the help of many different information technologies to complete a comprehensive assessment, integrating the usual grades, practical behavior and final grades to a great extent, while adjusting the ratio of the three, especially for the practical and usual grades link to make the corresponding increase, avoiding formalization and highlighting the authenticity.

#### **5. CONCLUSION**

In the context of informatization, this paper collects teaching data related to ideological and political theory courses in colleges and universities through a multi-data chain network and establishes an informatized assessment system through a quantitative approach. Compared with the traditional assessment mechanism, the informatization assessment method is more scientific and the rationality is increased by 14.52% on average. In the age of informatization, teachers take advantage of many different current advanced technologies to achieve a great degree of enrichment and diversification of evaluation subjects. It is necessary to draw on not only teachers' evaluation, but also students' own evaluation and mutual evaluation among students. The evaluation system is more and more comprehensive, transparent, and effectively recognized in its objectivity.

#### **ABOUT THE AUTHOR**

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# STUDY ON THE OPTIMIZATION OF THE ECONOMIC MANAGEMENT MODEL OF ENTERPRISES COMBINED WITH MARGINAL ANALYSIS

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## ABSTRACT

Under the new economic situation, the model of enterprise economic management needs to be further optimized. This paper proposes a framework for economic efficiency audit in enterprise economic management based on marginal analysis, and explores the calculation method of marginal profit under unconstrained conditions. The equimarginal law is constructed for the constrained conditions, and the marginal analysis curve of production and sales is established through incremental analysis. For the marginal analysis of a regional metalworking enterprise A, the profit of the enterprise is to be maximized, i.e., the value of the derivative function of the marginal profit function is to be zero. The value of independent variable  $x$  satisfying this condition is 220, and the maximum profit is 31.08 million yuan. The marginal analysis can provide a quantitative reference for the economic management of the enterprise.

## KEYWORDS

Marginal analysis; Marginal profit; Incremental analysis; Enterprise economic management; Efficiency audit

## 1. INTRODUCTION

Under the market economy system, enterprises are facing huge pressure of survival and competition [1-2]. Enterprise economic management work should be constantly innovated, and at the same time combined with enterprise strategic planning, it can make enterprise economic management work more smoothly and better regulate enterprise economic activities, so that enterprise economic management activities can be more relevant to the development of enterprises in the new situation [3-5]. Enterprise economic management work is an important part of the daily management of enterprises [6]. Enterprise managers should improve the efficiency of enterprise economic management by establishing a good economic management concept and improving the efficiency of enterprise economic management to achieve the purpose of improving the economic efficiency of enterprises [7-8].

With the improvement of information technology, more and more emerging technologies are used in enterprise economic management. Santoro, G et al. applied big data analysis to enterprise economic management and designed a big data deployment framework for the business management of retailer enterprises [9]. Oyewo, B et al. oriented to the economic management of consulting firms, analyzed the effect of data applications on the improvement of business competitiveness using least squares regression with respect to big data technology [10]. Globocnik, D et al. proposed an integrated management framework for corporate strategic planning and business models, which provides a scientific decision-making process for goal planning [11]. Brenner, B proposed a sustainable business management model based on a

reconstructionist and value-sharing reasoning framework [12]. This paper, on the other hand, applies marginal analysis to the optimization of economic management of enterprises, and empirically analyzes the management decision of profit maximization of enterprises by exploring the analysis of different constraint scenarios with a typical enterprise.

## 2. ECONOMIC MANAGEMENT OF ENTERPRISES BASED ON MARGINAL ANALYSIS METHOD

### 2.1. MARGINAL ANALYSIS METHOD

Marginal analysis decision method is one of the basic research methods in economics and plays a considerable role not only in theory, but also in practice. The mathematical principle of the marginal analysis method is simple. For the discrete case, the marginal value is the ratio of the amount of change in the dependent variable to the amount of change in the independent variable. For the continuous case, the marginal value is the value of the derivative of the dependent variable with respect to some independent variable. So the meaning of the margin itself is the rate of change of the dependent variable with respect to the independent variable, or the amount of change in the dependent variable when the independent variable changes by one unit. The marginal analysis decision method embodies the idea of forward-looking decision making and is a central tool in the search for optimal solutions.

### 2.2. MARGINAL ANALYSIS OF ENTERPRISE ECONOMIC EFFICIENCY AUDIT

#### 2.2.1. UNCONSTRAINED CONDITION

Profit maximization is the fundamental goal of the firm's decision making considerations. Profit maximization is obtained at the point where marginal profit is equal to zero, which is also the difference between marginal revenue and marginal cost:

$$MB = MR - MC \quad (1)$$

The economic decision of the enterprise can thus be evaluated in such a way that such economic activity is desirable as long as the marginal revenue is greater than the marginal cost. Under unconstrained conditions, the amount of input of resources is optimal and economic efficiency is maximized when the value of marginal profit is zero.

#### 2.2.2. WITH CONSTRAINTS

The following optimality law can be obtained for the constrained case. Under the constrained condition, the marginal benefits per unit increase in resources are equal in all directions, and the constraints are satisfied at the same time, and the total benefits of resource allocation are optimal. This law is also called the law of equal margins. The calculation of the extreme value with constraints is modeled and normalized to obtain:

$$\begin{cases} \min f(x) \\ g_j(x) \geq 0 \end{cases} \quad (2)$$

where  $f(x)$  is the objective function and  $g_j(x)$  is the constraint.

If  $g_j(x^{(k)}) = 0$ , then  $g_j(x)$  is the acting constraint at the point  $x^{(k)}$ . According to the Kuhn-Tucker condition, the desired extremal point  $x^*$  should satisfy

$$\begin{cases} \nabla f(x^*) - \sum \gamma_j \nabla g_j(x^*) = 0 \\ \gamma_j g_j(x^*) = 0 \\ \gamma_j \geq 0 \end{cases} \quad (3)$$

where  $\gamma_j$  is the Lagrangian multiplier.

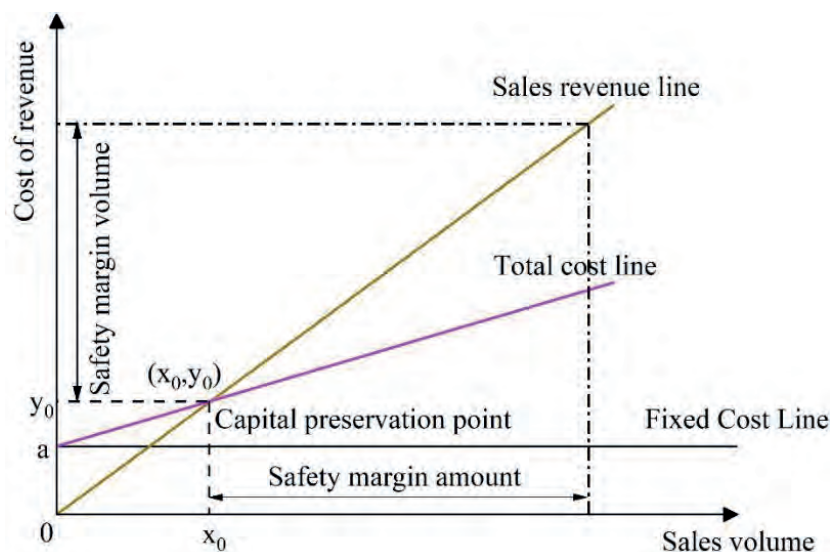
The extreme value point of the objective function can thus be obtained. When the resource under consideration is money, the constrained optimality law is that the marginal benefit of each additional dollar in each direction is equal while the constraint is satisfied. If the funds are used to purchase resources, and the prices of resources in each direction are constant, respectively, the constrained optimization law is that the ratio of marginal benefits to prices in each direction is equal to a constant while satisfying the constraint.

### 2.2.3. INCREMENTAL ANALYSIS

Incremental analysis is a variation of marginal analysis, which involves an incremental amount of change in the independent variable. The exact rate of change of the function formed by this trace change is

$$f'(x) = \frac{f(x + \Delta x) - f(x)}{\Delta x} \quad (4)$$

The above equation is the concept of marginality, which is mathematically expressed as a derivative. Incremental analysis is the analysis of the impact of a certain decision on revenue, cost or profit. The decision referred to here can be a large number of changes in variables, including discrete, jump changes, or non-quantitative changes. For example, the value of the change in variables caused by different decisions is analyzed by comparing different technical conditions and different environments. The marginal analysis curve of production and sales is shown in Figure 1. Marginal analysis can be used to determine the optimal goal of production and operation. The optimal goal of production and operation of an enterprise, such as the lowest cost and the most profit, can be determined by using the method of marginal analysis to determine its optimal marginal point. For example, the production volume that can make the enterprise achieve the lowest cost, what is the sales volume that can realize the most profit, etc.



**Figure 1.** Marginal analysis curve of production and sales

### 3. STUDY OF MARGINAL ANALYSIS OF ENTERPRISE ECONOMIC MANAGEMENT

#### 3.1. EMPIRICAL ANALYSIS OF ENTERPRISE ECONOMIC MANAGEMENT

In order to propose an optimal model of enterprise economic management based on marginal analysis, this paper takes a certain enterprise in a certain region as a case study. There is a metalworking enterprise A in a certain region, which needs to produce a batch of metalworking products in a production quarter under the market demand. The marginal analysis of economic management for enterprise A is shown in Table 1. Let  $x$  be the output of the product, the total cost function of the metal parts needed to produce this product is  $C(x) = 0.9 * x^2 + 82 * x + 5600$ , and the total revenue function is  $R(x) = 0.62 * x^2 + 165 * x$ . The ultimate goal of the enterprise is to maximize the profit of the enterprise, that is, to make the marginal profit function to achieve the maximum. The first step is to make the marginal revenue equal to the marginal cost, or marginal profit is zero, that is, the value of the derivative function of the marginal profit function is zero. The value of the independent variable  $x$  under this condition is 220, and then the rate of change of marginal revenue should be less than the rate of change of marginal cost, which translates into a marginal function of  $d^2L / dx^2 = -0.45 < 0$ , so the requirement is met. The value of  $x$  obtained above is brought into  $L(x)$  to obtain the maximum profit of the enterprise of 31.08 million yuan.

**Table 1.** Marginal analysis of economic management of enterprise A

Variables	Function	Fetch/ 10000 yuan
Total Costs	$C(x) = 0.9 * x^2 + 82 * x + 1600$	63200
Total Revenue	$R(x) = 0.62 * x^2 + 165 * x$	66308
Profit	$L(x) = -0.28 * x^2 + 83 * x - 1600$	3108
Marginal profit	$L'(x_0) = \lim_{\Delta x \rightarrow 0} \frac{L(x_0 + \Delta x) - L(x_0)}{\Delta x}$	-
Marginal revenue	$M_R(x) = 1.25 * x + 180$	455
Marginal Costs	$M_C(x) = 1.7 * x + 90$	464

#### 3.2. OPTIMIZATION OF THE MODEL OF ENTERPRISE ECONOMIC MANAGEMENT

For enterprises with different business models, in the process of actual optimization decision making, it is necessary to initially decide on each decision goal and to divide in detail the goals of pending problems and subsequent work implementation. In particular, in the process of applying marginal contribution analysis and safety analysis methods, it is necessary to make a detailed classification of each production and management activity and to divide the decision objectives and economic efficiency output target values from the top down. From the perspective of management accounting and senior management, the decision targets are decided, and the threshold of profit and loss values are also divided in detail, and the marginal contribution values and safety margins are compared and analyzed to ensure that each internal product pricing and other business decision items can be implemented smoothly. In the process of deciding each business decision objective, it is necessary to make a detailed classification of decision objectives and methodological tools in the process of comparative analysis of data indicators such as total, average and marginal behavioral volumes, combined with actual business management data information and the current status of the company's activities.

### 4. CONCLUSION

The optimal application of marginal analysis in economic management requires binary and ternary statistical analysis of various business data within the enterprise, the development of

business decision targets at different stages, and the hierarchical use of marginal contribution and safety margin analysis methods. Traditional data processing technology can no longer meet the needs of the times, and for this reason, enterprises must strengthen their understanding of the importance of data technology. The value of data analysis technology in enterprise economic management is brought into play by improving relevant talent management mechanisms, building information platforms, and optimizing internal controls, thus promoting sustainable development of enterprises while enhancing their core competitiveness.

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# ANALYZING THE ROLE OF TOURISM ENGLISH TRANSLATION ON TRADITIONAL CULTURE TRANSMISSION USING GAME THEORY

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## ABSTRACT

Starting from cultural communication and tourism English translation, we analyze the role of tourism English in traditional cultural communication. This paper constructs a basic framework of game theory based on three levels of strategy, participants and benefits, and classifies the results of cultural games into assimilation type and integration type. On the basis of the cultural game, the role of tourism English translation on traditional cultural communication is studied from different levels. The average degree of influence of tourism English translation on traditional cultural communication reached 0.324, and tourism English translation should play its role of cultural communication to meet tourists' needs to understand Chinese culture.

## KEYWORDS

Game theory analysis; Cultural game; Traditional cultural communication; Tourism English translation; Assimilation type

## 1. INTRODUCTION

In the context of today's rapid social development, China's tourism industry is rapidly progressing and gradually moving toward internationalization [1-2]. In order to better welcome foreign tourists and bring high quality tour guide services to them, the tourism industry needs to strengthen the application of cross-cultural awareness in the introduction of attractions as well as in the translation process. Different countries are very different in terms of region and culture [3-5]. Therefore, tour guides should not simply use direct translation in the translation process, which can result in inaccurate translations and misunderstandings. Rather, the attractions and the specific things in the attractions should be presented in an easy-to-understand manner according to cultural awareness, cultural differences between different languages and different countries, and language differences [6]. Some studies point out that English translation is almost an essential presence in transnational tourism, and how to properly understand cultural differences between cross-international and accurately translate cultural terms of tourist attractions becomes an important skill for English translation in every tourist attraction [7]. Other studies have argued that different cultures have different effects on English translations of tourist attractions [8]. Translation researchers have suggested that in applying cross-cultural awareness to English translations of tourist attractions, it is necessary to try to preserve the information and content in the text under the purpose orientation of the tourist text [9].

## 2. GAME THEORY MODEL OF CULTURAL COMMUNICATION

### 2.1. CLASSICAL GAME THEORY MODELS

#### 2.1.1. BASIC FRAMEWORK OF GAME THEORY

Game theory, also known as response theory, is a branch of operations research, which mainly uses mathematical tools to study how each decision maker makes a decision in favor of himself or a group of decision makers based on the information he has. It originated from economics and is now commonly used in social, political and transportation fields. The three elements of participants, strategy sets and benefits form a game pattern. The participants are the subjects of the game, not only individuals, but also make a group of people, organizations, companies and governments, where the set of participants of a  $n$ -person game is expressed as

$$N = \{1, 2, \dots, n\} \quad (1)$$

A strategy set is, as the name implies, the set of all strategies, where the set of strategies of participant  $i (i \in N)$  is denoted by  $S_i$ . The set of strategies of all participants is denoted as

$$S = \{S_1, S_2, \dots, S_n\} \quad (2)$$

The combination of strategies for all participants is expressed as

$$s = \{s_1, s_2, \dots, s_n\} \quad (3)$$

The outcome after a game is called the gain, which can be some quantitative value or some utility that can be quantified, such as satisfaction. The vector of gains for all participants is expressed as

$$u = \{u_1, u_2, \dots, u_n\} \quad (4)$$

A typical game can be expressed as follows:

$$G = \{N; S_1, S_2, \dots, S_n; u_1, u_2, \dots, u_n\} \quad (5)$$

#### 2.1.2. TYPES OF CULTURAL GAMES

When culture A and culture B play a game, the dominant culture forces itself into the weaker culture, so that the receiving culture cannot play its subjectivity. Thus, the dominant culture replaces the original cultural factors, resulting in the essential change or even disappearance of the latter, which is then assimilated and integrated. This is the result of assimilation in the cultural game. After the game between culture A and culture B, the two cultures are influenced by each other to different degrees and integrated, but both still retain their own cultural components. This is the result of the integration of the culture game.

## 2.2. CHARACTERIZATION OF CULTURAL GAMES

### 2.2.1. PARTICIPATING SUBJECTS

In the cultural game, the cultural strength and influence of the participating subjects of different cultures vary. The first is the inequality of the culture owned by the participating subjects, including the cultural resources and cultural traits, etc. An open, inclusive and innovative culture must be more competitive and influential than a closed, conservative, backward and xenophobic culture. The second is the inequality in the ability of participating subjects to use cultural resources. Some countries rely on their strong political and economic strength, have the priority of acquiring information and the monopoly of shaping the discourse, and use humanistic exchanges and commodity trade to occupy the initiative of cultural export



and put their own culture in a strong position.

### 2.2.2. NON-ZERO COINCIDENCE OF GAME FORMS

In the era of globalization, the forms and means by which different cultures participate in the game are increasingly diverse, and the fierce competition and game between cultures often unfold in a mild and hidden cooperative manner. It is often hidden in the process of international cultural communication, exchange and cooperation through the appearance of commodities and capital.

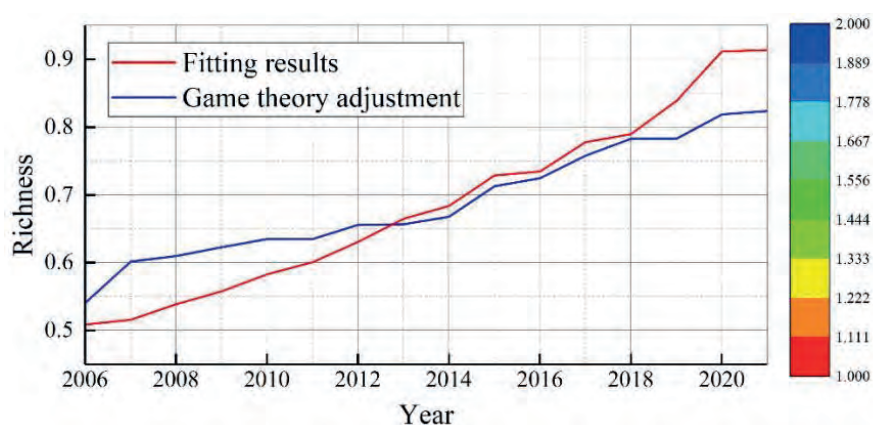
### 2.2.3. GAMING PROCESS

The game between cultures is a complex process in which static and dynamic games coexist, and the participants in the cultural game respond to each other by judging each other's strategies and behaviors, which is dynamic in nature. However, such responses usually do not occur simultaneously, and the culturally dominant party adopts more covert and diverse game tactics, so that the culturally disadvantaged party lacks prevention and cannot formulate timely response strategies, resulting in continuous cultural erosion.

## 3. GAME ANALYSIS OF TOURISM ENGLISH ON TRADITIONAL CULTURE COMMUNICATION

### 3.1. ANALYSIS OF DISSEMINATION CHANNELS

English translation for tourism is a special cross-cultural communication channel. With the continuous development of tourism, most overseas tourists travel to China with the main purpose of not only viewing historical monuments but also, to a large extent, to learn about the customs of foreign countries and cultures. The role of tourism English translation on cultural communication channels is shown in Figure 1. With the gradual improvement of all aspects of tourism English translation, the richness of traditional cultural transmission pathways increases from 0.509 to 0.914. After the adjustment of game theory analysis, the richness is adjusted to a shift from 0.541 to 0.824.

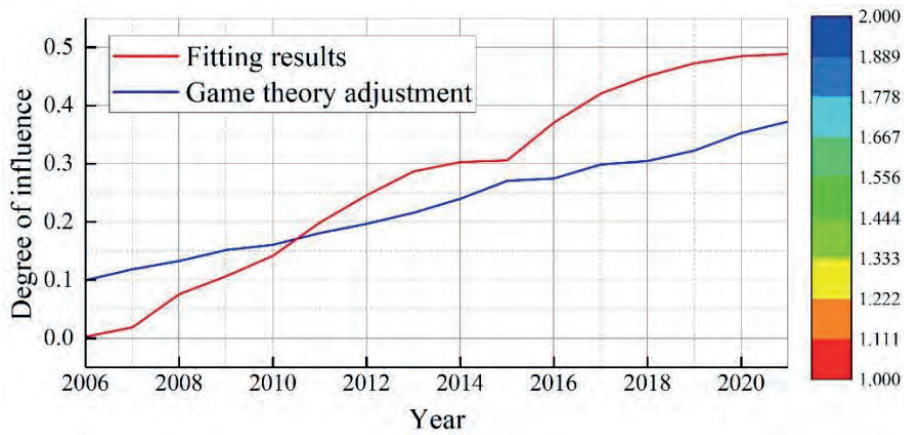


**Figure 1.** The role of tourism English translation for cultural transmission channels

### 3.2. CULTURAL EXCHANGE ANALYSIS

In Chinese, the most important feature of tour guide words is the extensive use of adjectives decorative words to attract tourists. The influence of tourism English translation on traditional cultural communication is shown in Figure 2. Based on the analysis of game theory, the average degree of influence of tourist English translation on traditional cultural communication reaches 0.324. Through tourist English translation, tourists can understand the historical and cultural connotation of China and enjoy the beautiful scenery while providing them with more

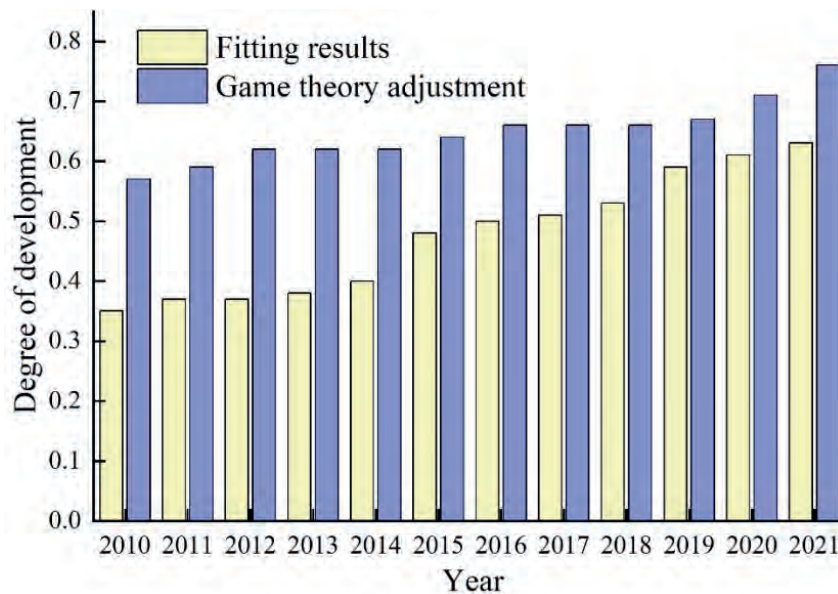
cultural information.



**Figure 2.** The role of tourism English translation for traditional cultural exchange

### 3.3. ANALYSIS OF CULTURAL FEEDBACKS IN THIS PAPER

In the process of cultural gaming, it is more the result of the integration of cultural gaming. Tourism translation often has to highlight its historical and cultural accumulation and national cultural characteristics, which in turn promotes the development of local culture. The promotion effect of tourism English translation on the development of local traditional culture is shown in Figure 3. Through the results of the game analysis of both cultures in the process of tourism English translation, the development degree of native culture is enhanced by 12.7% on average. Tourism translation can promote the development of native culture in each tourism region of China, thus realizing the spread of native culture.



**Figure 3.** The role of English for tourism in the development of traditional culture

## 4. CONCLUSION

Based on the basic framework of game theory, this paper constructs a cultural game model and analyzes the role of tourism English translation on traditional culture communication from three levels: communication pathway, cultural exchange and cultural feedbacks. After the adjustment of the game theory analysis, the richness of traditional culture communication channels is adjusted to a shift from 0.541 to 0.824.

English translation for tourism is an effective way of cultural communication that crosses nationalities, cultures and languages to facilitate exchange and communication among people

around the world. Tourism English translation provides a channel for international cultural exchange. Through tourism English translation, the profound cultural connotation hidden in scenic spots can be expressed, helping overseas tourists to understand the human landscape as well as the cultural connotation, so that overseas tourists can improve their own cultural literacy in tourism.

## FUNDING

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# DYNAMIC PANEL ANALYSIS OF THE IMPACT OF CONSUMPTION ENVIRONMENT ON CONSUMPTION LEVEL OF RURAL RESIDENTS

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## ABSTRACT

This paper explores the mechanism of the influence of natural, economic and social environments on the consumption of residents, and then empirically investigates the growth of rural residents' consumption by establishing a dynamic panel model. The dynamic characteristic relationship between consumption environment and rural residents' consumption level is examined by adopting the VEC model which is a VAR model containing cointegration constraints and applying it to the effect of rural residents' consumption level with cointegration non-stationary time series. The results show that each 1% increase in village residents' income will promote their consumption to increase by 0.031%. The research in this paper has theoretical and practical implications for strengthening the improvement of rural residents' consumption level and promoting rural economic development.

## KEYWORDS

Dynamic panel model; Rural consumption; Cointegration constraint; VAR model; Time series

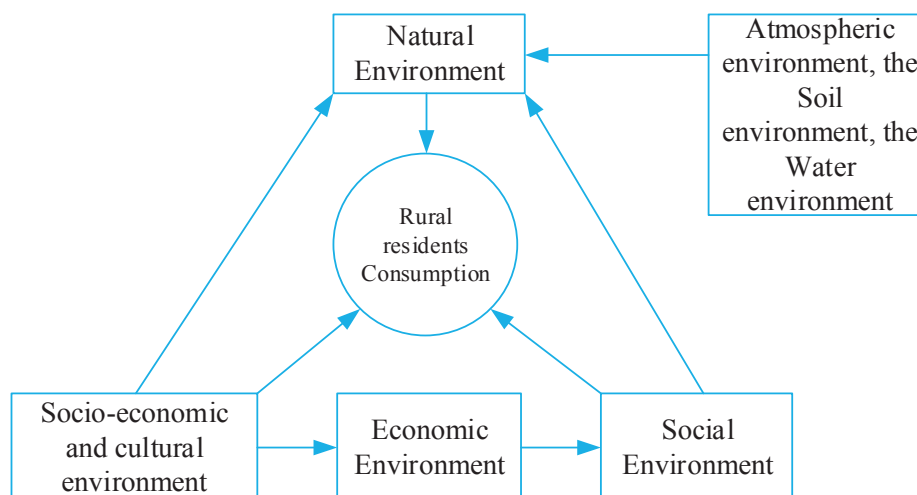
## 1. INTRODUCTION

With the unbalanced and insufficient economic development in urban and rural areas, rural residents face many challenges to improve their consumption level, among which the consumption environment is one of the important factors [1-2]. Changes in the consumption environment can directly affect the consumption behavior and consumption level of rural residents [3]. Past studies have concluded that changes in the consumption environment have a significant impact on the consumption levels of rural residents [4]. For example, building better transportation, communication, and logistics networks can provide rural residents with more convenient and faster consumption channels and services, thus stimulating their consumption potential [5-6]. Some scholars also believe that urban-rural integration and the development of digital economy can bring more consumption choices and consumption experiences to rural residents, which in turn can promote consumption upgrading and optimization of consumption structure [7]. However, changes in the consumption environment may also trigger some consumption risks and adverse consumption effects, such as information asymmetry and vicious competition, which may also have a negative impact on the consumption level of rural residents [8-9]. Therefore, a comprehensive analysis of the impact of the consumption environment on the consumption growth of rural residents can help establish more effective countermeasures to help build the rural economy.

## 2. THE MECHANISM OF CONSUMPTION ENVIRONMENT AFFECTING RURAL RESIDENTS' CONSUMPTION

### 2.1. IMPACT OF NATURAL ENVIRONMENT ON RESIDENTS' CONSUMPTION

The influence of consumption environment on residents' consumption is a complex and dynamic process, and the influence of natural environment, economic environment and social environment on residents' consumption has corresponding links, and the general model of the influence of consumption environment on rural residents' consumption is shown in Figure 1.



**Figure 1.** Model of the influence of consumption environment on rural residents' consumption

The natural environment is particularly important for rural residents' consumption, as the abundance of natural resources and the state of the natural environment determine the level of supply and processing of material resources for rural consumption, as well as consumer preferences for consumer goods. Currently, China's rural areas are generally a combination of traditional smallholder economy, modern cooperative economy and market economy, and industries such as planting, breeding, and related processing and distribution of agricultural products need good natural environment support.

According to consumption theory, the income of residents is an important factor in determining their consumption. The natural environment, which consists of natural resources such as land, on which rural residents depend, has an important impact on their consumption behavior and can directly regulate consumption by influencing consumption demand and consumption perception. It also indirectly affects consumption expenditure and consumption structure in the case of deterioration of the natural environment and residents' poor expectations of future income.

### 2.2. IMPACT OF ECONOMIC ENVIRONMENT ON RESIDENTS' CONSUMPTION

The economic environment has a clear impact on the growth movements of the population's consumption. On the one hand, economic growth is intuitively reflected in the increase of residents' income, and the increase of consumption due to the increase of income is the main mode of growth of residents' consumption. On the other hand, economic growth is also reflected in the government's ability to provide public services and improve the level of infrastructure construction. The improved construction of roads, railroads, communications and trading markets due to the increased level of economic development is of great importance in increasing the enthusiasm of rural residents for consumption, promoting the progress of consumption behavior and improving the consumption structure. In this context, the positive

development of the economic environment means that the residents' consumption upgrade is guaranteed to a certain extent.

### 2.3. THE INFLUENCE OF SOCIAL ENVIRONMENT ON RESIDENTS' CONSUMPTION

The main development trend of the current society is informationization and innovation. The national release of mass entrepreneurship, innovation and information technology development outline all list innovation and information development as the main value trend of the current social development. As a result of the development of material life and the gradual increase in the level of social needs, product quality and quality have become the key to the satisfaction of people's material needs. As a result, lean production, which is more practical, has become an important direction for the development of enterprises under the social development trend. In this process, rural residents began to increasingly transform to adequate consumption of material needs, especially in the context of the consumer economy, social consumption culture gradually formed, rural residents of advanced consumption needs such as cars, buildings, etc. in this process, so it can be seen that the social environment has a corresponding impact on rural residents consumption.

## 3. DYNAMIC PANEL ANALYSIS OF CONSUMPTION GROWTH OF RURAL RESIDENTS

### 3.1. MODEL SETTING AND ESTIMATION METHODS

In classical consumption theory, Dusenbery's relative income hypothesis suggests that residents' consumption is constrained by their past consumption habits and exhibits a strong ratchet effect, i.e., residents' consumption in the previous period will have a shock on current period consumption. Static panel models cannot interpret the impact of such shocks on residents' current period consumption, and this paper introduces a one-period lag of the explanatory variable rural residents' consumption escalation rate to set a dynamic panel model:

$$\begin{aligned} \ln csug_{it} = & \beta_0 + \beta_1 \ln csug_{it-1} + \beta_2 \ln rrd_{it} + \beta_3 \ln rkn_{it} + \beta_4 \ln ryn_{it} \\ & + \beta_5 \ln ncj_{it} + \beta_6 \ln cpr_{it} + \beta_7 \ln ltx_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

Considering that the model contains one period lags of the explanatory variables, there may be endogeneity problems leading to the inability to obtain consistent parameter estimates, so the VEC model adopted in this paper is a VAR model with cointegration constraints, which is mostly applied to model non-stationary time series with cointegration relationships. p-order VAR model is:

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + B X_t + \varepsilon_t \quad (2)$$

where  $Y_t$  is an m-dimensional nonsmooth  $I(1)$ -series,  $X_t$  is an n-dimensional deterministic variable, and  $\varepsilon_t$  is a new interest vector. After deformation, this can be rewritten as

$$\Delta Y_t = \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \Pi Y_{t-1} + B X_t + \varepsilon_t \quad (3)$$

where,  $\Gamma_i = \sum_{j=i+1}^p A_j$ ,  $\Pi = \sum_{i=1}^p A_i - I_m$ , then the above equation is the vector error correction

(VEC) model for the growth of village consumption.

### 3.2. ANALYSIS OF MODEL EMPIRICAL RESULTS

The empirical analysis session uses OLS estimation methods to estimate moments for the dynamic panel model and the robustness model, and the results are obtained as shown in Table 1.

**Table 1.** Results of the empirical analysis of the model

	VEC model	VAR model
	1.005(115.238)	0.938(155.419)
	0.025(101.775)	0.289(15.51)
	0.031(13.389)	0.029(9.37)
lnSN	0.386(14.75)	0.041(79.92)
lnAB	0.051(5.663)	0.036(12.57)
lnDA	0.056(10.21)	0.069(5.38)
AR(1)	0.008	0.218
AR(2)	0.061	0.336
Sargan Test	0.875	0.903

Among them, it shows that the dynamic panel model set up in this paper has a good analysis effect. At the 1% significance level, the growth of residents' income has a significant positive effect on promoting consumption, and each 1% increase in rural residents' income will promote their consumption to increase by 0.031%. Meanwhile, the consumption environment variables set in this paper-*lnSN*, *lnAB*, and *lnDA* all have positive correlations on the consumption growth of rural residents, among which the social security level has a higher utility in promoting the consumption growth of rural residents. This is followed by natural environmental conditions, and finally, transportation and communication. The results indicate that accelerating the establishment of social security mechanism in rural areas can reduce rural residents' investment in medical care and pension, and more part of the increase in income will be transferred to consumption. It will promote the rise of rural consumption level and the formation of rural consumption market, which is important for boosting domestic demand to drive social and economic growth.

#### 4. CONCLUSION

This paper investigates the influence of consumption environment on rural residents' consumption level through dynamic panel analysis. In terms of the mechanism of consumption environment affecting rural residents' consumption, the impact of natural environment, economic environment and social environment on residents' consumption is analyzed. In terms of the dynamic panel analysis of rural residents' consumption growth, this adopts a model setting and estimation method, and the empirical results of the model are analyzed. It can be concluded that the consumption environment has a significant effect on the consumption level of rural residents, and the growth of residents' income has a significant positive effect on promoting consumption at the 1% significance level, and each 1% increase in rural residents' income will promote their consumption by 0.031%. Therefore, the government should strengthen the protection and enhancement of rural residents' income, while focusing on improving the rural consumption environment and optimizing rural financial services in order to promote the improvement of rural residents' consumption level.

#### FUNDING

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# RESEARCH AND PRACTICE OF PHYSICAL EDUCATION TEACHING REFORM IN UNIVERSITIES UNDER INFORMATION TECHNOLOGY ENVIRONMENT

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## ABSTRACT

This paper firstly elaborates the importance and necessity of the reform of physical education teaching in colleges and universities, and then analyzes the specific contents of informatized physical education, the way of integrating physical education teaching with information technology and the advantages of informatized physical education teaching. Finally, the effect of using informationized PE teaching in colleges and universities was analyzed through the indicators of teachers' and students' attitude perceptions towards the integration of information technology into PE teaching and the satisfaction of informationized teaching. The results showed that the percentages of teachers and students who were satisfied with the teaching effect were 37% and 46% respectively, and those who were very satisfied were 4% and 17%, and the teachers and students were satisfied with the effect of information technology teaching. This study helps to promote the modernization and development of physical education teaching in colleges and universities.

## KEYWORDS

Pedagogical reform; Information technology; Physical education; Attitude perception; Integration approach; Satisfaction

## 1. INTRODUCTION

With the progress of society, more and more colleges and universities have started to apply information-based teaching in the process of physical education, so as to innovate teaching methods and improve teaching quality [1-2]. Sports informatization teaching is to deepen the development and extensive use of sports teaching information resources with the support of various modern information means such as computers, multimedia and network communication. Through an efficient and intelligent multimedia information processing platform, the rich educational resources and sports information are transmitted to the frontier terminal of sports education by using the high-speed transmission network medium to complete the transmission of educational information between the educator and the educated, so as to achieve the expected goals of sports education [3].

The realization of information-based teaching of college physical education can create a good teaching context for modern physical education and stimulate the learning interest of college students [4]. At the same time, with the characteristics of information technology intelligence, openness and interactivity, it creates a learning environment for students to search and analyze problems independently and to develop their ability to obtain and process information independently [5].

Zhang Y et al. studied the construction of an information-based teaching system for young

teachers and explored the teaching effect of the platform, and the results showed that the teaching platform was effective [6]. Ma Z et al. used information technology in physics teaching, and the results showed that information technology improved the effectiveness and teaching efficiency of the classroom and stimulated students' interest in learning [7]. Guo-rong S et al. analyzed the influence of the environment on teachers' IT teaching ability, explored specific influencing factors, and made targeted recommendations [8].

## **2. REFORM OF INFORMATION-BASED COLLEGE PHYSICAL EDUCATION**

### **2.1. INFORMATION-BASED PHYSICAL EDUCATION**

Informational physical education refers to the creation of an informational teaching environment through the effective integration of information technology into the physical education process.

Informatization can also be referred to as digitalization, and digital physical education can be understood at two levels: broad and narrow. In a broad sense, digital physical education refers to the use of digital technologies such as multimedia, computers and networks by teachers and students in a digital environment to digitize physical education knowledge and content for use in physical education practice. In a narrow sense, digital physical education refers to the process of physical education knowledge transmission in which teachers use digital resources as the medium of instruction and use digital technology characteristics and advantages to reproduce actions, practice skills and correct techniques in physical education classroom teaching.

The informatization of physical education means that in physical education, teachers make use of informatization teaching facilities and technology to make students' learning process realize digital experience of words, images and senses, and the teaching link changes from simple memory of movements to knowledge comprehension and memory to achieve good interaction between teaching parties, improve teaching quality and efficiency, and enhance students' physical quality.

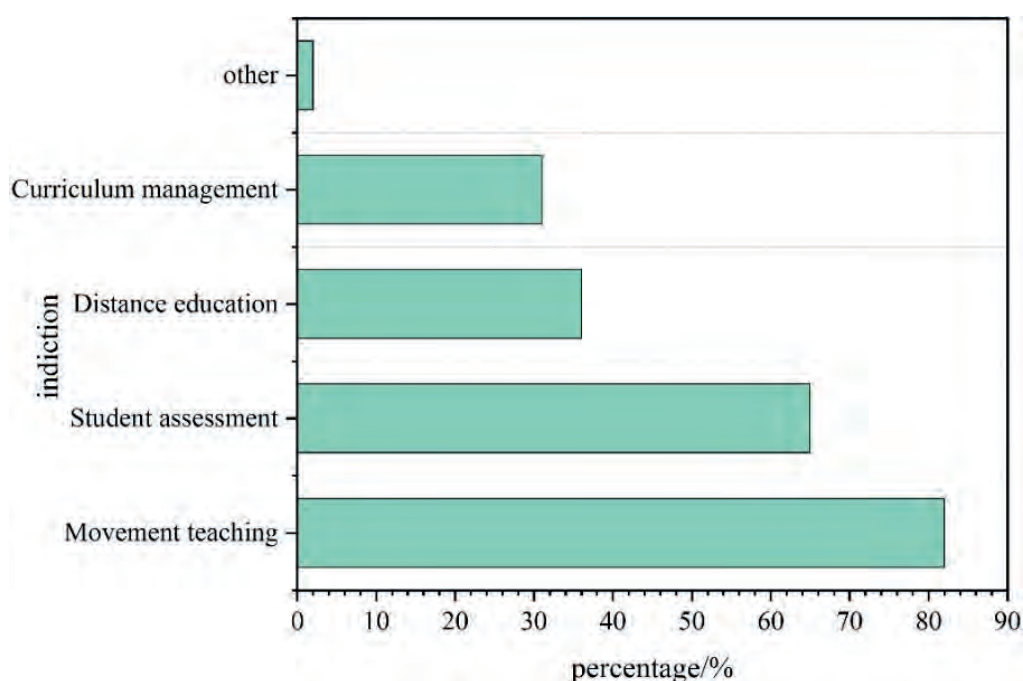
Physical education informatization is defined as the process of integrating modern multimedia technology, computer network technology and other informatization resources into the physical education teaching process, creating a good teaching environment, improving teaching and learning methods and means to better accomplish the goals of physical education, and finally realizing the modernization of physical education.

### **2.2. ADVANTAGES OF INFORMATION-BASED EDUCATION AND TEACHING**

The knowledge of information-based teaching is comprehensive, and the webpage covers the content of all areas of physical education, with clear knowledge points that can be learned at a glance, without the limitation of time and space in physical education classes. Students can use their spare time to learn physical education knowledge in dormitories or classrooms by using the Internet or cell phones to search for physical education learning websites. Being able to pre-study before class and review after class is helpful for mastering sports skills. Be able to communicate and exchange with teachers through the Internet in a timely manner, not just limited to class time. Being able to watch videos of my technical movements through multimedia is helpful to be able to continuously improve movement techniques. Can implement what the teacher said in class into the form of text and video images, through the network to students to show. The ability to supplement the teacher's lectures in a timely manner. It is a better means of communication with students in a timely manner. Can improve the intellectualization of the faculty.

### 2.3. USE OF INFORMATION-BASED TEACHING METHODS IN PHYSICAL EDUCATION

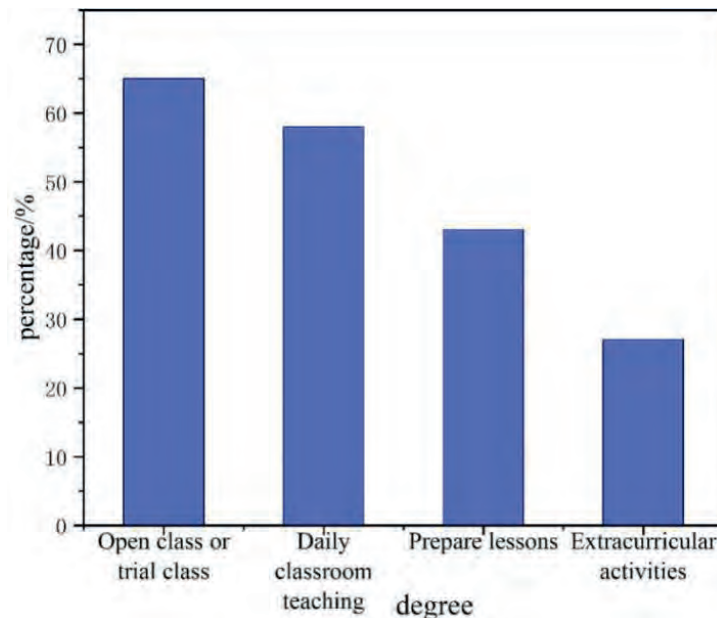
In this paper, the effect of information-based teaching reform of college physical education was studied in School A as an example. A total of 850 questionnaires were distributed and 802 were collected. Figure 1 shows the different aspects of PE teaching informatization. It can be seen that physical education teachers have used information-based teaching in different physical education teaching sessions. Among the 60 teachers who had used informatization teaching, 48 teachers used informatization teaching in the technical teaching of physical education movements, such as using multimedia to play technical movement videos, accounting for 80% of the total sample, which is the highest percentage. Thirty-six teachers used it for student assessment, such as organizing student physical education test items and scores into electronic files. 23 teachers used it for distance physical education, such as uploading videos of their physical education classes to the website. 20 teachers used it for managing and scheduling physical education classes, such as using a physical education management system. Two teachers also use it for other aspects, such as lesson planning.



**Figure 1.** The links to informing physical education

Figure 2 shows the occasions of information technology in physical education. When you were asked “If you have used information technology teaching in PE, in what environment”, 39 teachers chose “seminar or open class”, accounting for 65% of the highest percentage. This data reflects that most teachers use information technology teaching in PE because they want to create a good visual effect and classroom atmosphere through information technology teaching under the pressure of public class or seminar class, but they neglect to apply information technology teaching from its essence and to explore the unique teaching function of information technology teaching in a deeper way.

Thirty-two teachers chose “daily classroom teaching”, accounting for 52% of the total sample. Twenty-six teachers chose “lesson preparation”, accounting for 42% of the total sample. Sixteen teachers chose “extracurricular activities”, accounting for 28% of the total sample. These three data indicate that the overall application of information technology in physical education is good in daily physical education classroom teaching, but the application frequency is low in “extracurricular activities”.



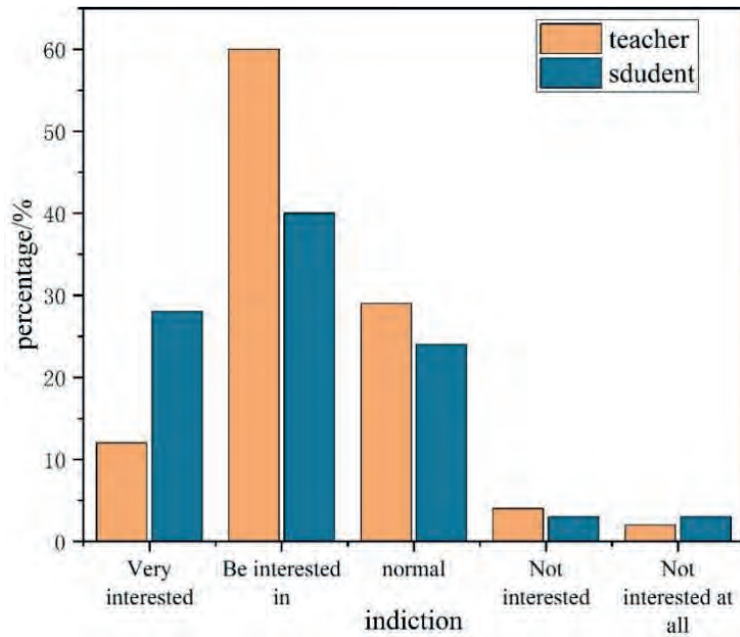
**Figure 2.** Occasions for informing PE teaching

### **3. THE EFFECT OF USING INFORMATION TECHNOLOGY IN PHYSICAL EDUCATION IN COLLEGES AND UNIVERSITIES**

#### **3.1. TEACHERS' AND STUDENTS' PERCEPTIONS OF ATTITUDES TOWARD THE INTEGRATION OF INFORMATION TECHNOLOGY INTO PHYSICAL EDUCATION**

The level of interest of teachers and students in information technology education and teaching directly affects the frequency of application in classroom teaching and the effectiveness of education and teaching. A survey was conducted to investigate the attitude perceptions of teachers and students about the integration of information technology into aerobics teaching, and the details are as follows.

Willingness is the most basic and fundamental factor, which is the driving force for a person to want to reach his or her goal. Figure 3 shows teachers' and students' willingness to teach with information technology. Teachers and students are very interested in using information technology in aerobics teaching with 12.3% and 28.5% respectively, 59.7% and 41.9% respectively are interested in incorporating information technology, and 29.6% and 24.8% respectively have an average degree of willingness. It can be seen that teachers and students in colleges and universities have a high willingness to integrate information technology in teaching, which can speed up the pace of aerobics information technology teaching reform to a certain extent.

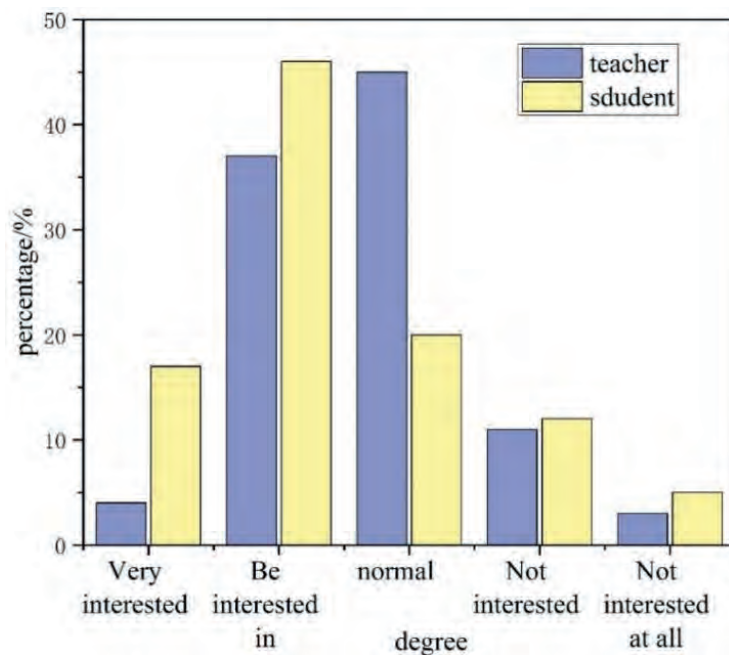


**Figure 3.** Willingness of teachers and students to teach with information technology

### 3.2. ANALYSIS OF SATISFACTION WITH INFORMATION-BASED TEACHING

The effectiveness of education and teaching is the key to measure the quality of information technology teaching in aerobics. A survey was conducted on the satisfaction level of teachers and students regarding the effectiveness of information technology teaching during and after the epidemic era, and the details are as follows.

Figure 4 shows the satisfaction level of teachers and students with the effectiveness of aerobics informatics teaching during the epidemic. According to the related analysis results, it can be seen that the percentage of 60 teachers and 300 students who were satisfied with the teaching effect as average were 45% and 20%, the percentage of those who felt satisfied were 37% and 46%, and those who were very satisfied were 4% and 17%, only 11% and 12% of teachers and students were dissatisfied with the teaching effect, and 3% and 5% of teachers and students presented a very dissatisfied attitude. It can be concluded from the analysis that teachers and students are satisfied with the effectiveness of information technology teaching, where the overall satisfaction of teachers is lower than the overall satisfaction of students.



**Figure 4.** Satisfaction levels of teachers and students

#### **4. CONCLUSION**

This paper explores the ways and advantages of information technology teaching, and analyzes students' and teachers' attitudinal perceptions of information technology integration into physical education and satisfaction with information technology physical education. The following conclusions are drawn:

In terms of attitudinal perception, 12.3% and 28.5% of teachers and students were very interested in the degree of willingness to use information technology in teaching, and 59.7% and 41.9% were interested in the willingness to integrate information technology. Both teachers and students in colleges and universities hold a high willingness to integrate information technology in teaching and learning.

In terms of and satisfaction with the teaching effect, 60 teachers and 300 students expressed satisfaction with the teaching effect accounting for 37% and 46%, respectively, while those who were very satisfied were 4% and 17%. The satisfaction level of teachers and students with the effectiveness of information technology teaching was good, where the overall satisfaction level of teachers was lower than the overall satisfaction level of students.

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# RESEARCH ON THE INTEGRATION STRATEGY OF UNIVERSITY LEGAL EDUCATION AND CURRICULUM CIVICS COMBINED WITH ITERATIVE FUSION OPTIMIZATION ALGORITHM

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## ABSTRACT

This paper firstly introduces the importance and significance of the integration of legal education and curriculum Civics, and introduces the current challenges of the integration of legal and curriculum Civics. Then, an iterative integration optimization algorithm based on the path of the integration of law and curriculum thinking and politics is proposed, which continuously optimizes the curriculum design and education methods through iterative integration optimization algorithm for several iterations until the best integration effect is achieved. Then, a training system and a moral cultivation program were established for the integration of law and curriculum thinking and politics. Finally, the effectiveness of the integration of law and curriculum thinking and politics was evaluated through teacher feedback and student feedback. The average score of teachers' evaluation is  $3.48 \pm 0.32$ , and the average score of students' evaluation is  $3.68 \pm 0.15$ , which indicates that teachers and students think that the effect of integrating law education with curriculum thinking and politics is good. The research of this paper has certain practical significance and academic value for promoting the integration of legal education and curriculum thinking and politics.

## KEYWORDS

Iterative fusion optimization algorithm; Legal education; Curriculum thinking; Moral education; Integration effect; Training program

## 1. INTRODUCTION

Legal education in China's universities is an important part of higher education. It is an educational activity with the content of imparting legal knowledge, training legal thinking and cultivating qualified legal professionals [1-2]. Influenced by the properties of the legal profession itself, legal education is closely related to many aspects of society such as politics, economy, culture, science and technology, etc. The level of legal education, the development trend will eventually be the result of the role of comprehensive social factors [3].

Vigorous development of education and science should effectively strengthen the ideological and moral construction to provide clear objectives, namely, to adhere to educational innovation, deepen educational reform, optimize the educational structure, reasonably allocate educational resources, improve the quality of education and management, and comprehensively promote quality education [4-5]. Xu H et al. used big data technology to establish an intelligent system for law studies to test the learning efficiency of students [6]. Metallidou C I et al. studied the syllabus content of undergraduate legal studies and developed a course and suggested its inclusion in the undergraduate curriculum of technical universities

[7].

## **2. IMPORTANCE AND SIGNIFICANCE OF THE INTEGRATION OF LEGAL EDUCATION AND CURRICULUM THINKING AND POLITICS**

### **2.1. THE IMPORTANCE OF INTEGRATING LEGAL EDUCATION AND CURRICULUM CIVICS**

Law is not morally uninvolved, as positivist jurisprudence points out, but is an institutional being with close ties to morality. The proposition of the relationship between law and morality has long been apparent in the controversy between Hart and Fuller, with Hart insisting on the separation of morality from law, while Fuller returned to the natural jurisprudence tradition, arguing that law has a moral character and that law and morality cannot be separated. Then later Hart also changed his attitude slightly and considered law as the minimum morality. Therefore, law and morality can not only coexist, but must coexist and integrate in nature. To sum up, we can see that there is a complex, close and overlapping relationship between legal education and Civic Education. In terms of nature, they overlap. In terms of function, they complement each other. In terms of purpose, both are aimed at safeguarding the interests of the ruling class, at achieving the various great goals of socialism with Chinese characteristics in the new era, and ultimately at safeguarding the common interests of all people.

### **2.2. THE SIGNIFICANCE OF INTEGRATING LEGAL EDUCATION AND CURRICULUM THINKING AND POLITICS**

The political attributes of the law profession are very strong, which also makes the function of nurturing people in the law profession course Civics more powerful and has a very prominent content. In the process of teaching law majors, it is not only necessary to make students understand and master more professional knowledge, but also to actively guide students to grasp the correct political direction, which is the only way to make the teaching of law majors more relevant and characteristic, and also to achieve a greater breakthrough in cultivating students' comprehensive quality. Thus, in this sense, the connotation of Civic Education in law courses is firstly reflected in the ability to effectively cultivate students' political awareness and political stance. This also requires the majority of law course teachers to have strong political quality, to integrate more ideological and political elements in the process of teaching, and to maximize the cultivation of students' comprehensive quality.

It is an important part of the training of legal professionals in the new era, which meets the needs of training legal professionals, meets the requirements of socialist colleges and universities, is conducive to promoting the sustainable development of students, and can promote the construction of the three-wide education mechanism.

## **3. THE PATH OF INTEGRATION OF LAW AND CURRICULUM THINKING POLITICS COMBINED WITH ITERATIVE FUSION OPTIMIZATION ALGORITHM**

### **3.1. ITERATIVE FUSION OPTIMIZATION ALGORITHM**

In order to improve the performance of the overall fusion algorithm and to achieve a better global search capability for the operations borrowed from the GA algorithm, this paper introduces the concept of iteration in the GA/PSO fusion algorithm and applies iteration to the population initialization and mutation operations. Since the density of the iterative orbit points generated by the Tent mapping is uniformly distributed and the iteration speed is faster compared with other mappings, the Tent mapping is used here to generate the iterative sequence for initialization. The Tent mapping iteration equation can be described by the following equation.



$$l(n+1) = \mu(1 - 2|l_n - 0.5|), 0, l_0, 1 \quad (1)$$

where  $\mu$  is the bifurcation control parameter,  $\mu \in [0, 1]$ , when  $\mu = 1$ , the Tent mapping is in a fully iterative state and traverses the entire  $[0, 1]$  interval. The basic steps of iterative initialization can be described as follows. First initialize the number of individuals in the population  $m$ , the range of values of the population variable  $[x_{\min, j}, x_{\max, j}]$ , and set  $k = 0$ . Write equation (2) in the following form:

$$l_j^{(i+1)} = \mu(1 - 2|l_j^{(i)} - 0.5|), j = 1, 2, L, D \quad (2)$$

Where  $j$  – iterative variable ordinal number,  $i = 1, \dots, D$ ;  $i$  – particle population ordinal number  $i = 0, 1, \dots, m$ ;  $l_j$  – iterative variables,  $0 \leq l_i \leq 1$ ; make  $\mu = 1$  in the Tent mapping, and generate an iterative variable by iterating with equation (2) according to the iterative search of the probability back idea. Then make  $i = 1, L, m$ , the initialization of the whole population can be completed.

Here, the population is initialized by iterative initialization, and unlike the BS algorithm, the GA mutation operation does not use the traditional method of changing the “0, 1” sequence, but adopts a re-iterative initialization method, i.e., when an individual is selected for mutation, it is re-initialized using an iterative method.

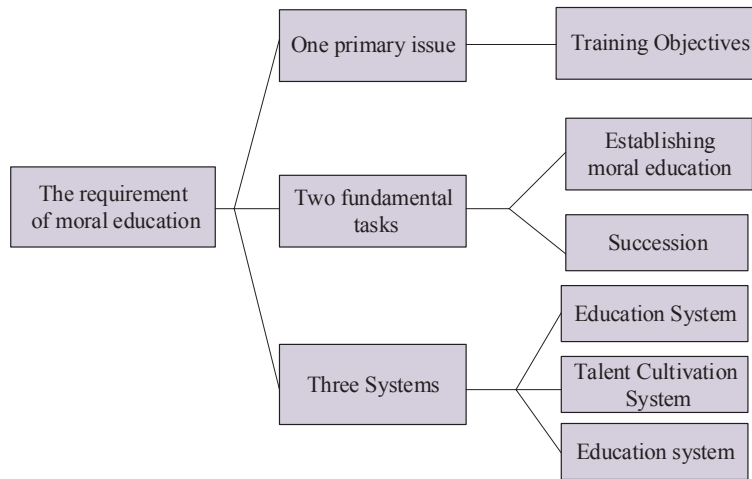
### 3.2. THE PATH OF INTEGRATION OF LAW AND CURRICULUM THINKING AND POLITICS

In this paper, we use an iterative fusion optimization algorithm to combine the fusion of course Civics and law knowledge to construct a path of fusion between law and course Civics. The algorithm continuously adjusts the parameters by iteration, so that the fusion effect gradually reaches the optimal state. The specific fusion method is as follows.

(1) The cultivation program is closely focused on the requirements of moral education

The real state of education function is not static, but a dynamic process of activity. The process of education is always permeated with value science or cultural science, which aims at value construction and meaning interpretation. In this process, the inner world of the individual is constantly undergoing spiritual transformation. The process of education is not only a process of knowledge acquisition, but also a total life activity in which all psychological factors, such as knowledge, emotion and intention, are fully activated and involved. Only in this way education ceases to be a mere ladder of knowledge and becomes an intermediary form of soul awakening and personality cultivation.

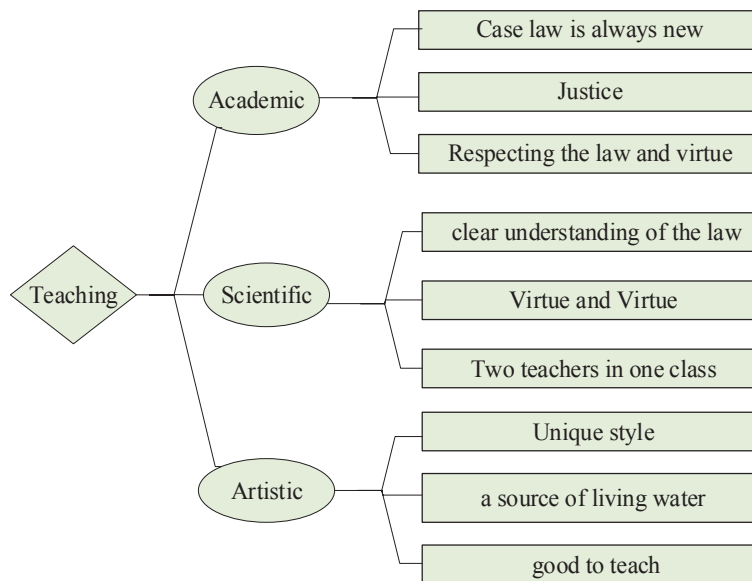
Law professional education is closely related to the practice of national rule of law construction, and the curriculum of law professional is the main position of law education. In order to significantly improve the level of education and teaching, teaching innovation should identify with “one primary issue” and “two fundamental tasks” and construct “Three systems”. The primary problem that needs to be solved in the cultivation of legal talents is what kind of people to cultivate, and legal education should shape the spirit of socialist rule of law character, so we should adhere to the fundamental task of establishing moral education, and take the cultivation of socialist builders and successors as the fundamental task. At the same time, we should build an education system of comprehensive cultivation of moral, intellectual, physical, social and aesthetic development, form a higher level of talent cultivation system, and improve the system of whole staff cultivation, whole process cultivation and all-round cultivation. Specifically as shown in Figure 1.



**Figure 1.** The pathway of moral development through the training system

(2) Efforts to improve the quality of classroom teaching in law courses

Professional courses are directly related to the quality of higher education personnel training, and course learning has an important position in the professional education system. The improvement of teaching quality is formed on the basis of long-term moral education and the accumulation of experience in legal professional education. The law professional curriculum has a comprehensive, integrated and fundamental role. Curriculum teaching innovation and the integration of ideology and politics of law professional courses should not only complete the teaching content of professional courses, but also complete the ideological and political education objectives, or more accurately expressed as, the ideological and political education objectives are integrated with the knowledge transfer and ability cultivation of law professional. In the process of construction of teaching innovation and integration of ideology and politics in the curriculum, the spiritual character of socialist rule of law talents, the ability to study and think about theoretical issues of law as well as the reality of the rule of law, the professional ethical quality of dedication to social justice, loyalty to law and truthfulness in three cultivation effects are the judgment criteria for improving the quality of teaching in law courses. The basic idea of integrating classroom teaching innovation with the construction of Civics, on the other hand, is to allow students to complete inquiry-based learning under the guidance of teachers. Figure 2 shows the three levels of classroom teaching quality improvement.



**Figure 2.** Three levels of classroom teaching quality improvement

### (3) Transformation of the “student-centered” teaching model

The audience of course teaching is students, and the task of cultivating students’ learning ability cannot be derogated from in any way, but rather from the beginning of the course, students’ learning ability should be continuously exercised in a progressive way. The essence of student-centeredness is to focus on the acquisition of knowledge and the acquisition of abilities by students. Student-centeredness is not to subvert the dominant position of teachers in the classroom, but to require that the core of teachers’ teaching and training process is the quality of student training. Student-centeredness can be enriched in the teaching and learning process, for example, by developing second and third classes that focus on competency development and value guidance to complement the knowledge transfer in the first classroom, forming a training loop and implementing a developmental view of education and training along with continuous improvement.

## 4. ANALYSIS OF THE EFFECT OF THE INTEGRATION OF LAW AND CURRICULUM THINKING AND POLITICS

The questionnaire feedback on the effect of Civics teaching practice was conducted for 94 teachers and 100 students in H university respectively in the process of Civics construction practice of law courses, as follows.

### 4.1. ANALYSIS OF TEACHER EVALUATION FEEDBACK

As can be seen from Table 1, the average score of teachers in the five aspects of “the degree of attention to curriculum thinking and politics, the degree of integration of curriculum thinking and politics, the construction effect of curriculum thinking and politics, students’ acceptance of the content of this course thinking and politics, and the degree of help of this course to students” is  $3.48 \pm 0.32$ , which also suggests that although teachers think that the degree of help of curriculum thinking and politics to students is high, there is still room for improvement in the daily teaching process. The average score of  $3.48 \pm 0.32$  for the five aspects of “how helpful the course is to students” also suggests that although teachers think the course is helpful to students, there is still room to improve the attention and integration of the course in the daily teaching process. On the other hand, it also indicates that the construction of the course Civics should be made concrete and avoid abstraction, and the teaching of Civics should be combined with current national events, students’ training goals and social needs, and focus on cultivating students’ independent thinking ability and correct three views. Table 1 shows the feedback from teachers on the construction of Civics in law courses.

**Table 1.** Faculty feedback on the construction of the Civics in Law course

Survey Items	5 Score	4 Score	3 Score	2 Score	1 Score
Degree of attention to curriculum thinking and politics	10(10.64)	22(23.68)	40(42.57)	10(10.63)	12(12.78)
Degree of integration of curriculum thinking and politics	9(9.59)	34(36.46)	32(34.35)	14(14.84)	5(5.35)
Effectiveness of Curriculum Civics	10(10.69)	35(37.25)	44(46.85)	5(5.34)	0
Students’ acceptance of the content of this course	11(11.76)	33(35.56)	45(47.45)	5(5.35)	1(1.08)
How helpful the course is to students	25( 26.65)	40(42.56)	26(27.89)	2(2.16)	1 point

### 4.2. STUDENT EVALUATION FEEDBACK

The content of students’ evaluation includes 12 aspects: “family and national spirit, traditional cultural identity, socialist core values, moral integrity, sound personality, intellectual ability, epistemology and methodology, critical thinking, innovation consciousness, academic integrity, positive communication, and respect for the elderly and children”, with scores from 1

to 5 indicating the impact of the current curriculum thinking and teaching. The average score is  $3.68 \pm 0.15$ , with the highest being moral sentiment and the lowest being intellectual ability. The average score is  $3.68 \pm 0.15$ . The highest score is moral sentiment and the lowest is intellectual ability.

## 5. CONCLUSION

This paper constructs a path of integration of university legal education and curriculum thinking based on iterative integration algorithm planning, and analyzes the integration effect teaching. The following conclusions are drawn:

The average score of teachers in the five aspects of “the degree of attention to curriculum thinking and politics, the degree of integration of curriculum thinking and politics, the effect of the construction of curriculum thinking and politics, students’ acceptance of the content of curriculum thinking and politics, and the degree of help of this course to students” is  $3.48 \pm 0.32$ , which means that teachers think that curriculum thinking and politics is more helpful to students.

The average score of students’ evaluation is  $3.68 \pm 0.15$ , with the highest being moral sentiment and the lowest being intellectual ability. It indicates that the students’ feedback is generally good and the integration of course Civics in legal education is effective.

## FUNDING

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# THE APPLICATION OF PRODUCTION-ORIENTED APPROACH IN THE BLENDED TEACHING MODEL OF RUSSIAN LISTENING IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper firstly elaborates the main contents and teaching concepts of production-oriented approach. Based on this, a hybrid teaching model of Russian listening based on production-oriented approach is proposed to enhance students' listening ability and language expression ability by combining online and offline teaching. Finally, the teaching effect of this model was analyzed by comparing the students' listening scores before and after. The results showed that the average of students' listening scores was 14.7345 in the pre-test and 19.7834 after using this teaching method, indicating that the production-oriented approach is suitable for teaching Russian listening to students. The study of this paper has important reference value for Russian language education and blended teaching reform.

## KEYWORDS

Production-oriented approach; Russian listening; Blended teaching; Big data; Teaching model; Teaching philosophy

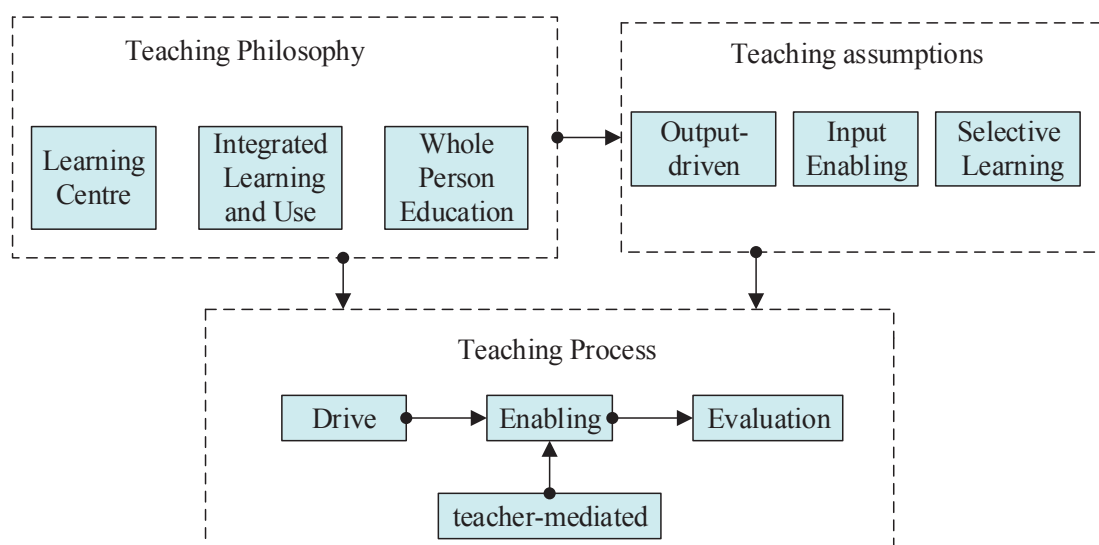
## 1. INTRODUCTION

Foreign language learning differs in many ways from the learning of other subjects, and it has always been a difficult task for many students due to various complex factors [1-2]. Russian, on the other hand, belongs to the Indo-European and Slavic language family, which is both very different from Chinese and has many differences from Russian, so Russian is more difficult for our students to learn and master [3-4]. Traditional research on foreign language teaching focuses more on how teachers teach and ignores the influence of students' individual factors such as intelligence, personality, cognitive style, motivation, and learning strategies on learning outcomes [5]. This results in the disconnection of foreign language teaching research from practice, which both hinders the development of foreign language teaching and affects the improvement of students' ability to actually use foreign languages [6]. Zinchenko, Y. P et al. studied the influence of information processing speed, memory capacity and intellectual factors on Russian language learning using a comparative experimental approach using regression analysis [7]. Ovchinnikova I V et al. studied the psychological characteristics of Russian language learners, and the study showed that Russian language learning has an important contribution to motor skills, visual perception, and communicative learning [8].

## 2. THEORY AND PRACTICE OF PRODUCTION-ORIENTED APPROACH

### 2.1. MAIN ELEMENTS OF PRODUCTION-ORIENTED APPROACH

The production-oriented approach is a teaching theory oriented to teaching objectives, which mainly includes teaching philosophy, teaching assumptions, and teacher as mediator. The teaching philosophy is divided into learning-centered, learning-use integration and whole-person education, which turns classroom teaching into a “learning-centered” classroom teaching pattern with the application of theoretical knowledge as the main content, aiming to cultivate comprehensive development of high-quality talents. Output-driven and input-driven are the main components of the teaching assumptions. Output-driven is mainly for higher level learning, which not only helps students to enhance their language fluency, but also tests the correctness of learners’ teaching assumptions. The teaching philosophy, teaching assumptions and teaching process of the output-driven method are shown in Figure 1.



**Figure 1.** production-oriented approach philosophy, assumptions and processes

### 2.2. TEACHING CONCEPT OF PRODUCTION-ORIENTED APPROACH

The innovative teaching philosophy guided by the production-oriented approach consists of three components: learning-centeredness, learning-use integration, and whole-person education.

The “learning center” in the production-oriented approach challenges the concept of “student-centeredness”, which advocates that classroom teaching and learning are conducted in a way that prepares the ground for effective learning to occur.

The “learning-use theory” does not completely deny the importance of teaching materials, but advocates the combination of learning while using, learning while using, and learning while using, combining input learning and output tasks, and linking the two organically. “The “learning and use in one” approach hopes to integrate learning and use, to develop students’ ability to use Russian as a whole, to use textbooks and texts as a means to learn to complete output tasks in Russian. The aim of the program is to develop students’ ability to analyze and solve problems in Russian.

According to the “holistic education theory”, humanistic goals can be achieved in three ways. First, the topics of output tasks are carefully chosen. Output topics can be divided into two categories: internal and external. Internally, they are conducive to students’ own development of a correct outlook on the three concepts and help them grow up healthy and strong. Externally,

it is conducive to the spread of Chinese culture and civilization, enhancing the country's soft power, and cultivating students' social responsibility to promote cultural exchange between China and foreign countries and introduce China to the world. Second, input materials are carefully chosen to serve the output tasks. The input materials echo the topics, involving both internal and external. Internally, they are language materials with a high level of ideology and a positive outlook. Externally, they are materials that are topical and focus on national and world events. Third, the organization of teaching activities is cleverly designed. For example, through group activities to cultivate students' spirit of unity and cooperation or organize debate competition mode, so that students can appreciate their opponents and cooperate with their teammates in competition.

### **3. DESIGN OF A BLENDED RUSSIAN LANGUAGE TEACHING MODEL BASED ON THE PRODUCTION-ORIENTED APPROACH**

The production-oriented approach is based on the assumption that learners are "output-driven", i.e., they output their own language first, emphasizing the importance of output. When students become aware of their output difficulties and identify their own shortcomings, the teacher then provides input that is relevant to the output goal and the student's output difficulties, helping each student to effectively improve himself or herself and achieve self-improvement. "Input facilitation requires teachers to find a series of tasks that are appropriate for students and that fully engage students' interest and motivation, so that input and output tasks complement each other and improve students' overall learning.

In the early stage of teaching, the teacher briefly explained the theory of production-oriented approach to the students in the experimental class, and encouraged them to export more of what they had learned to achieve the teaching effect of "use for learning" and "use for learning". At the same time, students were taught to use the Feynman method of learning, i.e., the concept that "the best student is the one who can tell what he or she has learned". In each teaching practice, the teacher first pushes the relevant teaching video through the WeChat group two days before the class. The online platform posts pre-class tasks for students to actively participate in online discussions to stimulate their interest in what they are about to learn. The students pre-study the content on their own through the online platform. The day before the lesson, the teacher posts listening questions online to find out the students' level of pre-reading and interest in the unit.

The classroom allows students the flexibility to use their cell phones to complete a series of teaching activities posted online and offline by the teacher with the help of the online platform. For example, group-based analysis of important and difficult points of the text is conducted so as to cultivate students' awareness of their goals. Problem-oriented, group seminars are conducted for the problems and issues encountered by students in their learning, so as to cultivate students' awareness of problem identification and problem-solving ability, thus achieving the purpose of promoting learning through use. Throughout the process, teachers provide timely evaluation and positive encouragement.

The online platform allows students to continue their learning in depth after the lesson, including critical thinking exercises, post-lesson consolidation quizzes, and essay summaries and compare-and-contrast activities aimed at strengthening students' relatively weak Russian language skills and improving their Russian language output.

### **4. ANALYSIS OF THE EFFECT OF MIXED TEACHING OF RUSSIAN LISTENING**

In this paper, we will analyze students' listening tests in School A as an example. In order to ensure the reliability and validity of the listening test questions, the test questions used in this study before the experiment are from the listening section of the Russian language test in

the 2019 National Higher Education Entrance Examination. After marking the papers, the pre-test scores of the experimental and control classes will be analyzed by using the professional software SPSS, so as to determine whether the listening levels of the two classes are comparable before the experiment and to provide data support for determining the two classes as the sample for the experiment.

The pre-test scores of the two classes were counted and analyzed using SPSS software. Table 1 shows the statistical comparison of the pre-test paper scores of the two classes.

Table 2 shows the results of the independent sample t-test. The mean value of the pre-test scores in the experimental class was 14.7345 and the mean value of the scores in the control class was 14.6127, which shows that there is not much difference between the listening scores of the two classes. The results of the independent sample t-test include the results of Levene's test for the variance equation and the results of the t-test for the mean equation, as shown in the table. Levene's test for the variance equation has two hypotheses of assuming equal variances and assuming unequal variances. Sig=0.545>0.05 in the Levene's test of the variance equation, which shows that the sample variances of the pre-test scores of both the experimental and control classes are chi-square. At this point, we can focus on Sig=0.765>0.05 in the t-test of the mean equation, which indicates that there is no significant difference between the Russian listening scores of the two classes in the pre-experimental period. The 95% confidence interval of the last part of the difference score shows that there is a 95% probability that the mean falls between [-1.5206-1.7856], and the middle value of the upper and lower limits can contain 0, indicating that the mean of the difference between the two classes before the experiment can be 0. From this data we can conclude that the difference between the Russian listening scores of the two classes in this study before the experiment was negligible and the students' listening levels were comparable and could be selected for the study.

**Table 1.** Statistical comparison of pre-test paper results between the two classes

Classes	N	Mean value	Standard deviation	Standard error of the mean
Experimental Classes	78	14.7345	4.80245	0.60567
Control Classes	76	14.6127	4.46240	.56670

**Table 2.** Independent samples t-test results

	Equation of variance Levene's test				t-test for the mean equation				
	F	Sig	t	df	Sig.(double test)	Mean Difference	Standard error value	Lower limit of 95% confidence interval	95% Confidence Interval Upper limit
Assuming equal variances			0.135	124	0.765	0.1356	0.7325	-1.5206	1.7856
Assume variances are not equal	0.2334	0.545	0.156	122.445	0.765	0.1367	0.7323	-1.5203	1.7834

To further test whether there is a significant difference between the pre and post test data of the experimental class and the control class, so as to verify whether the experimental use of production-oriented approach is significantly more effective in improving students' listening performance than the control class using the traditional listening teaching method. Table 3 shows the statistical comparison between the pre and post test papers of the experimental



class.

Table 4 shows the results of the paired sample test. The mean listening scores of the students in the experimental class were 14.7345 in the pre-test and 19.7834 in the post-experiment, from which it can be concluded that the mean Russian listening scores of the experimental class improved significantly before and after the experiment of this study. The data  $T=-7.546 < 0.05$  in the t-test of the listening scores of the experimental class on the pre- and post-tests indicate that there was a significant difference in the listening scores of the students in the experimental class before and after the experiment. The listening scores of the students in the experimental class who applied the production-oriented approach in listening teaching improved significantly compared with those before the experiment.

**Table 3.** Statistical comparison of test paper results before and after the experimental class

Experimental Classes	N	Mean value	Standard deviation	Standard error of the mean
Pre-test	78	14.7345	4.80245	0.60567
Post-test	78	19.7834	5.03456	0.63567

**Table 4.** Paired sample test results

	Mean value	Standard deviation	Standard error of the mean	Lower limit of difference	Upper limit of difference	t	df	Sig.(double measurement)
Pre-test results - Post-test results Results	-5.0456	-5.0778	-0.0268	-6.5789	-3.4879	-7.546	-7.6778	0.000

## 5. CONCLUSION

This paper firstly investigates the specific connotation and teaching concept of production-oriented approach, and discusses the way of using production-oriented approach in Russian listening teaching, the process of using it and the effect of using it. The following conclusions are drawn:

The average listening score of the students in the experimental class was 14.7345 in the pre-test and 19.7834 in the post-test, which shows that the average listening score of the experimental class in Russian language has improved significantly before and after the experiment of this study. The data  $T=-7.546 < 0.05$  in the t-test of the listening scores of the pre and post-tests of the experimental class indicate that the listening scores of the students in the experimental class applying the production-oriented approach have improved significantly compared to the pre-experimental period.

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# APPLYING MULTI-OBJECTIVE PLANNING TO ANALYZE THE INNOVATIVE PATH OF INTEGRATING CURRICULUM THINKING INTO COLLEGE PHYSICAL EDUCATION

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## ABSTRACT

This paper proposes an innovative path of applying multi-objective planning analysis to address the difficulties in the integration of Civics in college physical education courses. Firstly, the steps and principles of multi-objective planning are studied. Then, under the guidance of multi-objective planning algorithm, a specific path for the implementation of the thought politics of college physical education courses is proposed around four dimensions of moral responsibility, moral environment, moral principles and moral system. Finally, the effect of integrating curriculum thinking politics into college physical education was analyzed based on indicators such as students' health, course gains and ideological changes. The results show that 52% of them think that they have improved their learning attitudes and 45% of them think that they have gained good moods and emotions. Another 80% of students thought that the study of curriculum Civics had a positive impact on ideological values. This study is of great value to promote the reform of physical education teaching in colleges and universities and to promote talent cultivation.

## KEYWORDS

Multi-objective planning; Curriculum thinking; Physical education; Ideological value; Innovative path; Integration effect

## 1. INTRODUCTION

School physical education and ideological and political education are both important components of school education, among which, ideological and political education is fundamental to the implementation of moral education and school physical education is a fundamental project to realize the fundamental task of moral education and improve the comprehensive quality of students [1-2]. Integrating school physical education into ideological and political education can not only realize the disciplinary development requirements of ideological and political education close to students, close to life, and close to social reality, enhance the affinity and relevance of ideological and political education, but also be more conducive to the implementation of the goal of school physical education and ideological and political education to establish morality and educate people [3].

Under the requirements of the new era, ideological and political education is in urgent need of developing new educational models, exploring new educational methods, tapping new teaching resources, and developing new teaching platforms [4]. The exploration and research on the integration of school physical education into ideological and political education came into being, which is both a reflection on the traditional ideological and political education based on theoretical indoctrination and an attempt to improve ideological and political education in

the new era [5-6]. TalaghirLG et al. studied the methods of physical education teaching reform and proposed that curriculum ideology should be integrated into physical education and that an assessment system should be established to evaluate the teaching effectiveness. WanshengZ proposed that a system of moral education curriculum objectives and activities should be established to bring moral education curriculum back to life and infiltrate moral education in the teaching of life and other subjects [7-8].

## 2. THE IMPLEMENTATION PATH OF THINKING POLITICS OF PHYSICAL EDUCATION CURRICULUM BASED ON MULTI-OBJECTIVE PLANNING

### 2.1. MULTI-OBJECTIVE PLANNING ALGORITHM

The path planning problem studies the planning of an optimal path given a goal and a cost. Different combinations of conditions and objectives give rise to different planning problems, such as planning with multiple objectives is multi-objective planning, and planning where losses can be abstracted as yes or no is 0-1 planning.

Before building the model, a preliminary analysis of the strategy for goal selection is first made according to the generalized graph model.

The objective function is:

$$J_1 = S_0 + N_d K + \frac{1}{2} P_w \left( W_0 + W_c - \sum_{i=1}^{D_0} c_i W_i \right) + \frac{1}{2} P_f \left( F_0 + F_c - \sum_{i=1}^{D_0} c_i^j F_i \right) - (W_0 P_w + F_0 P_f + 2W_c P_w + 2F_c P_f), j = 1, 2, 3 \quad (1)$$

The objectives are therefore:

$$X^* = \arg \max J_1(c_i^j, W_i, F_i) \quad (2)$$

Where  $W_i$  is the material decision variable,  $c_i^j$  is the main decision variable, and  $F_i$  is the factor decision variable.

### 2.2. INNOVATIVE PATH FOR THE IMPLEMENTATION OF CIVIC GOVERNMENT IN PHYSICAL EDUCATION COURSES IN COLLEGES AND UNIVERSITIES

This paper adopts a multi-objective planning algorithm to combine the goal requirements of physical education curriculum and Civic Education to construct the implementation path of Civic Education in physical education curriculum. And the implementation process is divided into four dimensions: responsibility of establishing morality, environment of establishing morality, principles of establishing morality and system of establishing morality, and the implementation path is established from three major principles: improving the quality of teachers of university public physical education course thinking politics, optimizing the teaching environment of university public physical education course thinking politics and executing university public physical education course thinking politics.

#### (1) Strengthen the responsibility of establishing morality

Physical education teachers should do self-internalization of professional knowledge and improve their thinking and political cultivation. Do keep abreast of the frontier of sports knowledge and explore the depth of research, with a sense of mission and responsibility. To deeply understand the importance of the course Civics, and actively guide students to establish correct values, outlook on life and worldview in physical education. Physical education teachers should focus on the combination of knowledge transfer and value leadership, so as

to educate people throughout the whole process. Fully guarantee that teaching objectives, teaching content, teaching methods and teaching evaluation can play the effect of Civic Education.

### (2) Improving the moral environment

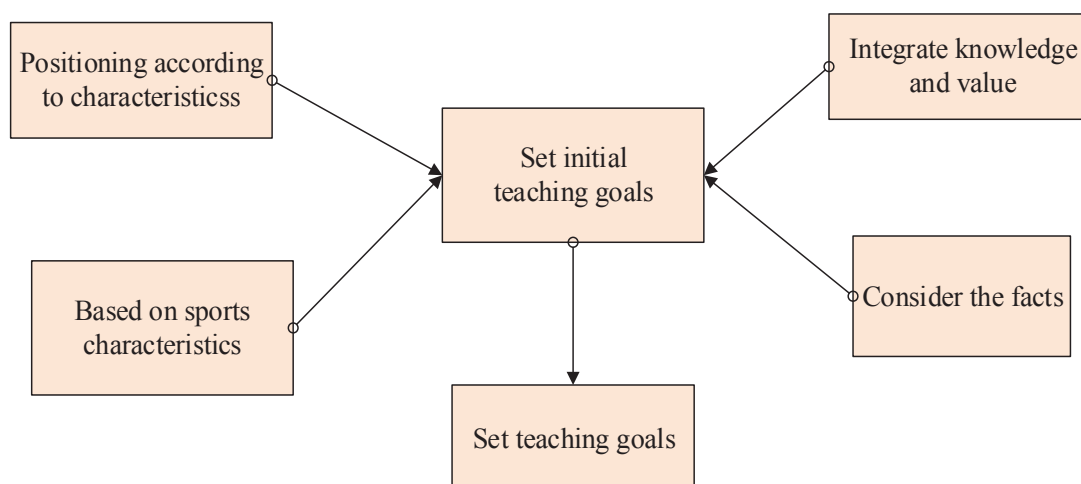
The teaching environment of physical education class as an external factor has a certain influence on the effect of course development. The school strengthens the policy incentive and the provision of venue facilities conditions is the material guarantee to optimize the university public physical education course thinking and teaching environment, teachers actively create a good physical education classroom culture atmosphere is the basis for optimizing the university public physical education course thinking and teaching environment.

### (3) Clearly establish the principle of morality

Civic politics of physical education courses should serve the training objectives of physical education. On the basis of completing the teaching objectives of physical education classes, we should appropriately and reasonably integrate the ideological and political education objectives in order to achieve the effect of course ideology for sports professional training objectives. Physical education course Civics should be in line with the law of student growth. Civic politics of physical education course should conform to the law of teaching and educating people. Understand the students' acceptance level while following the development and cognitive law of things, and at the same time to comply with the law of moral education, to eliminate the indoctrination teaching.

### (4) Constructing a moral system

In order to achieve good results in the implementation of university public physical education course thought politics only theoretical guidance is not enough, need to go deep into the teaching practice to do a good job in the design and implementation of physical education course thought politics. The teaching design of physical education course Civics includes setting the teaching objectives of the course Civics, sorting out the content of physical education Civics, innovating teaching methods and improving the teaching evaluation system, etc. to build a comprehensive system. Figure 1 shows the teaching goal setting.



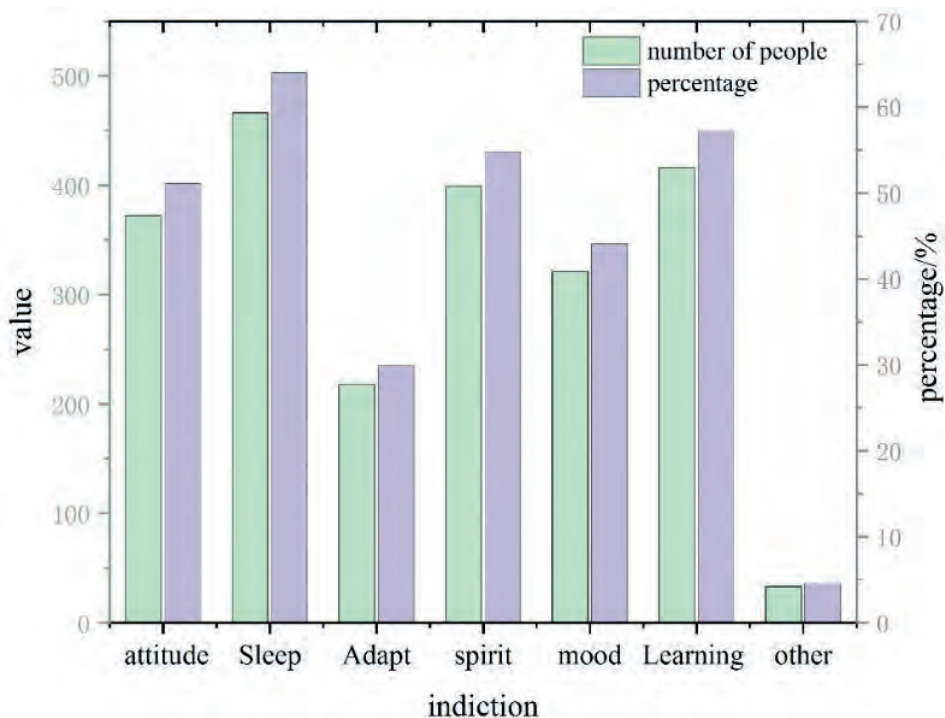
**Figure 1.** Setting of teaching objectives

### 3. ANALYSIS OF THE EFFECT OF INTEGRATING CIVICS INTO COLLEGE PHYSICAL EDUCATION

#### 3.1. ANALYSIS OF THE IMPACT OF PHYSICAL EDUCATION COURSE CIVICS ON STUDENTS' HEALTH

The impact of the implementation of the physical education course Civics on the students' own health status needs to be paid attention to. The teaching of physical education should take the development of students' physical and mental health as an opportunity to strengthen students' ideological and moral cultivation, so that students can master physical skills while strengthening their bodies and minds.

Figure 2 shows the impact of the implementation of the physical education curriculum on the health status of students. It can be seen that 65% of the total number of students chose "improve sleep quality", 58% of the total number of students chose "promote learning efficiency", 55% of the total number of students chose "boost spirit", 52% of the total number of students chose "improve learning attitude", and 52% of the total number of students chose "gain good mood and emotional well-being". 55% of the total number of students, 52% of the total number of students who chose "improve learning attitude", 45% of the total number of students who chose "gain good mood and emotion", and 45% of the total number of students who chose "improve social adjustment ability". The number of students who chose "improve social adjustment ability" accounted for 29% of the total number of students, and the number of students who chose "other" accounted for 5% of the total number of students. Through the physical education course Civics students' own health status has improved significantly in all aspects, especially in study attitude, sleep quality, study efficiency and mental state.



**Figure 2.** The impact of the implementation of Civics in PE lessons on students' health status

#### 3.2. ANALYSIS OF STUDENTS' GAINS IN PHYSICAL EDUCATION CLASSES

Physical education teachers in colleges and universities provide comprehensive training for students in other aspects such as physical health, athletic ability, professional skills, sports knowledge, moral quality, and quality spirit. Table 1 shows the gain of students' ideological and political education.

Students are able to feel and learn from all these aspects, especially the physical health, athletic ability, professional skills and sports knowledge brought by physical activities, and students gain a lot from them.

The ideological and political education that students gained through the physical education activities was significant. The percentage of those who gained patriotism was 68%. The percentage of those who were able to feel the spirit of selflessness and dedication in physical education courses was 59%. The percentage of those who can feel the spirit of collectivism in physical education activities is 78%. The percentage of those who can reflect the spirit of hard work and endurance is 76%. 78% of those who can reflect the spirit of aggressiveness. 65% can feel the sense of rules. 60% can feel the awareness of safety. 51% of those who can feel the sense of integrity.

**Table 1.** Students' ideological and political education gains

Options	Number of people	Proportion
Patriotism	496	68%
Selflessness	430	59%
Collectivism	569	78%
The spirit of hard work and hardship	554	76%
Enterprising spirit	569	78%
Awareness of rules.	474	65%
Safety consciousness	438	60%
Awareness of integrity.	372	51%
Other	73	10%

### 3.3. ANALYSIS OF STUDENTS' IDEOLOGICAL CHANGES AFTER SPORTS CIVIC EDUCATION

After the education of sports thinking, the students' thoughts have changed significantly, and this paper uses a questionnaire to analyze the changes in students' thoughts. Among them, "1" represents the change of the proposed ideas, "2" represents the change of the proposed ideas, "3" represents the change of the proposed ideas, "4" represents the change of the proposed ideas, "5" represents the change of the proposed ideas, "4" represents the change of the proposed ideas, "5" represents the change of the proposed ideas. "4" represents the changes in the proposed ideas, "5" represents the changes in the proposed ideas, and "5" represents the changes in the proposed ideas.

After the implementation of the Civic Politics of Physical Education curriculum, students have undergone the above-mentioned ideological changes, and in general, students' ideological perceptions have improved accordingly. The implementation of the Civic Science and Politics of physical education has a greater role in guiding the development of students' minds, and through the reasonable integration of Civic Science and Politics education and physical education by teachers, students can be taught to develop their minds in a good way, so that the development of students is in line with the needs of national development personnel. Students occupy a large proportion of the patriotic change of mind, accounting for more than 80% of the total number of students. Ideas such as respecting teachers and establishing the right values account for 80% of the total number of students. Sports has its own characteristics, unlike other disciplines, which mainly rely on theoretical education, students will encounter various difficulties and challenges in sports practice, and their bodies, spirits and minds are subjected to different degrees of load, thus it can be seen that sports activities have a better role in promoting the development of students' correct sports values. Figure 3 shows the

changes of students' thinking after sports thinking education.

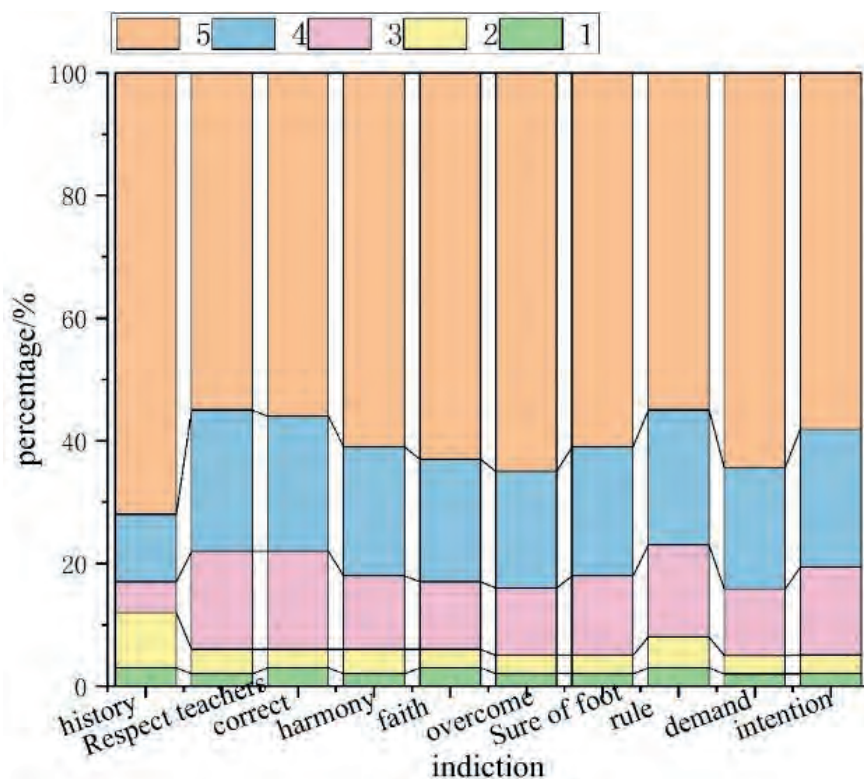


Figure 3. Changes in students' thinking after sports thinking education

#### 4. CONCLUSION

This paper analyzes the path of integration of Civics in college physical education courses based on multi-objective planning algorithm planning, and analyzes the effect of Civics integration into college physical education teaching from indicators such as student gains and changes in students' minds. The following conclusions are drawn:

In terms of the impact of the physical education course Civics on students' health, 58% of students think that the study of course Civics promotes learning efficiency. 65% think it improves sleep quality. 52% think it improves learning attitude. 45% think it gains good mood and emotion.

In terms of students' gains, the percentage of those who gained patriotism was 68%. The percentage of those who could feel the spirit of selflessness in the physical education program was 59%. The percentage of those who can feel the spirit of collectivism in sports activities is 78%. The percentage of those who can reflect the spirit of hard work and endurance is 76%. The ideological and political education effect that students reaped through physical education course activities was significant.

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# ELASTICITY ANALYSIS AND LOAD CHARACTERISTIC PREDICTION OF INTEGRATED NEW ENERGY POWER SYSTEM

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## ABSTRACT

This paper analyzes the stability and improvement strategies for new energy power systems, which include static voltage stability analysis method, dynamic voltage stability analysis method and nonlinear dynamics analysis method, and uses AC voltage control to improve the small disturbance synchronous stability. To further improve the system stability, the load characteristics of the power system are predicted using system damping retrospective evaluation. The results show that among the three inter-regional oscillation modes of the actual system, mode I has the widest involved range and the smallest damping ratio of 0.0410, and the oscillation frequencies of mode I and mode II are relatively close, with a difference of 0.08 Hz. This indicates that the system damping retrospective evaluation method can predict the load characteristics of the power system.

## KEYWORDS

Power system; Voltage stability analysis; AC voltage; Load characteristics; Damping traceability evaluation

## 1. INTRODUCTION

With the accelerated industrialization of the world, the development of national economies and industries has become overly dependent on fossil energy sources, leading to an increasing problem of energy crisis, which seriously threatens the survival and development of human

beings [1-2]. In order to achieve efficient use of energy, reduce environmental pollution, and lower the operating costs of energy systems, research on the integrated use of various forms of energy, such as electricity, gas, and heat, has begun [3]. The concept of integrated energy systems has been proposed in recent years [4]. The traditional electric, natural gas, and thermal systems are basically planned and analyzed separately, lacking coordination among them, and suffering from low energy utilization [5-6]. IES, on the other hand, can achieve coordinated planning and optimal operation among multiple energy sources, improve the safety and self-healing capability of the social energy supply system, promote the efficient utilization of energy, reduce the operating cost of the whole energy system, and achieve sustainable development [7-8].

In this paper, the stability of the new energy power system is firstly analyzed, which leads to the voltage stability analysis method and the improvement strategy of AC voltage control for small disturbance synchronous stability. Next, the concept, principle, characteristics and classification of charge prediction are described, and the load characteristics of the power system are predicted by using the system damping retrospective assessment method. Finally, the effectiveness of the proposed generator damping assessment method under a multi-machine system is verified by a real system simulation analysis. The results show that the system damping retrospective evaluation method predicts the load characteristics of new energy power systems.

## 2. STABILITY IMPROVEMENT STRATEGY OF NEW ENERGY POWER SYSTEM

### 2.1. VOLTAGE STABILITY ANALYSIS METHOD

The small disturbance analysis method is based on Lyapunov stability analysis, and therefore has a solid and rigorous theoretical support. Power systems are usually described by nonlinear differential algebraic equations, in which the differential equations link the dynamic characteristics of the system components. When the system is subject to small disturbances, the differential equations can be linearized at the equilibrium point, and the system voltage stability can be analyzed by determining the nature of the eigenvalues of the system state matrix. The differential algebraic equations of the power system are as follows:

$$\begin{cases} \dot{x} = f(x, y, p) \\ 0 = g(x, y, p) \end{cases} \quad (1)$$

Where,  $x$  is the system state variable,  $y$  is the system algebraic variable, and  $p$  is the system control variable.

Linearization of equation (1) at the equilibrium point yields

$$\begin{cases} \Delta\dot{x} = A\Delta x + B\Delta y \\ 0 = C\Delta x + D\Delta y \end{cases} \quad (2)$$

By eliminating the algebraic variables in equation (2), the standard equation of state is obtained as follows:

$$\begin{cases} \Delta\dot{x} = J\Delta x \\ J = A - BD^{-1}C \end{cases} \quad (3)$$

where  $J$  is the coefficient matrix.

## 2.2. AC VOLTAGE CONTROL FOR SMALL DISTURBANCE SYNCHRONIZATION STABILITY IMPROVEMENT STRATEGY

AC voltage control is used to regulate the AC side voltage of converters, which helps to support the AC system voltage and improve the dynamic response performance of the grid. However, the dynamic behavior of the AC voltage can destabilize the system.

In the traditional synchronous motor stability analysis process, the synchronous motor electromagnetic torque is usually decomposed into damped torque component and synchronous torque component, and the synchronous stability is discriminated by the magnitude of the two torque components. When the motor system lacks sufficient damping torque, the system will produce oscillatory instability, and when the motor system lacks sufficient synchronous torque, the system will suffer from non-periodic slip instability of the rotor angle. Only when the motor has sufficient synchronous torque and damping torque, i.e., the torque vector is in the first quadrant, the system stability can be guaranteed. Similarly, damping and restoring force can be used in the analysis of the effect of converter AC voltage control on synchronous stability. If the phase-locked loop can be equated to an ideal rotor, the end-voltage axis component can be decomposed into a damping component and a restoring force component. Both the reduction of the damping component and the reduction of the restoring force will undoubtedly reduce the synchronization stability of the system. Table 1 shows the stability comparison between the conventional synchronous machine and the grid-following converter.

**Table 1.** Stability comparison of conventional synchronous machine and grid-following converter

The relationship between torque and stability of conventional synchronous machines	Relationship between damping, restoring force and stability of grid-type converters
Decomposition of electromagnetic torque into damped and synchronous torque components	Decomposition of the q-axis AC voltage into damping and restoring force components
1. Lack of damping torque will lead to oscillation instability of the system 2. Lack of synchronizing torque will lead to non-periodic slip instability of the system	1. Lack of damping will lead to oscillatory instability of the system 2. Lack of restoring force will lead to non-periodic slip instability of the system

## 3. INTEGRATED NEW ENERGY POWER SYSTEM LOAD FORECAST ASSESSMENT

### 3.1. LOAD FORECASTING

Load is the amount of electricity demand, the total load of the power system is the sum of the total power consumed by all the power-using equipment in the system. Electricity load forecast, that is, power demand forecast, is the basis of power planning and design, is the preparation of power supply planning, power balance of the premise and arrange the basis of power grid infrastructure projects, only do a good job of this work, power supply planning, substation layout, network planning to be more in line with the actual. Forecasting work should be based on frequent investigation and analysis, collection of information on economic and social development and the development of construction of various industries, full study of electricity consumption, load historical data and development trends for measurement, in order to make the forecast results have a certain degree of accuracy. Table 2 shows the basic information of electric load forecasting.

**Table 2.** Basic information of power load forecast

Load Forecasting Principles	(1) Knowability Principle; (2) Possibility Principle; (3) Continuity principle; (4) Similarity Principle; (5) Feedback principle; (6) Systematic Principle
Characteristics of load forecasting	(1) Inaccuracy; (2) Conditionality; (3) Temporal; (4) Multi-programming
Classification of load forecasting	(1) Classified by time period, they are usually classified into long-term, medium-term, and short-term load forecasts. (2) It can be classified by industry into urban residential load, commercial load, rural load, industrial load, and other loads for load forecasting. (3) The characteristics are further divided into maximum load, minimum load, average load, peak-to-valley load difference, peak load average, low load average, flat load average, network-wide load, bus load, load rate etc.

### 3.2. SYSTEM DAMPING TRACEABILITY ASSESSMENT METHOD IMPLEMENTATION PROCESS

The value of GDLF determines the amplitude of the generator damping contribution, and the sign of GDLF determines the positive or negative damping provided by the generator. A negative GDLF indicates that the unit of interest injects additional transient energy into the system, which is detrimental to the system damped oscillations, and a positive GDLF indicates that the unit of interest consumes the transient energy of the system oscillations, which is beneficial to the system damped oscillations. Therefore, by calculating the energy structure of the system in the mode of interest through the MCSSD method proposed in this chapter, and then obtaining the GDLF of each generator, the generator damping can be finely evaluated. The calculation of the GDLF is based on the system energy trajectory, and the source of the trajectory can be either the time domain simulation output calculation or the PMU real measurement signal calculation, therefore, the above generator damping evaluation method has online application potential, and the main process of the method is as follows.

(1) The online monitoring of contact line power is used to determine whether the system is experiencing weakly damped or negatively damped low-frequency oscillations.

(2) If continuous oscillation occurs in the system, for generators in the oscillation region, the relevant generator PMU measurement signals are selected according to the data requirements for calculating generator dissipation energy.

(3) The oscillation characteristic parameters and the decoupled oscillation information of the mode of interest are obtained by the MCSSD method.

(4) Based on the generator dissipation energy distribution in the energy structure, the dissipation energy of each generator element is calculated, and then the total dissipation energy of a single generator is obtained.

(5) The GDLF of the generator in the mode of interest is calculated, and the damping contribution of each generator during the oscillation is evaluated according to the ranking of the GDLF index, and the information is fed back to the auxiliary decision system.

### 3.3. ACTUAL SYSTEM ANALYSIS

In this section, the effectiveness of the proposed generator damping evaluation method under a multi-machine system is verified through a real system simulation analysis. The system is divided into four regions, where the northern region is an equivalent system interconnected to other regions of the system through two 50 kV contact lines, No. I and No. II. Under the base operation mode, the power delivered from the central region to the northern region in the actual system is 100 MW. eigenvalue analysis of this actual system shows that there are three important inter-regional oscillation modes in the system under the base operation mode, and Table 3 identifies and calculates the eigenvalue results.

**Table 3.** Identification and eigenvalue calculation results

Model number	Frequency/Hz		Eigenvalue calculation		Oscillation participation area
	MCSSD	Prony	f/Hz	$\xi$	
I	0.876	0.862	0.87	0.0410	{West South Central} vs {North}
II	0.962	0.957	0.95	0.0619	{South West} vs {Central Central}
III	1.285	1.292	1.25	0.1437	{Western Central} vs {Southern North}

Among the three inter-area oscillation modes, mode I has the widest involved range and smaller damping ratio, and the oscillation frequencies of mode I and mode II are closer. A 200-ms three-phase short-circuit fault is set at the midpoint of mode II to excite the inter-area oscillation mode of the system, and the speed deviation signal of unit G1 at the Holling River pit is analyzed by the MCSSD method and the Prony method, and the obtained mode information is listed in Table 3. By comparing with the results of the eigenvalue calculation and the Prony analysis, it can be seen that the MCSSD method can effectively extract the system oscillation mode.

Under the basic operation mode, the fault form remains unchanged, and the GDLF calculated for each mode according to the mode decoupling information of each electrical quantity, for a certain mode, some units provide positive damping and some units provide negative damping with different amplitudes, so that the decentralized evaluation of damping during low-frequency oscillation can be realized according to the calculation results of GDLF.

#### 4. CONCLUSION

Starting from the stability improvement strategy of new energy power system, this paper describes the voltage stability analysis method and the differential algebraic equations of power system to improve the small disturbance synchronous stability using AC voltage control. In order to predict the load characteristics of the integrated new energy power system, a system damping retrospective evaluation analysis is performed. The eigenvalue analysis of the actual system shows that among the three inter-regional oscillation modes, mode I has the widest involved range and the smallest damping ratio of 0.0410, and the oscillation frequencies of mode I and mode II are relatively close to each other with a difference of 0.08 Hz. The results show that the decentralized evaluation of damping during low-frequency oscillation can be achieved based on the calculation results of GDLF. This shows that the load characteristic prediction method based on the retrospective evaluation of system damping can extract the oscillation signal characteristics of the elastic charge.

#### FUNDING

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# STUDY ON THE IMPROVEMENT STRATEGY OF POWER SUPPLY SECURITY OF NEW ENERGY POWER SYSTEM CONSIDERING UNCERTAIN LOSS FACTORS

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## ABSTRACT

This paper firstly analyzes the structure and function of the new energy power system and gives its optimal scheduling strategy. Secondly, the modeling approach for the power and load probability of the new energy power system is addressed. Finally, four optimization strategies, DMPC, SMPC-HC, SRHC and PBC, are compared and analyzed for different uncertainty levels. The results show that with a 15% error in the prediction value, the operating cost increase rate of SRHC strategy is only 4.15% and the voltage violation rate is only 1.52%, which is 71.99% and 77.28% lower than that of DMPC strategy, respectively. This shows that the voltage stability of the new energy power system can be ensured by the SRHC strategy and the security of power supply of the power system can be promoted.

## KEYWORDS

Uncertainty level; New energy; Power system; Power supply security; DMPC strategy; SRHC strategy



## **1. INTRODUCTION**

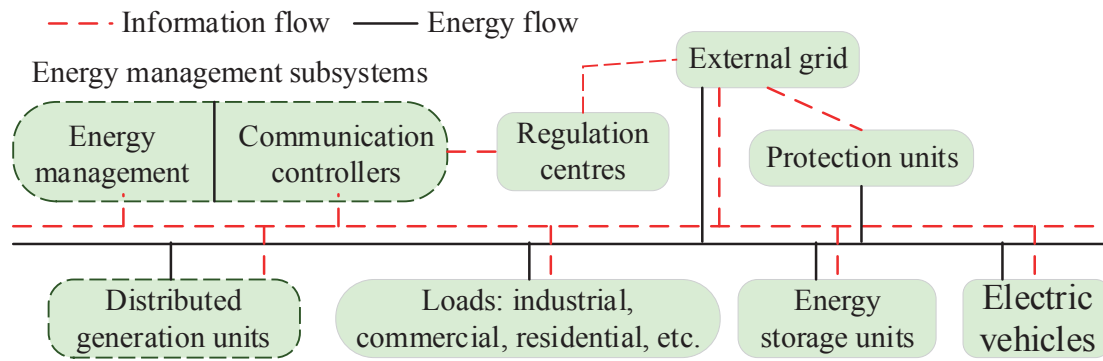
As the pace of social development in the world is gradually accelerating, the energy crisis and environmental pollution problems are becoming more and more serious around the world. China is now in a period of rapid development, and is also facing the current situation of fossil energy depletion, energy shortage, serious environmental pollution and ecosystem destruction [1-2]. In this context, the problems of insufficient resource reserves and environmental damage caused by the traditional centralized power supply model are gaining attention. At the same time, the low energy efficiency conversion of traditional fossil energy sources has led to excessive emissions of pollutants, which in turn have led to extreme weather conditions such as photochemical smog, acid rain, and haze. These many energy security issues are forcing China to adjust its energy structure and change the status quo of the previous single form of power generation that consumes too much non-renewable resources [3-4]. Therefore, new energy technologies with the advantages of unlimited, renewable, clean and environmental protection and high efficiency of power generation have gradually received widespread attention at home and abroad, and governments have incorporated the development of clean energy into their national development strategies, and renewable energy will be the top priority for sustainable development in all countries and will be the main driver to promote the current energy transition [5-6].

The development and promotion of new energy applications is an effective means to adjust the energy consumption structure, reduce carbon emissions and accelerate the realization of the “double carbon” goal. The integration of new energy generation into the power supply system can not only realize energy saving and emission reduction, but also alleviate the problem of new energy consumption. The energy storage system helps to improve the energy utilization of regenerative braking energy in the traction network [7-8]. Introducing new energy generation and energy storage system together into the power supply system can reduce the power quality problems such as negative sequence caused by three-phase voltage unbalance and guarantee the power supply safety of the power system [9-10]. However, because new energy generation is influenced by the timing and location, there are a series of uncertain factors, so how to effectively improve the power supply safety of new energy power system under the consideration of uncertain loss factors is an urgent problem to be solved.

## **2. OPTIMAL SCHEDULING ARCHITECTURE OF NEW ENERGY POWER SYSTEM CONSIDERING UNCERTAINTY**

### **2.1. NEW ENERGY POWER SYSTEM ARCHITECTURE AND FUNCTIONS**

A typical new energy power system is a small power generation and distribution system consisting of energy storage devices, distributed power sources, loads, energy conversion devices and control and protection devices. The new energy power system can be connected to the distribution grid as a whole to interact with the external grid, or it can operate independently to achieve internal energy supply and demand balance. As the most frequent interaction with users in the energy system, the new energy power system can sense the needs of users.



**Figure 1.** New energy power system architecture

As the nerve center of the whole energy system, the new energy power system regulation and control center can collect information of each device in the power system, such as load information, tariff information, each distributed micro-source output, energy storage status and real-time electricity demand. And through the regulation means to the overall scheduling of the system to ensure the stable operation of the system and power supply safety, reduce operating costs, to achieve the purpose of energy optimization management.

## 2.2. NEW ENERGY POWER SYSTEM OPTIMAL SCHEDULING STRATEGY

The optimal scheduling of new energy power system means that the energy management unit can coordinate energy storage devices, distributed controllable power generation units, interaction with the grid, electric vehicle charging and discharging scheduling and other parts of the microgrid to achieve the maximum utilization of renewable energy in the new energy power system, peak reduction and valley filling through interaction with the grid, to achieve the minimum overall operating cost and the maximum overall benefit to society, and to improve the safety of the power supply system. The objectives include The stochastic operation optimization model of active power distribution system is an operation optimization model built on the basis of deterministic operation optimization model, considering the uncertainty of system parameters and input uncertainty. The optimization modeling of active power distribution system mainly includes distributed unit modeling and distribution network modeling. Among them, distributed units mainly include distributed photovoltaic, distributed wind power, distributed controllable generating units, distributed battery energy storage, shunt adjustable reactive power compensation capacitors, and on-load regulators. SRHC has lower control cost, smaller voltage violation probability and better voltage steady-state regulation performance.

## 2.3. NEW ENERGY POWER SYSTEM POWER SUPPLY AND LOAD PROBABILITY MODELING

The wind speed is random, and the wind speed varies in different regions and seasons. In practical applications, the two-parameter Weibull distribution is often used to represent wind speed, and its probability density function and probability distribution function are expressed as

$$f(v) = \frac{k}{c} \left(\frac{v}{c}\right)^{k-1} \exp\left[-\left(\frac{v}{c}\right)^k\right] \quad (1)$$

$$F(v) = 1 - \exp\left[-\left(\frac{v}{c}\right)^k\right] \quad (2)$$

Where  $k$  is the shape factor of Weibull distribution,  $c$  is the scale factor of Weibull distribution, and  $v$  represents the wind speed.

The power-wind speed function relationship of the wind turbine roughly satisfies the following segmental function:

$$P_{wind} = \begin{cases} 0, v < v_{ci} \text{ or } v > v_{co} \\ k_1 v + k_2, v_{ci} \leq v \leq v_{co} \\ P_r, v_r \leq v \leq v_{co} \end{cases} \quad (3)$$

Where  $k_1 = P_r / (v_r - v_{ci})$ ,  $k_2 = -k_1 v_{ci}$  and  $v_{ci}, v_r, v_{co}$  denote the cut-in wind speed, rated wind speed and cut-out wind speed, respectively, and  $P_r$  denotes the rated active power output of the wind turbine.

In PV power generation, the PV active output is closely related to the light intensity. Here, assuming that it is only related to the light intensity and that the light intensity approximately obeys the Weibull distribution  $w(k_s, c_s)$ , the active output of PV power generation can be expressed by the following equation:

$$P_s = P_{s\_rate} \frac{S}{S_r} (0 \leq S \leq S_r) \text{ or } P_{s\_rate} (S_r < S) \quad (4)$$

Where,  $S_r$  is the rated value of light intensity,  $P_{s\_rate}$  is the rated value of PV active output.

The load of the new energy power system has random fluctuations and is often described by a normal distribution in the calculation:

$$f(P) = \frac{1}{\sqrt{2\pi}\sigma_P} \exp\left(-\frac{(P - \mu_P)^2}{2\sigma_P^2}\right) \text{ and } f(Q) = \frac{1}{\sqrt{2\pi}\sigma_Q} \exp\left(-\frac{(Q - \mu_Q)^2}{2\sigma_Q^2}\right) \quad (5)$$

where  $\mu_P, \mu_Q, \sigma_P, \sigma_Q$  is the mathematical expectation and mean squared deviation of the active and reactive loads, respectively.

### 3. ANALYSIS OF NEW ENERGY POWER SYSTEM VOLTAGE OPTIMIZATION ALGORITHM CONSIDERING UNCERTAINTY

To analyze the performance of the four optimization strategies DMPC, SMPC-HC, SRHC, and PBC under different uncertainty levels, several different prediction error standard deviation scenarios of 5%, 10%, and 15% are set here. Table 1 gives the cost escalation and voltage constraint violations for these four types of methods under the three uncertainty scenarios. The operating cost escalation rates given in the table are calculated based on the PBC operating costs at the same level of uncertainty.

**Table 1.** Comparison of optimization strategies under different uncertainty scenarios

	Uncertainty level	5%	10%	15%
<b>DMPC</b>	Operating cost escalation rate	12.25%	13.48%	14.82%
	Voltage constraint violation rate	2.87%	4.13%	6.69%
<b>SMPC-HC</b>	Operating cost escalation rate	5.53%	7.18%	--
	Voltage constraint violation rate	0.01%	0.02%	--
<b>SRHC</b>	Operating cost escalation rate	3.76%	4.03%	4.15%
	Voltage constraint violation rate	0.82%	0.95%	1.52%
<b>PBC</b>	Operating cost(¥)	906.82	931.65	989.64
	Voltage constraint violation rate	0.00%	0.00%	0.00%

From the comparison of the results of the optimization strategies of the four new energy power systems under different uncertainty levels, it is clear that the operating cost of the PBC approach increases gradually as the uncertainty level grows as a response to the fluctuation of the new energy power system and load power. Compared with the DMPC approach, the voltage regulation performance and operating cost of SRHC are significantly higher.

The voltage constraint violation rate decreases from 2.87% for DMPC to 0.82% for SRHC when the standard deviation of the prediction error is 5% of the predicted value, and from 6.69% to 1.52% when the standard deviation of the prediction error increases to 15%. In the scenario where the standard deviation of the prediction error is 10% of the predicted value, it costs 3.15% more to run SMPC-HC compared to the SRHC method. When the standard deviation of the prediction error increases to 15%, SMPC-HC cannot find a feasible solution. This indicates that the SRHC method has better conditioning performance compared to DMPC in the scenario where the prediction error increases. When the standard deviation of the prediction error is 15% of the predicted value, the operating cost increase rate and voltage violation rate of DMPC are 14.82% and 6.69%, while the operating cost increase rate of SRHC method is only 4.15% and voltage violation rate is only 1.52%, which are reduced by 71.99% and 77.28%, respectively. This shows that the operational voltage constraints in new energy power systems can be achieved by the SRHC method to ensure the security of power supply in the power system. Although the voltage constraint of SMPC-HC can be nearly 100% satisfied with only 0.01%~0.02% error, but it costs more operation cost.

In summary, in order to better realize the security of power supply for new energy power systems, the active distribution system stochastic rolling optimization strategy, i.e. SRHC strategy, should be selected. It can ensure the operating cost escalation rate and also effectively realize the voltage constraint of the power system to ensure the normal operation of the power system and improve the power supply security of the new energy power system.

#### **4. CONCLUSION**

This paper analyzes the optimal dispatching strategy of new energy power system from the architecture and function of new energy power system with uncertainty, and gives the modeling of power supply as well as load probability of new energy power system. In order to explore the strategy of power supply security of new energy power system considering uncertainty, an arithmetic analysis is carried out. The results show that the voltage violation constraint rate decreases from 2.87% for the DMPC strategy to 0.82% for the SRHC strategy at different uncertainty levels when the prediction error is 5%. When the prediction error is 10%, it costs 3.15% more to run SMPC-HC compared to the SRHC method. When the prediction error is 15%, the SRHC strategy has 71.99% and 77.28% lower operating cost escalation rate and voltage violation constraint rate, respectively, compared to the DMPC strategy. This shows that the SRHC strategy derived from the example in this paper can effectively promote the security of power supply of new energy power systems under uncertain loss factor levels.

#### **FUNDING**

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# APPLICATION OF TRADITIONAL CHINESE CULTURAL ELEMENTS IN FASHION STYLING IN THE AGE OF INFORMATION TECHNOLOGY

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## ABSTRACT

This paper firstly analyzes the structure of Chinese traditional culture and the characteristics of contemporary fashion styling, and gives a scheme to grasp the relationship between inherited tradition and fashion innovation in clothing. Secondly, the modern fashion design concept of clothing is analyzed and its trend of personalization, national culture and unification of innovation and tradition is elaborated. Finally, in order to further study the application of Chinese traditional cultural elements in fashion styling, an experimental analysis was conducted with a fashion competition of clothing design as the research object, and the results showed that in the fashion competition of clothing design, all the three judges scored more than 8 points for the new Chinese entry group, with an average score of 8.4.

## KEYWORDS

Traditional cultural elements; Fashion styling; Clothing fashion; Personalization; National culture; Innovation

## 1. INTRODUCTION

Chinese traditional culture has a long and profound history. Among the cultural systems that have been nurtured in the cradle of four ancient civilizations in the world, Chinese traditional culture is the only surviving cultural system and the only classical culture that has continued uninterruptedly without a break [1-2]. Chinese traditional culture is all-encompassing, especially the traditional Chinese plastic arts, such as the traditional Chinese folk plastic arts, the distinctive Chinese architecture, fine artifacts, silk, calligraphy, painting, etc., all of which are the source of modern clothing design [3-4]. Entering the information age, the personalized expression of clothing design relies on the perfect combination of the play of traditional Chinese culture and modern fashion design techniques [5-6]. Designers need to study Chinese traditional modeling art in depth and combine traditional modeling elements with modern clothing fashion to make the design more in line with today's aesthetic habits and lifestyles while conveying profound cultural connotations and giving new contemporary meaning to traditional modeling elements [7-8].

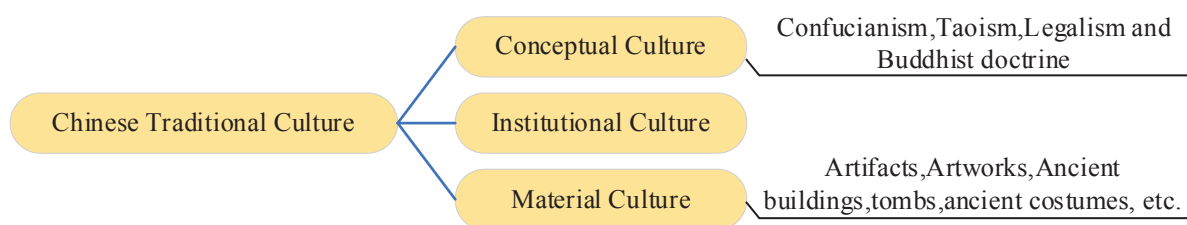
This paper first analyzes the structure of traditional Chinese culture and contemporary fashion styling, and points out that the relationship between inherited tradition and fashion innovation in clothing is the key issue facing Chinese fashion designers today. Then it elaborates the trend of personalization, national culture and the unification of innovation and tradition in modern fashion design concepts. Finally, the experimental analysis of fashion design based on traditional cultural elements shows that the application of Chinese traditional cultural elements in fashion styling can enhance the fashionability of modern clothing, which

in turn will lead China's fashion design industry to gradually establish its own brand in the international competitive market and spread China's excellent traditional culture to the world.

## 2. CHINESE TRADITIONAL CULTURE AND CONTEMPORARY FASHION STYLING

### 2.1. TRADITIONAL CHINESE CULTURE AND CONTEMPORARY FASHION STYLING

Chinese traditional culture is a grand classical cultural system with distinctive characteristics and stable structure, which has been passed down from generation to generation and influenced the whole social history, created by the Chinese nation as the main body and formed and developed on the land of China before the late Qing Dynasty. Figure 1 shows the structure of Chinese traditional culture. Chinese traditional culture is rich in content and has various forms of expression. The various forms of traditional culture have commonalities and are reflected in the basic spirit of traditional Chinese culture, which permeates all parts of traditional Chinese culture, mainly in the spirit of "humanism", "nature spirit" and "parity", This basic spirit permeates all parts of Chinese traditional culture, mainly in four aspects: the spirit of "humanism," the spirit of "nature," the spirit of "parity," and the spirit of "meeting."



**Figure 1.** Traditional Chinese Cultural Structure

Plastic art is an extremely broad category. Plastic art refers to the use of certain material materials, as well as shape, light, color, point, line, surface, body and other modeling means to occupy space, creating visible planes, relief or three-dimensional image, showing the objective existence of concrete things, to induce a close relationship with the visual of an art. Chinese traditional modeling art is the tangible fruit of traditional culture, intuitively presenting the history and reflecting the spiritual connotation of Chinese traditional culture, and is the visual basis for the innovation of later generations. The visual art of clothing, innovative design mainly relies on tangible cultural elements to reflect the spiritual connotation of traditional culture. Chinese traditional modeling art is rich in content, bronze, ceramics, silk, calligraphy, painting, ancient architecture, etc. are all creative sources of fashion design for clothing.

### 2.2. INHERITANCE OF TRADITION AND CLOTHING FASHION INNOVATION

How to grasp the relationship between inheritance of tradition and fashion innovation is the key issue facing Chinese fashion designers at present. First of all, it should be clear that inheritance of tradition is the premise of fashion innovation. Without understanding the traditional culture, the current design is the wood without foundation and water without source, and there is no way to talk about innovation. Although we have more than 20 years of experience in fashion design and have made certain achievements, in order to create famous brands to the world, we still need to sleep on our feet and learn traditional culture, because we have not done enough in this regard.

It is easy to find that the main reason for their success is that they have inherited their own cultural traditions and fully explored the connotations of their traditional culture. Here we might as well refer to their successful experience, the success of the French clothing industry is well known, the biggest feature of French clothing is its national character. French clothing expresses the historical tradition and spiritual connotation of the French nation, maintaining the aristocratic atmosphere of the French court and incorporating the simplicity and generosity

of modern life, French clothing reflects the combination of tradition and fashion.

Secondly, designers should learn to study traditional Chinese culture from a historical and macroscopic perspective. Chinese traditional plastic art is produced in each specific historical period, with a specific historical background and the attributes of the times. Any traditional culture has two sides, both the positive meaning of “excellent cultural heritage”, but also contains the negative meaning of backwardness, conservatism, etc., in the “ancient for the present”, we must “remove the false to preserve the truth, to remove the rough to extract the essence “, critically absorb and learn from. To create fashion culture, we must not lose the premise of national identity, dare to take the attitude of abandonment of tradition, that is, dare to deny the past. The right attitude to inherit tradition is to constantly enrich it, develop it and surpass it, and constantly push out new ideas to make tradition and modernity more integrated, so as to create fashionable clothing with individuality.

### **3. MODERN FASHION DESIGN CONCEPT OF CLOTHING**

#### **3.1. TREND OF PERSONALIZATION**

People are increasingly pursuing personalization in clothing, which is a new starting point after stylization and perfection of clothing and a sign of human spiritual civilization to higher development. The continuous improvement of human value and the continuous strengthening of the dresser’s sense of individuality have led to the development of dress image shaping and the continuous strengthening of the sense of individuality. The so-called personality is not only a single person, sometimes it may be a group of dressers, is the coordinates and symbol of the high development of human culture, and will also foreshadow the tendency of dress personalization in the future not too long period of history.

#### **3.2. ETHNIC CULTURE TREND**

Respect for regional cultural characteristics of clothing design, as expressed in its design style should reflect the differences in terroir, climate and other natural conditions of different regions, as well as heterogeneous cultural connotations and different national personalities, that is, to retain the regional cultural characteristics of clothing, fully reflect the region’s “sense of culture”. At the same time, clothing design should also be tapped into traditional culture, innovation, the incorporation of foreign culture, the transformation and development of different nationalities, regions and even the traditional culture of the East and West into a diversified, regional, personality characteristics of modern culture, which is an important feature of the concept of modern clothing design culture. In the current field of clothing design, where East and West cultures interpenetrate, many designers have made bold explorations, innovations and refinements on how to make these two cultures intermingle and blend. In this regard, Japanese fashion design, which has both national characteristics and modernity, is particularly remarkable and has achieved high achievements.

#### **3.3. THE TREND OF UNIFICATION OF INNOVATION AND TRADITION**

In the era of economic globalization and fierce competition in the garment industry, the modern garment design concept focuses on the pursuit of highlighting local traditional culture. It is also combined with modern fashion trends to realize the unity of innovation and tradition. Only by achieving the unity of innovation and tradition can we upgrade from the use of surface symbols to the performance of cultural connotation design. At present, Chinese clothing design as a whole still has a design concept is not high intention, creativity is not new, not the essence of China’s traditional culture into the design of clothing. The development trend of clothing is spiraling upward, so it means that innovation is necessary. Pay attention to theoretical research, grasp oriental culture and traditional Chinese culture at the level of cultural spirit, firmly grasp



the spiritual concept of traditional Chinese culture, and prevent symbolic and superficial combination of traditional elements, illustrative and hunting exhibition of Chinese elements. Think and feel the spiritual concept of Chinese culture.

In conclusion, the use of traditional modeling elements in modern clothing design caters to the individual distinction of modern clothing design concept, the national culture and the unification of innovation and tradition, which is the key to the success of modern design works.

#### 4. ANALYSIS OF FASHION DESIGN OF CLOTHING BASED ON TRADITIONAL CULTURAL ELEMENTS

In order to study the application of traditional Chinese cultural elements in fashion modelling, the author invited five group of clothing design professional teachers and students from the famous art school to design each group of 10 designers. Three judges were invited to score by 0-10. The design style of the five participants is France, light, dark style, American retro style and new style of Chinese style, and table 1 shows the scores of the five groups. The design style of French dress design is usually simple and optimized, and the design of light clothing usually focuses on the simplicity of the line, the dark dress design style is the smooth and smooth line of the line, the American retro style is full of the feeling of hard, wild and unruly. The Chinese style new wind combines the traditional elements, the pursuit of the rigour and the elegance.

**Table 1.** Scoring of the 5 groups of participants by the 3 judges

Competition Group	French style	Light Luxury	Dark style	American retro style	New Chinese Style
Judges 1	7.9points	7.9points	7.49points	8.0points	8.4points
Judges 2	8.2points	7.5points	7.5points	7.6points	8.5points
Judges 3	8.0points	7.8points	7.3points	7.9points	8.3points

From Table 1, we can learn that the highest rated group was the New Chinese style entry with an average score of 8.4, and the lowest rated group was the Dark Style entry with an average score of 7.4. This shows that the judges preferred the new Chinese style with contemporary traditional culture, which evolved from the traditional Chinese clothing style and contains various traditional Chinese cultural elements. Therefore, in order to meet the requirements of contemporary consumers, we need to explore and apply modern clothing design more deeply in the discovery of traditional art, and contribute a modest effort to find the fit between traditional Chinese styling elements and modern clothing design.

#### 5. CONCLUSION

This paper analyzes the structure of Chinese traditional culture and the characteristics of contemporary fashion styling in the context of the information age as the research background, and shows the importance of grasping the relationship between inherited tradition and fashion innovation in clothing. In order to be able to better analyze the fashion design of clothing based on traditional cultural elements, this paper conducts an experimental analysis using a clothing design fashion competition as the research object, and the results show that in the clothing competition, the highest rating was given to the new Chinese entry group, with an average score of 8.4. This shows that contemporary consumers prefer the new Chinese style with contemporary traditional culture, and this conclusion can lay a stable foundation and provide a strong impetus for the more diversified development of China's clothing fashion design industry.

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# SIMULATION OF MULTI-LEVEL SECURITY ACCESS CONTROL IN LABS BASED ON RBAC MODEL

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## ABSTRACT

This paper firstly constructs a laboratory system framework based on the B/S model and designs a security management system for the laboratory system. Secondly, the RBAC model is introduced to calculate the global trust degree to obtain access control policies and then assign access rights to the users of the laboratory system. Finally, simulation tests are conducted to verify the effectiveness of the system and the ability of security access control. The results show that the maximum average response time of this system is 0.65s and 1.39s when the number of concurrent users is 1000 and 10000 respectively, which shows that the RBAC model can effectively realize the security access control of the laboratory system and ensure the security of laboratory information.

## KEYWORDS

RBAC model; Global trust degree; Laboratory system; Secure access; B/S model; Control policy

## 1. INTRODUCTION

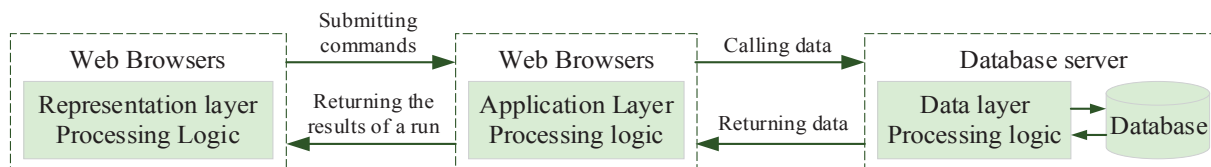
Internet application scenarios, laboratory network links generate a large amount of data every day, which is crucial to the secure operation of the network. Since the network has to provide data access services to users without interruption, network attacks may be encountered in the process, resulting in security threats to laboratory network data, and security access control of data is thus on the agenda and has become an urgent problem in the Internet industry [1-3].

With the rapid development of laboratories and the widespread use of smart devices, privacy protection in laboratories is receiving increasing attention. When a large amount of laboratory device data is collected, processed and shared through IoT, corresponding access control mechanisms are needed to prevent unauthorized access to resources and protect sensitive private data [4-5]. The main function of access control is to prevent unauthorized user operations and restrict unauthorized users from operating specific devices [6-7]. Through the access control mechanism, users with different rights levels have their own levels of access rights, and each user can only access the private data resources under the operation corresponding rights, which can effectively secure the laboratory data [8-9]. Therefore, the access control mechanism in laboratories has become one of the important research elements for protecting data security and privacy.

## 2. LABORATORY SYSTEM FRAMEWORK AND ITS SAFETY MANAGEMENT SYSTEM DESIGN

### 2.1. FRAMEWORK OF LABORATORY SYSTEM IN B/S MODE

The network operation mode of this laboratory system adopts B/S structure, i.e., browser/server structure as shown in Figure 1, and the main transaction logic is on the server side, forming a three-layer architecture of representation layer-application layer-data layer, which is convenient for system function expansion.



**Figure 1.** Framework for a laboratory system in B/S mode

The representation layer, the client browser, is the interface through which the user interacts with the lab system. The representation layer contains the display logic of the system and is located on the client side. The user calls the applications in the system and accesses the system data through the representation layer. The application layer is the part that implements the logic of various things in the lab and is the key to the whole system architecture, located on the server side. The data processing logic of the system is contained in the data layer, located at the database server side. The task of the data layer is to accept requests from the server for data manipulation.

### 2.2. LABORATORY SYSTEM SAFETY MANAGEMENT SYSTEM DESIGN

The user security management mechanism is designed to prevent legitimate users from overstepping their rights to access laboratory system applications or data information, while satisfying the distributed anxiety among users with different roles, in order to address the issues of differentiation and definition of user roles, differentiation and granting of user rights, and user authentication involved in the representation layer. The system security prevention mechanism is designed for the security issues involved in the application layer in terms of system software and hardware and its operational reliability. It is used to help the laboratory system to face different security threats, so that it can be targeted to protect the system hardware and software information from malicious damage, changes and leakage. The database security management mechanism is designed for the data layer involving data information storage security and communication security.

## 3. RBAC MODEL-BASED LAB SYSTEM USER RIGHTS ASSIGNMENT

### 3.1. FUNDAMENTALS OF THE RBAC MODEL

RBAC is an effective privilege management model.

Direct trust is the degree of trust for users who have a direct pointing relationship  $TD_{ij}^{(0)}$ , i.e:

$$TD_{ij}^{(0)} = w(T) \prod_i^k P(x_i) \quad (1)$$

Where,  $P(x_i)$  is the joint probability of accessing the message sequence,  $w(T)$  is the time factor introduced in the laboratory system,  $i, j (i=1, 2, \dots, n; j=1, 2, \dots, m)$  is the trust factor, and  $T$  is the length of time.

The global trust degree  $T_{i,j}$  is the trust degree of the user's full access to the information resources of the laboratory system, i.e:

$$T_{i,j} = \alpha \cdot T_{D,i,j} + \beta \cdot T_{R,i,j} \quad (2)$$

Where  $\alpha > \beta > 0$ ,  $T_{R,i,j}$  is the recommended trust level and  $T_{R,i,j} = \lambda \cdot T_{D,i,j}$ . Then the access control policy is

$$T_{i,j} = (\alpha + \beta \cdot \lambda) \cdot T_{D,i,j} \quad (3)$$

where  $(\alpha + \beta \cdot \lambda)$  is the global node trust degree parameter.

### 3.2. LAB SYSTEM USER RIGHTS ASSIGNMENT BASED ON RBAC MODEL

Using the global trust degree and the set access control results, the laboratory system user rights are assigned, which are divided into autonomous and mandatory access. The formula for calculating the idea of assigning weights for autonomous type access control is

$$R = \begin{cases} r_i, \forall r_i = refuse(1 \leq i \leq n) \\ T_{ij}(r_1 + r_2 + \dots + r_n), \forall r_i \neq refuse(1 \leq i \leq n) \end{cases} \quad (4)$$

Where  $R$  is the user access result after incorporating the autonomous access control weight assignment idea, and  $r_1, r_2, \dots, r_n$  is each access permission of the user. The forced access control weight assignment idea is calculated as

$$S = \begin{cases} r_i, \forall r_i = refuse(1 \leq i \leq n) \\ \mu(r_1 + r_2 + \dots + r_n), \forall r_i \neq refuse(1 \leq i \leq n) \end{cases} \quad (5)$$

## 4. LABORATORY SYSTEM MULTI-LEVEL SECURITY ACCESS CONTROL SIMULATION EXPERIMENTS AND ANALYSIS

In order to verify the security access control performance and feasibility of the lab system built based on RBAC model and B/S mode in this paper more effectively, simulation experiments are conducted. One computer is used to run the system designed in this paper, and the other two computers are used to run the blockchain system and the trust degree system, respectively, as the control group A and control group B. Before the formal start of this simulation experiment, the relevant experimental parameters need to be set, and the setup parameters are shown in Table 1.

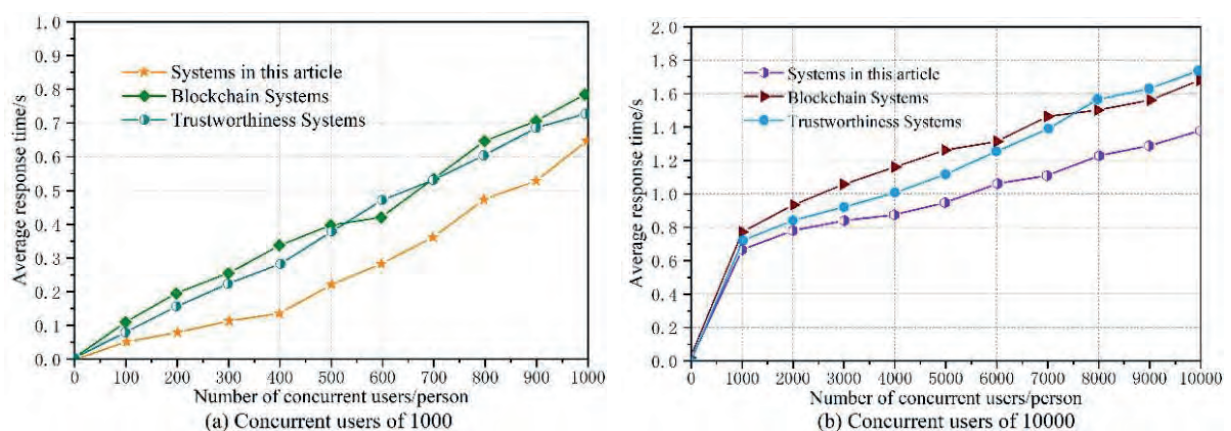
**Table 1.** Experimental parameter setting table

Parameters	Experimental group	Group A	Group B
Network Security Parameters	$3.85 \cdot 10^{-5}$	$3.85 \cdot 10^{-5}$	$3.85 \cdot 10^{-5}$
Total access control/TB	$4.68 \cdot 10^5$	$4.68 \cdot 10^5$	$4.68 \cdot 10^5$
Total amount of data/TB	$11.55 \cdot 10^8$	$11.55 \cdot 10^8$	$11.55 \cdot 10^8$
Estimated response time/s	1.02	1.35	1.58
Connectivity rate/%	98.37	98.26	98.15

As can be seen from Table 1, in this simulation experiment, only the expected response time is inconsistent between the experimental group and the control group, and other experimental parameters are the same, so the average response time of the network security access control system is used as the research index in this experiment. After setting the experiment-related parameters, the network security access control system of the

experimental group and the control group were controlled to run synchronously, and the number of concurrent users was set to 1000 and 10000 during the experiment, and the experimental results were obtained as shown in Figure 2.

From the comparison of the average response time of the system, it can be seen that with the increasing number of concurrent users, the average response time of the laboratory security access control system is increasing, but the response time of the designed system in this paper is much smaller than that of the two control systems. When the number of concurrent users is 1000, the maximum average response time of the system designed in this paper is only 0.65s. When the number of concurrent users is 10000, the maximum average response time of the system designed in this paper is 1.39s, which is smaller than that of the experimental control group. This shows that the laboratory system designed in this paper based on B/S model has better performance, and the security access control using RBAC model can further optimize the security of the laboratory system and protect the laboratory system data from unauthorized access.



**Figure 2.** Comparison of system response times for different numbers of concurrent users

## 5. CONCLUSION

In this paper, starting from the laboratory system framework, the basic framework of the laboratory system is constructed in B/S mode, and the security management system of the laboratory system is designed. For security access control of the lab, RBAC model is used for system user permission assignment. The system in this paper is compared with the blockchain system and the trustworthiness system in a simulation test of the average response time. The results show that when the number of concurrent users is 1000 and 10000, the average maximum response time of this system is 0.65s and 1.39s respectively, which indicates that the system built in this paper has good performance, and the RBAC model can be used to better realize the multi-level security access control of the laboratory and guarantee the security of laboratory data.

## ABOUT THE AUTHOR

Yonghua Xu (1971.04-), male, Han nationality, born in Rugao City, Jiangsu Province, Master degree, senior experimenter, senior engineer, research interests: computer network, big data mining, laboratory construction and management, etc.

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# URBAN LOW-CARBON STRATEGY BASED ON BIG DATA TECHNOLOGY: IMPLEMENTATION OF INNOVATIVE LANDSCAPE DESIGN

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## ABSTRACT

This paper firstly analyzes the design principles and fundamental role of urban low carbon landscapes. Secondly, the ecological and environmental contribution values of landscape spatial pattern gradients are calculated by using landscape load ratio index under big data analysis. The degree of influence of ecological changes in the landscape and changes in the gradient of landscape spatial pattern is analyzed by the single factor evaluation method, and the comprehensive potential measurement model is used to calculate the comprehensive force measurement of each gradient pattern. Finally, the three methods were used to compare and analyze the scheme of innovative landscaping. The results show that the comprehensive force measurement value of this paper's method is 9.5, which is 40.74% and 72.73% higher than the other two methods, respectively.

## KEYWORDS

Urban low carbon strategy; Landscape design; Spatial pattern gradient; Landscape load ratio; Comprehensive force measurement; Ecological contribution value

## 1. INTRODUCTION

Landscaping is an important part of urban construction, it is the main place for urban residents to relax and sightsee, and it plays a pivotal role in improving urban environment, reducing pollution, reducing noise, promoting urban ecological balance, and achieving carbon sequestration [1-2]. The design of urban garden plants landscape with low-carbon concept as the core is the fundamental requirement for maximizing the efficiency of carbon sequestration in urban greening, and good design is the key to the effect of the whole gardening [3-4].

In the design of urban garden plants based on low carbon concept, designers need to strictly follow the principle of low carbon. From a practical point of view, plants themselves have the function of temperature regulation, and if the ecological environment of the city is in trouble, the application of some plants can play an effective role in reducing the environmental temperature [5-6]. This is mainly due to the low carbon emission and high carbon sink characteristics of plants, which can improve the urban living environment to a great extent.

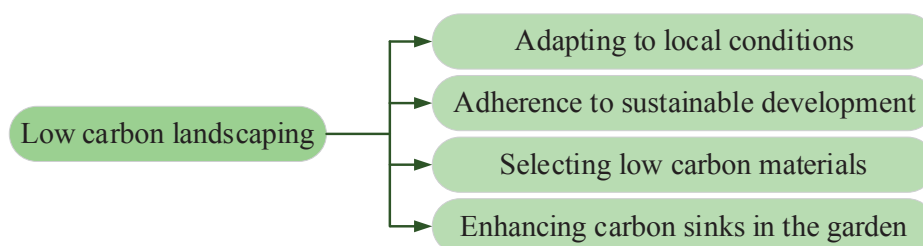
Therefore, urban garden plant landscape design should focus on the carbon sink function of the green space system, carry out green, low-carbon and recycling urban landscape construction, and build a conservation garden, ecological garden and environment-friendly garden [7-8]. Thus, it can promote the high-quality development of urban green space and contribute to the construction of social ecological civilization and beautiful China.



## 2. PRINCIPLES AND ROLE OF URBAN LOW-CARBON STRATEGIES IN LANDSCAPE DESIGN

### 2.1. DESIGN PRINCIPLES OF URBAN LOW CARBON LANDSCAPING

Developing carbon sequestration and biological carbon sink technologies, increasing carbon absorption in terrestrial ecosystems through afforestation, actively carrying out forest fire prevention and disease control, and improving the carbon storage capacity of nature are the common technical ways to reduce emissions. As the creator of “urban green lung”, landscape is an important part of energy-saving and carbon-reducing society. Low carbon is a development model aimed at reducing greenhouse gas emissions, which can achieve low pollution, low energy consumption and low emissions. In the whole life cycle of planning, design, construction and post-maintenance of low-carbon landscape construction, carbon dioxide emissions should be minimized. The design principles of urban low-carbon landscaping are shown in Figure 1.



**Figure 1.** Design principles for low carbon urban landscaping

### 2.2. THE ROLE OF URBAN LOW-CARBON STRATEGIES IN LANDSCAPE DESIGN

In the process of urbanization, resulting in the energy crisis and environmental deterioration is very serious, not only domestic, the global are facing such contradictions, so that the security pattern of the city gradually collapse, so that people’s production and life by different degrees of interference. The effect of urban low-carbon concept in landscape design is to make the layout of urban green landscape more scientific and reasonable, which can strongly moderate the contradiction of severe environmental pollution in the process of urbanization.

The most direct effect of the urban low-carbon concept in landscape design is to improve the atmospheric environment and optimize the spatial conditions for human survival. The implementation of the low-carbon concept in the design of urban garden plants and landscapes will make the distance and distribution between green landscapes more scientific and reasonable in urban construction, which directly affects the ecological cycle in urban areas. It greatly improves the resilience of the ecosystem itself, promotes the optimization of the urban ecological pattern, and enhances the ability to resist urban atmospheric pollution. The ability of different types of plants to sequester carbon and release oxygen is shown in Table 1.

**Table 1.** Plants’ ability to sequester carbon and release oxygen

Plant type	Average whole plant carbon sequestration/(g/d)	Average whole plant oxygen release/(g/d)
Trees	429.22	313.35
Deciduous plants	404.36	296.54
Evergreen	297.67	218.72
Shrubs	168.52	124.13

## 3. GRADIENT OPTIMIZATION OF URBAN LANDSCAPE SPATIAL PATTERN BASED ON BIG DATA

The ecological environmental contribution value of the gradient of landscape pattern is

calculated by using landscape load ratio index under big data analysis, the influence degree of ecological change of landscape and gradient change of landscape spatial pattern is analyzed by single factor evaluation method, and the comprehensive measuring force of each gradient pattern is calculated by using comprehensive potential measurement model. The landscape flow of the landscape spatial pattern is calculated by the index method, and the gradient optimization of the landscape spatial pattern is completed according to the calculation results combined with the ecological environment contribution value and the comprehensive measurement force.

Let  $LCI$  represent the contribution of the spatial gradient pattern of the landscape to the ecological environment, then:

$$LCI = \log \left\{ \frac{\sum_{i=1}^m S_i \cdot W_i \cdot P_{ci}}{\sum_{j=1}^m S_j \cdot W_j \cdot P_{cj}} \right\} \quad (1)$$

Where  $S_i$  represents the area of the trigonometry of the  $i$ nd “sink” landscape in the Lorenz diagram,  $S_j$  represents the area of the trigonometry of the  $j$ th “source” landscape in the Lorenz diagram.  $W_i$  represents the weight of the  $i$ th “source” landscape in the gradient pattern, and  $W_j$  represents the weight of the  $j$ th “sink” landscape in the gradient pattern.  $P_{ci}$  represents the percentage of the  $i$ th “source” landscape in the watershed, and  $P_{cj}$  represents the percentage of the  $j$ th “sink” landscape in the watershed.

The single-factor evaluation method is used to analyze the degree of influence of ecological changes in landscape and gradient changes in landscape spatial patterns, and compare the standard and index values of each factor to obtain the degree of influence of the target by each factor, and the single-factor evaluation formula is:

$$\psi_i = \begin{cases} C_i / C_1, & 0 < C_i \leq C_1 \\ 1 + (C_i - C_1) / (C_2 - C_1), & C_1 < C_i \leq C_2 \\ \vdots & \vdots \\ 2 + (C_i - C_2) / (C_n - C_2), & C_2 < C_i \leq C_n \end{cases} \quad (2)$$

where  $\psi_i$  and  $C_i$  are the single-factor evaluation indices and measured values of the  $i$  influence factors on the spatial pattern gradient of the landscape, respectively.  $C_1, C_2, \dots, C_n$  represents the standard value of the evaluation criteria for the spatial pattern gradient of the garden landscape.

According to the evaluation index of influence shadow  $\psi_i$ , the landscape ecological potential of each gradient pattern in the landscape space is calculated using the integrated potential measurement model, and the expression of the integrated potential measurement model is:

$$Q = \sum_{i=1}^n S_i \cdot W_i / \psi_i \quad (3)$$

Where  $W_i$  represents the weight of the indicator,  $S_i$  represents the score of the indicator,  $n$  represents the total number of indicators, and the integrated power measurement  $Q$  is taken in the interval  $[1,10]$ .

Landscape flow is an important sign to reflect landscape functions and landscape processes. Patches are connected by corridors to form a network of landscape through interactions. The corridors in the spatial ecosystem of the landscape are connected by intersections to reflect the complexity of the spatial gradient pattern of the landscape. The index method is used to calculate the landscape flow of the landscape spatial pattern gradient, and the optimization of the landscape spatial pattern gradient is completed under the analysis of big data according to the calculation result of landscape flow  $Y$  combined with the ecological contribution value and comprehensive force measurement of the landscape spatial pattern, and the calculation formula of  $Y$  is

$$Y = L / L_{\max} = L / 3(g - 3) \quad (4)$$

Where  $L$  represents the number of connections in the actual landscape space,  $L_{\max}$  represents the maximum number of connections, and  $g$  represents the number of nodes in the actual landscape space.

#### 4. EMPIRICAL ANALYSIS OF LOW-CARBON URBAN LANDSCAPE PLANNING

To prove the effectiveness of the proposed planning scheme, the biodiversity index is used to evaluate the planning and design of urban low-carbon landscape, which is an important manifestation of ecological construction. The methods of this paper, the spatial landscape gradient optimization method at all levels in the context of rapid urbanization, and the land use based landscape pattern gradient optimization method are tested respectively. The spatial coordinate system of spatial gradient pattern of landscape was established, and the plant species in the gradient of spatial pattern of landscape optimized by three different methods were compared. The test results are shown in Table 2.

In Table 2, SY represents the number of iterations, Q represents the integrated force measurement of landscape spatial pattern gradient, DS represents the optimization method of landscape spatial pattern gradient under big data analysis, KS represents the optimization method of spatial landscape gradient at all levels in the context of rapid urbanization, JY represents the optimization method of landscape pattern gradient based on land use, and PJ represents the average value of integrated force measurement.

**Table 2.** Test results of three different methods

SY	Q		
	DS	KS	JY
1	10	6	6
2	9	8	6
3	10	7	5
4	9	6	5
PJ	9.5	6.75	5.5

Analyzing Table 2, we can see that the average comprehensive measurement force obtained by using the method of spatial pattern gradient optimization of landscape under big data analysis is 9.5, the average comprehensive measurement force obtained by using the method of gradient optimization of spatial landscape at all levels in the context of rapid urbanization is 6.75, and the average comprehensive measurement force obtained by using the method of gradient optimization of landscape pattern based on land use is 5.5. Comparing the average comprehensive measurement force of the three methods, we can see that the big It is clear that the gradient optimization method for landscape spatial pattern under data

analysis can effectively optimize the gradient pattern.

In summary, in the urban low-carbon garden plant landscape design, planning and design personnel should reasonably consider the geographical conditions, climatic conditions and other factors affecting plant growth in the area where the project is located, reasonably select the site and optimize the configuration of garden plants, and strengthen the integration of plants and the application of buildings such as pavilions and courtyards in the garden. And do a good job in the design of key parts such as entrances and exits, objective assessment of the garden carbon sink situation, the full implementation of the concept of low-carbon environmental protection, to enhance the social value of the garden project as well as ecological value.

## 5. CONCLUSION

This paper takes the design principles of urban low-carbon landscapes as the entry point and analyzes the role of urban low-carbon strategies in landscape design. The ecological and environmental contribution values of landscape pattern gradients are calculated by using landscape load ratio index under big data analysis, the influence degree of ecological changes in landscape and changes in landscape spatial pattern gradients are analyzed by single factor evaluation method, and the comprehensive potential measurement model is used to calculate the comprehensive measurement force of each gradient pattern. Finally, in order to verify the effectiveness of the method in this paper, a comparative experimental analysis was conducted. The results show that the integrated force measurement value of the proposed design scheme is 9.5, which is higher than the other two methods. This shows that the urban low-carbon strategy under big data technology needs to further strengthen the grasp of the spatial location of the garden landscape and promote the effective improvement of the carbon sink capacity of the garden, so that the urban low-carbon concept can be better developed.

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# EXPLORING THE INTEGRATION OF CHORAL CONDUCTING AND SIGHT-SINGING AND EAR TRAINING COURSES IN COLLEGE MUSIC EDUCATION BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

This paper firstly analyzes the importance of sight-reading to choral conducting in music education majors. Secondly, based on big data technology, a deep learning network is used to fuse music features and construct a music style classification model. Finally, an example analysis was conducted to verify the effectiveness of the model in teaching the integration of choral conducting and sight-reading. The results showed that the classification accuracy of the model was 88.52%, 82.34% and 72.16% for pop, electronic and classical music, respectively. This shows that using the music style classification model can help teachers better prepare music teaching contents and promote the integration teaching of choral conducting and sight-singing and ear training.

## KEYWORDS

Sight-reading; Choral conducting; Music education; Deep learning network; Musical style; Big data

## 1. INTRODUCTION

With the continuous progress of big data technology, reshaping music makes the disciplinary literacy cultivation, aesthetic perception, artistic expression and cultural understanding of music education become more supportive and creative, and exploring the application of big data technology to promote the reform and development of music teaching has a very important significance [1-3]. Based on big data technology, students are guided to learn to use scientific methods to cultivate computational thinking to create music, to appreciate music in a scientific context to cultivate students' sense of musical aesthetics, and to use scientific evaluation to enhance the efficiency of music classroom teaching [4-6]. Through these measures, school music education can be accurately carried out to differentiate teaching according to the material and highlight the characteristics of music education.

Sight-singing and choral conducting are the two basic courses required for undergraduate students in music majors in colleges and universities. Sight-singing and ear training are the foundation for music majors and guarantee students' further study of music, and choral conducting course is one of the most popular courses in colleges and universities in recent years [7-8]. The two courses are traditionally taught in a single-subject teaching mode, and the knowledge students receive in their studies is relatively independent and scattered. However, the art of music is profound and boundless, especially because there is a certain degree of integration between the courses, and there are commonalities and intersections between the courses of sight-singing and choral conducting. The learning of sight-singing and ear training

is to establish accurate pitch concept and serve for polyphonic music, while choral conducting training can be said to be an extension of polyphonic, which cannot be separated from the foundation of sight-singing and ear training [9-10]. Thus, exploring the effective strategy of integrating choral conducting and sight-singing and ear training based on big data technology can further promote the development of music majors in colleges and universities and bring out the characteristics of music students.

## 2. THE IMPORTANCE OF SIGHT-SINGING AND EAR TRAINING FOR CHORAL CONDUCTING

### 2.1. SIGHT-SINGING AND CHORAL CONDUCTING

The discipline of sight-reading and ear training, like other courses that develop musical skills, forms musical skills by digging deeper, refining and summarizing the musical elements contained in the musical material itself. The characteristics of the discipline are shown in Table 1.

**Table 1.** Sight-singing and ear-training subject features

Features	Contents
Basic	Extensive coverage, High level of coverage, Highly integrated
Practicality	The perception of music, The perception of music, Thinking about music
Independence	Rhythm and beat, Pitch and chords, Melody and Modulation
Integrated	Integration in content, Interactive in form

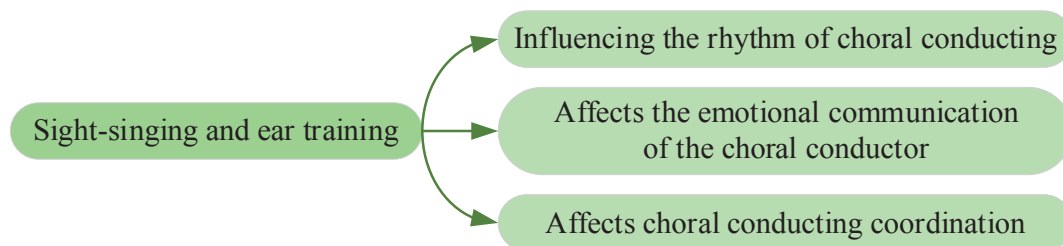
The importance of learning to sing and practice music cannot be overstated. In the process of teaching, it is necessary to combine the teaching of the subject with the practice of music to form a training mode that integrates the internal and external aspects. In the “internal” training, the main focus is to build up the inner “listening”, through the teaching of various musical information, to develop students’ perception of pitch and rhythm, and to form a fixed concept of pitch. In the “external” training, the main focus is on “singing”, through various forms of singing, to express the music in sound. Through various forms of singing, students can express the music with their voices. In the interplay of internal and external articulation, students’ ability of sight singing and ear training is improved.

Choral singing, as the name implies, is the process of interpreting a musical work in the form of singing by a group of people. Choral singing is a comprehensive form of music performance in all courses of music majors, mainly vocal, and incorporates the basic theoretical knowledge of various subjects, and is also a kind of training in colleges and universities to broaden students’ knowledge and increase employment opportunities. The conductor is the most critical and core character in the chorus, is the overall leader of the choir, in the whole team, whether in pitch, musical expression or rhythm control, the conductor should also be the best one deserved.

### 2.2. THE IMPORTANCE OF SIGHT-SINGING AND EAR TRAINING FOR CHORAL CONDUCTING

In choral singing, good polyphonic thinking is very important. Many pieces have monophonic and polyphonic parts, and some music will combine monophonic and polyphonic parts. Monophonic music can be done independently with one singer, while polyphonic music requires the cooperation of several people. Polyphonic music has two or more vocal parts, and collaboration is the typical form of polyphonic performance. Sight-singing training for polyphonic parts is systematic and mature in sight-singing textbooks, and such choral performances are compatible. Choral singing involves not only the pitch of the single part, but

also requires the rhythm to be strictly according to the score, as well as the harmony and tune style, etc. The influence of sight-reading on choral conducting is shown in Figure 1.



**Figure 1.** The impact of sight-reading on choral conducting

Choral singing needs to lay a good foundation through sight-singing and ear training, and choral singing cannot be done without the foundation laid by sight-singing and ear training. In the choral process, the music conductor must have the ability to identify the pitch and judge whether the harmony is harmonious, which needs to ensure the smooth progress of the chorus through the cumulative training of sight-singing and ear training.

### 3. MUSIC STYLE CLASSIFICATION MODEL BASED ON BIG DATA TECHNOLOGY

The use of big data technology to classify music styles can better help college music majors to understand music styles more intuitively when teaching the integration of choral conducting and sight-singing and ear training, and then achieve the accuracy of conducting and the precise grasp of timbre, rhythm and pitch. This chapter focuses on the construction of a music style classification model based on deep learning networks after fusing the characteristics of timbre, rhythm and pitch of music. The specific steps are as follows:

(1) The music features are input to the network, the weight matrix  $W$  of the deep learning network is initialized, and the bias  $a, b$  of the implicit and visible layers is initialized to 0.

(2) The visible layer neural units are assigned to forward transmit the input music features to obtain the activation probability corresponding to forward propagation in the deep learning network. That is:

$$p(h | v) = \prod_{j=1}^n p(h_j | v) \quad (1)$$

(3) The activation probability value  $p(h | v)$  corresponding to the neuron in the hidden layer is usually a real number, which is binarized.

(4) Back-propagating the probability value corresponding to the unit in the hidden layer in the deep learning network to obtain the reconstructed value  $v'$ . The activation probability is described by  $p(v' | h)$  as

$$p(v' | h) = \prod_{i=1}^n p(v_i | h) \quad (2)$$

(5) Calculate the backpropagation and activation probabilities in the improved deep learning network with forward propagation reconfiguration of  $v'$ .

(6) Use the above calculation results to obtain the increment corresponding to bias  $b$  in the visible layer, and also obtain the increment corresponding to bias  $a$  in the hidden layer  $h$ . The increments of the weight matrix  $W$  can be obtained by backpropagation probability and forward propagation probability calculation, thus constructing the music style classification model expressed as

$$\begin{cases} W_t = W_{t-1} + \varepsilon[v p(h|v) - v' p(h'|v')] \\ b_t = b_{t-1} + \varepsilon[p(v|h) - p(v'|h')] \\ a_t = a_{t-1} + \varepsilon[p(h|v) - p(h'|v')] \end{cases} \quad (3)$$

Where,  $\varepsilon$  represents the learning rate.

Through the above steps, the music style classification results are output.

#### 4. EMPIRICAL ANALYSIS OF THE INTEGRATION TEACHING OF CHORAL CONDUCTING AND SIGHT-SINGING AND EAR TRAINING

In order to further study the effectiveness of fusion teaching of choral conducting and sight-singing and ear training in college music education majors, this chapter carries out the fusion teaching model of choral conducting and sight-singing and ear training for teachers and 980 students of freshmen, sophomores and juniors in A city college as examples. This is to verify the effectiveness of the music classification model based on big data technology in the integration teaching of choral conducting and sight-singing and ear training.

##### 4.1. ANALYSIS OF THE CLASSIFICATION ACCURACY OF THE MUSIC STYLE CLASSIFICATION MODEL

For the music classification model constructed in this paper, this section uses the existing music style genre database on the Internet for quantitative analysis of the data, and the classification accuracy of the model for music styles is obtained as shown in Figure 2.

From the results of the classification accuracy of music styles, the classification accuracy of the music classification model constructed in this paper based on big data technology is higher for pop music, electronic music and classical music, with the accuracy rates of 88.52%, 82.34% and 72.16%, respectively. The reason for this is that pop music, electronic music and classical music are the mainstream music in the current society, which makes the process of music feature fusion more often use the rhythm and timbre of pop music, electronic music and classical music for feature extraction. This also shows that the music style classification model constructed in this paper can effectively classify music styles and provide effective teaching materials for the integration of choral conducting and sight-singing and ear training.

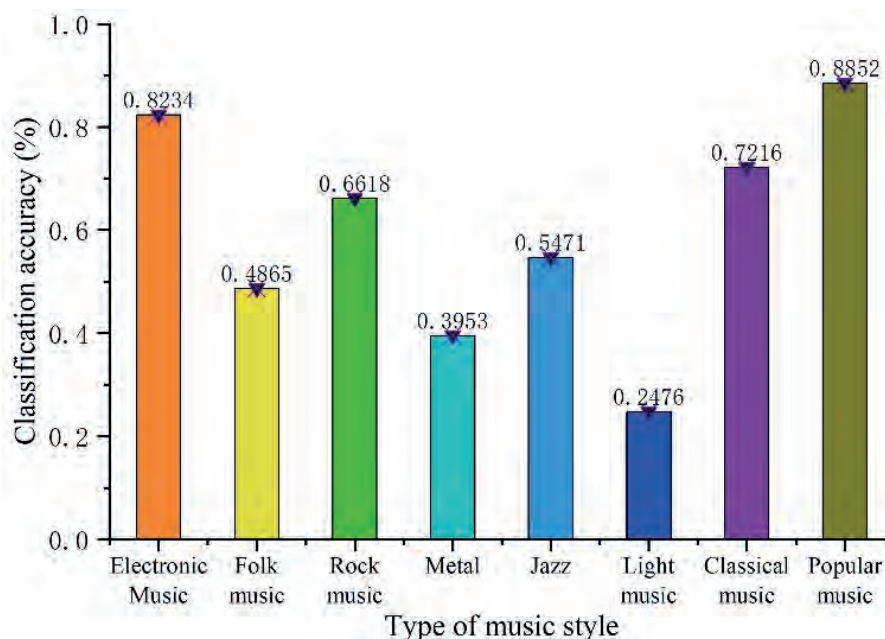


Figure 2. Classification accuracy of music classification models



## 4.2. STUDENTS' EVALUATION OF THE INTEGRATION OF CHORAL CONDUCTING AND SIGHT-SINGING AND EAR TRAINING TEACHING

In order to further analyze the effectiveness of teaching the integration of choral conducting and sight-reading, the evaluation data of students were collected and compiled in this section, and the results are shown in Table 2.

**Table 2.** Student assessment for integrated teaching and learning

	Very good	Good	Fair	Poor
Professional competence	429	338	198	15
Teaching Attitude	482	324	107	67
Teaching methods	327	325	225	103
Teaching effectiveness	401	209	209	161

From the students' evaluation of the integration teaching of choral conducting and sight-singing and ear training, the music style classification model constructed by using big data technology can effectively help students realize the discrimination of music genres, and then promote the coordinated development of sight-singing and choral conducting. The percentages of those who rated the teachers' professional ability, teaching attitude, teaching method and teaching effect as very good were 43.77%, 49.18%, 33.37% and 40.92%, respectively. This also shows that by using big data technology to classify music styles can better help teachers to innovate their teaching methods and contents, and improve students' mastery of music choral conducting and sight-singing and ear training skills.

## 5. CONCLUSION

This paper analyzes the influence of sight-reading on choral conducting, starting from the specific characteristics of sight-reading and choral conducting. In order to promote the integration teaching of both, a music style classification model was constructed based on big data technology using deep learning networks to fuse music features. The quantitative analysis of the data was carried out with the example of colleges and universities in city A. The results showed that the percentage of students who rated the teacher's professional ability, teaching attitude, teaching method and teaching effect as very good in the integration teaching of sight-singing and choral conducting through the music style classification model were 43.77%, 49.18%, 33.37% and 40.92%, respectively. This indicates that the classification of musical styles can strengthen the teaching effect of the integration teaching of sight-singing and choral conducting.

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# OPTIMIZATION STUDY ON THE CONSTRUCTION PATHWAY OF VIRTUAL TEACHING AND RESEARCH ROOM FOR SWIMMING COURSES COMBINED WITH ARTIFICIAL INTELLIGENCE TECHNOLOGY

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## ABSTRACT

This paper firstly constructs a virtual teaching and research room teaching platform for swimming professional courses by combining artificial intelligence technology, and uses median filter algorithm for data collection and pre-processing. Secondly, the advantages and framework of the application of virtual teaching and research room in swimming professional courses are analyzed. Finally, a performance test analysis was conducted to verify the effectiveness of the virtual teaching and research room teaching platform in this paper. The results show that the average incoming time delay of the virtual teaching and research room teaching platform does not exceed 1s and the data loss rate does not exceed 0.05%. This shows that the virtual teaching and research room teaching platform of swimming course combined with artificial intelligence technology can effectively enrich students' swimming learning methods and further enhance students' interest in swimming learning.

## KEYWORDS

Artificial intelligence technology; Teaching platform; Median filtering; Swimming; Virtual teaching room; Performance testing

## 1. INTRODUCTION

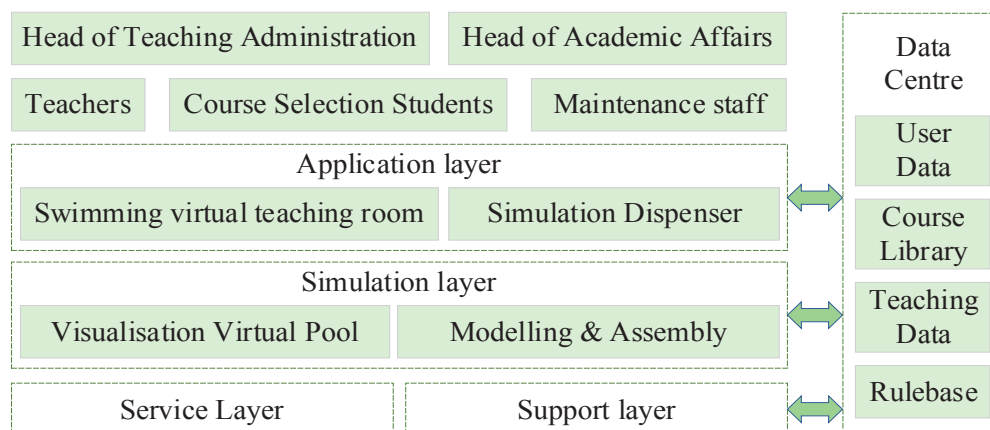
The virtual teaching and research office is a new type of teaching organization developed based on modern information technology, which can coordinate and drive the management of teaching resources in different regions, schools and disciplines, emphasizing the exploration of classification of multi-level and multi-type systems [1-2]. Compared with traditional teaching and research office, the core connotation of virtual teaching and research office is the teaching space created with the help of digital information technology or Internet platform, which breaks through the original temporal and spatial boundaries and administrative boundaries of universities [3-4]. The creation of this teaching space is concretely manifested as a new digital space form, which can spatialize or temporalize the coexisting practices at the same time with the help of information technology in the Internet [5-6].

In the era when artificial intelligence technology has been widely used in modern competitive sports, swimming, as one of the sports with high requirements for technological content, has relatively failed to keep up with the times in the teaching of swimming professional courses in China [7-8]. This paper discusses the necessity of introducing artificial intelligence technology in swimming professional courses from the current situation of combining swimming and artificial intelligence technology in China, illustrates the effectiveness of the application of virtual teaching and research room to swimming professional courses, and also

conducts a test analysis for the virtual teaching and research room platform of swimming professional courses. The results show that the virtual teaching and research room of swimming course based on artificial intelligence technology can effectively realize the innovation of swimming course and also provide a new way for the development of swimming course.

## 2. CONSTRUCTION OF VIRTUAL TEACHING AND RESEARCH ROOM FOR SWIMMING PROFESSIONAL COURSES BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY

Artificial intelligence technology and computer numerical simulation technology are used to build a virtual reality model for swimming teaching, which includes the realization of enhanced virtual effects such as people, swimming technique movements and environment. The powerful virtual reality technology can let students experience the feeling of being in the “water” in the waterless environment, and accompanied by a strong sense of entertainment and movement. Based on computer simulation technology, multimedia technology and artificial intelligence technology, this chapter integrates physical simulation, innovative design, intelligent guidance, virtual experiment results and teaching management, and builds a virtual teaching and research platform for swimming, whose basic architecture is shown in Figure 1.



**Figure 1.** Virtual teaching platform for swimming

The overall architecture of the platform contains 4 layers and 1 data center, which are application layer, simulation layer, service layer, support layer, and data center containing user information, course library, experimental data, rule library, and standard answer library. In the application layer, students need to read the experimental requirements of the swimming course, view the experimental data, conduct experiments, and submit experimental reports. The simulation layer contains the virtual pool, swimming technique movement modeling, and dispenser. The service layer contains experimental teaching management, experimental teaching management, theoretical knowledge learning, experimental resource management, experimental intelligent guidance, and interactive communication between teachers and students. The support layer contains security management, service container, data management, domain management and other links.

In the service layer, the data pre-processing algorithm chosen in this paper is the median filter algorithm, and the median filter processing of the signal can be quickly implemented with the Scipy.Signal.Filtfilt function in the Python library function. The median filter algorithm is a nonlinear signal processing method, and the median filter with the median filter algorithm as the core is a nonlinear filter, and the median filter can effectively filter out the impulse interference in the signal.

The median filter is a sliding window with an odd number of points, where the value of the

center point of the window is replaced by the median value of the points in the window. The median filter is a one-dimensional sequence  $f_1, f_2, \dots, f_n$  with a window of length  $m$ . The median filter is a sequence of  $m$  numbers  $f_{i-v}, \dots, f_{i-1}, f_i, f_{i+1}, \dots, f_{i+v}$ , of which  $f_i$  is the center point of the window,  $v = (m-1)/2$ . The  $m$  point values are then sorted by their numerical magnitude and the number whose number is the center point is taken as the filtered output:

$$y_i = \text{Med}\{f_{i-v}, \dots, f_i, \dots, f_{i+v}\}; i \in Z, v = (m-1)/2 \quad (1)$$

The shape and size of the median filter window have a significant impact on the filtering effect, and different window shapes and sizes are often used for different types of signals and the environment in which the signals are applied. The data of students in the virtual teaching room are collected and processed using the median filtering algorithm to help teachers better understand the learning situation of students.

### **3. ADVANTAGES AND FRAMEWORK FOR THE APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN SWIMMING PROFESSIONAL COURSES**

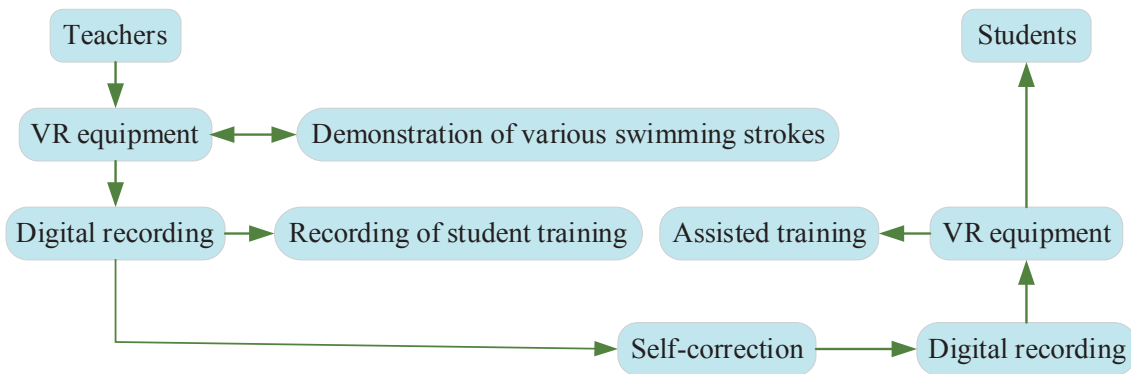
#### **3.1. ADVANTAGES OF THE APPLICATION OF VIRTUAL TEACHING AND RESEARCH ROOM IN SWIMMING COURSES**

The virtual teaching and research room combined with artificial intelligence technology provides very great support for the learning and practical ability cultivation of swimming professional courses. It not only enriches the original traditional teaching methods and practical activities, improves the current situation that students' practical ability training in real environment is not implemented, but also expands the channels of teaching practical ability training. The use of virtual teaching and research room can create a variety of forms of natural water places, live atmosphere, rescue skills training environment, can mobilize the enthusiasm of course learning and enhance learning interest.

The use of virtual teaching and research room for swimming professional course learning, is conducive to increasing the time of practice, breaking the traditional practice ability training time constraints, and greatly enhance the diversity of teaching equipment functions and equipment utilization. And can effectively avoid the dangers that exist in the real environment learning, for some relatively high risk factor and uncontrollable teaching practice, through simulation virtual practice training, so that students are familiar with the basic movements and operation process after the essentials and requirements. Then according to the teaching requirements in the virtual environment similar to the real environment to practice, so as to ensure the safety of practice and eliminate the danger.

#### **3.2. FRAMEWORK FOR THE APPLICATION OF VIRTUAL TEACHING AND RESEARCH ROOMS IN SWIMMING COURSES**

For learners who are new to swimming, the teaching methods used in traditional swimming teaching have certain limitations. In the teaching process, students have certain reaction time and understanding bias for the teacher's teaching language, and teachers mostly use the means of explanation + demonstration and multimedia + explanation to teach. Therefore, the implementation framework of the virtual teaching room is used to realize the teaching of swimming professional courses and its auxiliary teaching is shown in Figure 2.



**Figure 2.** Implementation framework for virtual faculty-assisted teaching

The virtual teaching room combined with artificial intelligence technology applied to swimming teaching can make swimming teaching get rid of the long-standing teaching dilemma in the past. The authenticity, timeliness, scalability and richness of the virtual swimming teaching room can effectively solve the problems of traditional swimming teaching such as visual obstacle in water, itchy demonstration on land, blurred positioning of wrong movements and inability to compare the body movements with self-knowledge.

#### 4. TEST ANALYSIS OF VIRTUAL TEACHING PLATFORM OF SWIMMING PROFESSIONAL COURSES

Table 1 shows five sets of test results, each including data volume, received data volume and data loss rate after sending data ten times in a loop using 5000 threads, as well as the rounded average incoming delay calculated after sampling 200 data.

**Table 1.** Data entry latency and loss rate testing Results

	1	2	3	4	5
Sending data volume	59247	62104	59917	58316	60015
Received data volume	59245	62102	59892	58312	60004
Data loss rate	0.02%	0.01%	0.05%	0.02%	0.04%
Average incoming delay	408ms	603ms	571ms	224ms	529ms

From the results of the five sets of performance tests, the average entry delay is as low as 224ms and as high as 603ms, which are not more than 1s. For a qualified virtual teaching and research room teaching platform, its data loss rate should not exceed 0.05%, and the data loss rate of the five test results in the table does not exceed 0.05%. Through the above two data show that this paper combined with artificial intelligence technology of swimming professional course virtual teaching room teaching platform has good stability and data fidelity, can make the student data can be completely shown in front of the teacher. In turn, it enables teachers to target the reform of swimming teaching course content and promotes students to improve their interest degree in learning swimming.

#### 5. CONCLUSION

Based on artificial intelligence technology and multimedia information technology, this paper constructs a virtual teaching and research room teaching platform for swimming, and analyzes the advantages and framework of the application of virtual teaching and research room in swimming professional courses. In order to further analyze the application effectiveness of the virtual teaching and research room teaching platform for swimming professional courses, performance test analysis was conducted for the platform. The results show that the average entry practice of the virtual teaching platform of the swimming professional course combined with AI technology is as low as 224ms and as high as 603ms, none of which exceeds 1s, and

the data loss rate in the five test results does not exceed 0.05%. This shows that the virtual teaching room of swimming professional course built by combining artificial intelligence technology can effectively realize the innovation of swimming professional course, and can further optimize the learning of swimming course and enhance the interest degree of students for swimming professional course.

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# EXPLORING THE AUDIT RISKS OF ACCOUNTING FIRMS UNDER THE FINANCIAL SHARING MODEL BASED ON BIG DATA TECHNOLOGY

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## ABSTRACT

This paper first analyzes the stage characteristics of the financial sharing model, and explains the content and characteristics of audit risk for accounting firms. Secondly, the impact of big data technology on the audit model of accounting firms is discussed, and an audit risk prediction model is constructed using multiple linear regression. Finally, in order to verify the effectiveness of the application of big data technology in the audit risk of accounting firms, an example analysis is conducted. The results show that the predicted value of the audit risk prediction model based on multiple linear regression has a significant difference from the actual value with an error of only 1.264%, Sig.=0.0001. It indicates that big data technology can help accounting firms to predict the financial data of audited units to find out their possible audit risks.

## KEYWORDS

Financial sharing model; Accounting firm; Big data technology; Multiple linear regression; Audit risk; Predictive model

## 1. INTRODUCTION

With the advent of the era of big data, an inseparable relationship has been formed between the audit work of accounting firms and various data, which is the trend of the times. For accounting firms, the audit work is carried out by the data to present the results and processes, therefore, the scientific use and analysis of data can greatly help accounting firms to prevent audit risks [1-3].

The establishment of the financial sharing model has changed the organizational structure of enterprises, which relies on modern network information technology to build an integrated information system platform that is internally integrated with various enterprise information systems and externally interconnected with finance-related systems. These changes have led to significant changes in the audit targets, audit methods, audit data forms, audit techniques, and requirements for auditors in accounting firms [4-5]. As a result, data security, information system security, and the rationality of business processes under the financial sharing model more seriously affect the audit risk during the audit work of accounting firms.

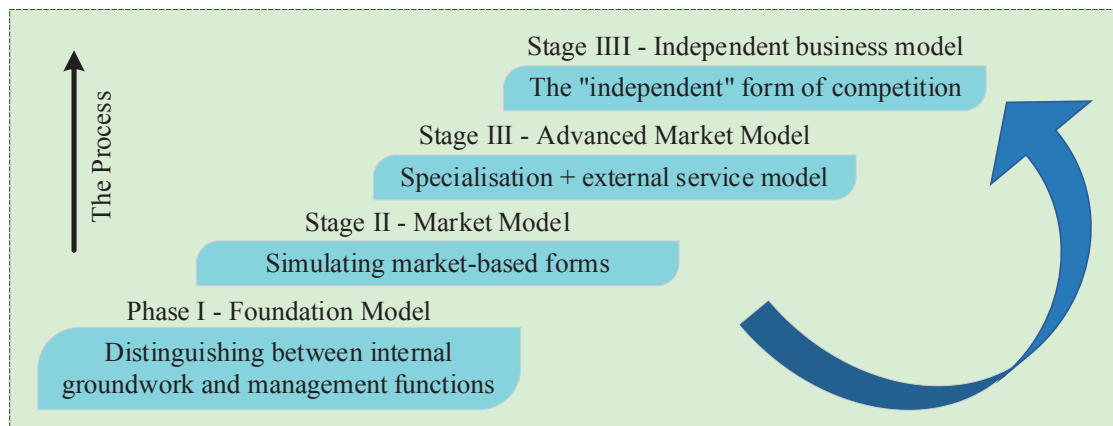
As far as the current situation is concerned, there are few accounting firms that apply big data, which in turn affects the implementation of auditing. Therefore, in the future, the application of big data CPA audit will become a trend, and it is likely to transform the audit model of accounting firms under big data application [6-8]. For this reason, this will not only bring new development opportunities to the auditing industry, but also likely to generate risks, which requires accounting firms to take effective measures to prevent such risks.



## 2. AUDIT RISKS OF ACCOUNTING FIRMS UNDER THE FINANCIAL SHARING MODEL

### 2.1. FINANCIAL SHARING MODEL

The four main factors that an enterprise should consider when choosing which model to adopt when building a financial shared service center include the development stage and management level of the enterprise, the enterprise's positioning of the financial shared service center, the objectives of financial management and services, and the corporate governance and leadership capabilities. Based on these influencing factors, the models of financial shared services can be broadly classified into basic model, market model, advanced market model and independent operation model, and their basic classification is shown in Figure 1.



**Figure 1.** Four types of financial sharing models

### 2.2. AUDIT RISK CONTENT AND CHARACTERISTICS OF ACCOUNTING FIRMS

#### (1) Content of audit risk

Audit risk consists of the probability that a CPA will render an incorrect audit opinion in the actual course of work due to various factors such as omissions and misstatements in accounting statements. Therefore, if the risk is classified according to the factors that cause it, it can be classified as inherent risk, inspection risk, control risk, etc.

Inherent risk refers to the risk arising from the audit unit's own characteristics at the time of the actual work. Inspection risk refers to the risk that the CPA does not find any hidden errors after careful examination in accordance with the inspection risk. The control risk refers to the problems caused by the operational errors or mistakes of the salesperson or accountant employed by the audited company or unit, but such problems cannot be solved by strengthening the supervision of the unit or company itself.

#### (2) Characteristics of audit risk

Audit risk occurs when the audit results do not match the actual situation due to some uncertainties in the audit process. In order to effectively avoid these risks, the first step is to understand clearly the characteristics of the financial audit risk, based on the characteristics of the necessary control measures. Accounting firms to conduct financial audits is the existence of audit risk characteristics shown in Table 1.

**Table 1.** Characteristics of audit risk

<b>Features</b>	<b>Meaning</b>
Objectivity	Financial audit risks are objective and unavoidable.
Universality	Audit risk exists in all aspects of financial auditing.
Potential	Audit risks are potential and need to be addressed in a timely manner.
Controllable	Audit risk can be avoided and controlled through effective methods.

Based on the above description of financial audit risks, it is also possible to understand the specific role of financial audit risk control for accounting firms. On the one hand, it improves the overall quality of financial auditing, and on the other hand, it can contribute to the healthy development of the auditing industry. Accounting firms focus on strengthening internal construction, through the control of financial audit risk, while strengthening the construction of the firm itself. Can promote the healthy and sustainable development of the whole industry, to ensure a more reasonable flow of social resources and promote the stable development of the entire market economy.

### **3. FRAMEWORK FOR THE APPLICATION OF BIG DATA TECHNOLOGY IN THE AUDIT RISK OF ACCOUNTING FIRMS**

#### **3.1. THE IMPACT OF BIG DATA ON THE AUDIT MODEL OF ACCOUNTING FIRMS**

##### (1) The impact on the audit sampling method

The application of big data technology by accounting firms has a greater impact on audit sampling methods, and audit sampling is gradually shifting in the direction of overall auditing. With the application of big data technology, accounting firms have increased the statistics and analysis of information data related to auditing and can better analyze the information data submitted by audited units effectively. It has increased the scope of audit work, making the results of audit work more accurate and improving the quality and effectiveness of audit work.

##### (2) Promoting the continuous development of auditing work

By applying big data technology, accounting firms can process relevant information data with modern technology in a high-quality and efficient manner. This not only saves time in auditing work, but also enables early detection of risks in auditing work and dealing with them. With the support of network technology and information technology, the auditing work of accounting firms is more informative and intelligent, which greatly improves the overall effectiveness of auditing work.

#### **3.2. AUDIT RISK PREDICTION MODEL BASED ON MULTIPLE LINEAR REGRESSION**

Multiple linear regression is a method to study the quantitative relationship between a dependent variable and multiple independent variables. When there is a linear relationship between audit risk variable  $y$  and  $n$  independent variables  $x_1, x_2, \dots, x_n$ , then the audit risk prediction model given multiple linear regression is established as

$$y = a_0 + a_1x_1 + a_2x_2 + \dots + a_nx_n + \varepsilon \quad (1)$$

Where  $y$  is the dependent variable,  $x_1, x_2, \dots, x_n$  is the independent variable,  $a_0, a_1, \dots, a_n$  is the regression coefficient, and  $\varepsilon$  is the random error.

The advent of the Big Data era and the development of technology has provided more efficient and advanced technologies and methods for the conduct of audits in accounting firms. To a certain extent, it makes it easier to conduct and implement audits and helps to improve the quality and efficiency of audits. The use of multiple linear regression models for audit risk

prediction analysis can effectively help accounting firms to identify audit risks more intuitively, and then propose targeted solutions to promote normal economic development.

#### 4. EMPIRICAL ANALYSIS OF AUDIT RISK PREDICTION OF ACCOUNTING FIRMS UNDER BIG DATA TECHNOLOGY

In order to further discuss the application of big data technology in forecasting audit risk in accounting firms, this chapter is designed to use the annual audit of Group S as a case study to see at a glance how big data technology can be applied in practice and can be strongly contrasted with the tediousness of traditional auditing.

The audit process uses regression equations to analyze and forecast data, mainly to analyze the rationalization of company expenses. For example, we have the actual data of Group S's operating costs for multiple years, and Table 2 shows the breakdown of Group S's operating costs for each year.

**Table 2.** Breakdown of operating costs by year

Project	2017	2018	2019	2020	2021
Time	1	2	3	4	5
Operating Costs	1442536.58	1684529.17	1855549.24	2033182.51	2618744.92
Operating income	1582414.42	1766483.55	1952412.61	2269547.18	3033154.79

From the table, we can see that Group S's operating costs and operating income are continuously increasing. If we want to forecast 2022 and verify the operating costs in 2021, then we can use the data from previous years to establish the regression equation as

$$Y = A + BT \tag{2}$$

where  $A, B$  is a constant,  $T$  is time, and  $Y$  is operating cost.

The specific regression results using regression analysis are shown in Table 3.

**Table 3.** Regression analysis results

	B	Error	T	Sig.
X	246427.48	11654.29	22.127	0.0001
Constants	-23541.65	65423.18	-0.153	0.3318
F			621.263	
Sig.			0.0001	

Through the above regression equation, we can roughly predict the operating cost to 2021 is 2585621.73, but the actual number of statements is 2618744.92, the error rate between the two is 1.264%, and the Sig. between the constants = 0.0001, indicating that it has a significant difference. And the error rate is around 1% proves that its prediction result is within the acceptable range, then it means that the prediction value is probable to be true, if the difference is great, then we need to find out the audit doubt. At the same time, through this regression equation we can calculate the projected value of 272342.16 in 2022, in order to achieve the forecasting effect and give the audited unit column to the reference value. The predicted data of operating cost can be used to analyze whether there is a certain degree of audit risk in Group S at present, and then provide effective data support for audit risk avoidance. This also shows that the regression analysis under the big data technology can effectively achieve the prediction of the enterprise financial data, through the data to show the possible audit risk of the audited unit, and then provide effective suggestions for the audited unit to solve, so that the audited unit can effectively avoid the audit risk and promote the normal operation of its

economy.

## 5. CONCLUSION

This paper discusses the impact of big data on the audit model of accounting firms under the financial sharing model, and constructs an audit risk prediction model using multiple linear regression model. In order to verify the effectiveness of the application of big data technology on the audit risk of accounting firms under the financial sharing model, a regression analysis of the data was conducted using Group S as an example. The results show that the error rate between the predicted and actual values of corporate financial income obtained from the regression analysis using big data technology is 1.264%, and the regression results are significantly different with Sig.=0.0001. This indicates that the use of big data technology can help accounting firms make accurate predictions of the financial data of audited units, and further determine the possible audit risks of audited units through the predicted values. The predicted values can be used to further determine the possible audit risks of the audited entity and then propose targeted solutions.

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# LIVELIHOOD TRANSFORMATION OF FARM HOUSEHOLDS RELOCATED ACROSS COUNTIES IN THE CONTEXT OF BIG DATA: ADVANTAGES, MECHANISMS AND THE WAY FORWARD

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## ABSTRACT

This paper analyzes the sustainable livelihood strategies of farming households by taking the sustainable development framework of cross-county relocation farming households as an entry point. Logistic regression in the context of big data is used for model construction and variable indicator selection, and validation analysis of the examples is conducted. The results show that the inter-county relocated farmers are mainly part-time farmers, part-time farmers and non-farmers, among which the influencing factors of part-time farmers are natural and human capital, with correlation coefficients of 0.387 and 0.335. The influencing factors of part-time farmers are human, financial and social, with correlation coefficients of 0.278, 0.345 and 3.012, respectively. The correlation coefficients were 0.278, 0.345, and 3.012, respectively.

## KEYWORDS

Inter-county relocation; Livelihood transition; Livelihood strategy; Logistic regression; Part-Agricultural; Part-Agriculture

## 1. INTRODUCTION

Inter-county relocation aims at poor people in areas where “one side of the land cannot feed one side of the people” and fundamentally changes the poor people’s poor living environment by means of spatial displacement, which is one of the important ways in the strategy of precise poverty alleviation [1-3]. The spatial displacement of cross-county relocation makes the migrants move from mountainous areas to new communities with tourism development, which is not only a change of living space. It is more the change of production methods, the reconstruction of social structure and social relations, and the deconstruction of cultural psychology hidden under the material space, to which the migrants have to re-adapt [4-6].

Sustainable livelihoods are the maintenance and improvement of living conditions through the acquisition of livelihood assets, capabilities and activities by individuals or households based on long-term development goals, and residents who have relocated across counties to engage in harvesting, logging, and clear-cut farming are one of the main ways to maintain and improve their livelihood patterns [7-8]. Livelihood transition is the best option for community residents to cope with the changes in their surroundings. Numerous studies have shown that livelihood transformation can achieve ecological conservation while promoting the survival and development of local residents, and achieving mutually beneficial coexistence between

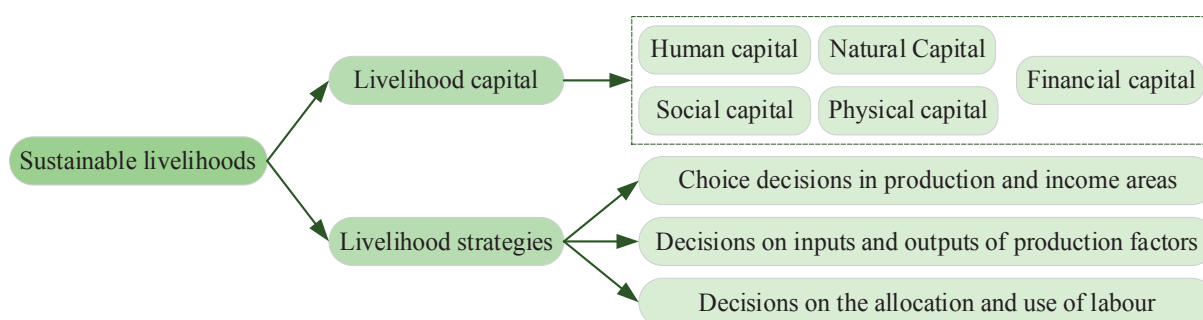
migrants and communities [9-10]. In the context of big data, more attention needs to be focused on the way of livelihood transition and the future direction of farmers relocating across counties, so that farmers can live better even when they move away from their hometowns.

## 2. SUSTAINABLE DEVELOPMENT FRAMEWORK FOR LIVELIHOOD TRANSFORMATION OF FARMERS RELOCATED ACROSS COUNTIES

### 2.1. SUSTAINABLE LIVELIHOOD STRATEGIES FOR FARM HOUSEHOLDS RELOCATED ACROSS COUNTIES

In this paper, cross-county easy-land poverty alleviation and relocation of farmers refers to the relocation of the poor population from the areas with scarce development resources, poor ecological environment, lack of public facilities, and non-availability of basic production and development conditions to the areas with better development conditions of all kinds through the government-organized and coordinated easy-land poverty alleviation and relocation project. Break through the constrained state of resources, environment and development conditions that restrict the development of the poor population to achieve poverty relief and coordinated development of poverty alleviation and development activities, as well as the relocated population generated by this activity.

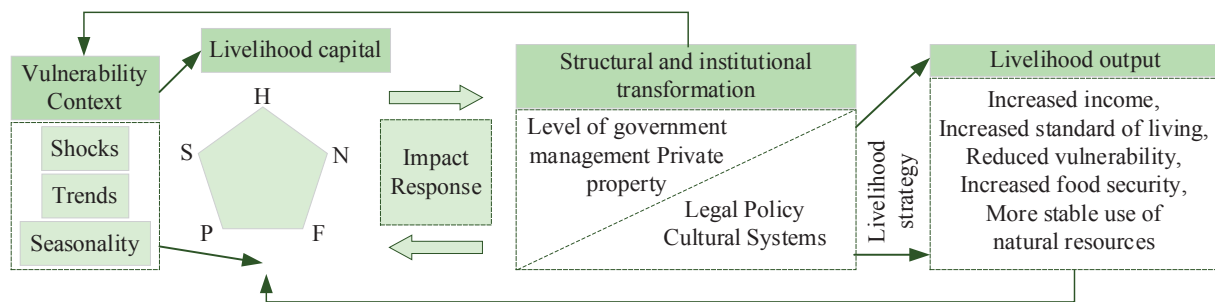
Sustainable livelihood refers to the activity of households or individuals to choose reasonable livelihood strategies to pursue positive livelihood outcomes based on the capital they possess and have access to in order to improve their long-term living conditions. Livelihood capital is the foundation and starting point of sustainable livelihoods. The livelihood capital that households or individuals possess and acquire includes five categories of human, natural, social, physical and financial capital. Livelihood strategy is a rational choice based on the status of livelihood capital, i.e., sustainable livelihood is the activity of allocating and combining various types of livelihood capital to choose the corresponding livelihood strategy and obtain positive benefits in order to maintain the long-term survival and development of a household or individual. The classification of sustainable livelihoods for farmers relocated across counties is shown in Figure 1.



**Figure 1.** Classification of sustainable livelihoods

### 2.2. FRAMEWORK FOR SUSTAINABLE LIVELIHOODS FOR FARM HOUSEHOLDS RELOCATED ACROSS COUNTIES

The sustainable livelihood framework for cross-county relocated farm households consists of five main components, namely, vulnerability context, five types of livelihood capital, structural and institutional transformation, livelihood strategies, and livelihood outputs, which are interlinked and interact with each other. The basic structure is shown in Figure 2.



**Figure 2.** A framework for sustainable livelihoods for farm households

The ultimate goal of the sustainable livelihood framework for cross-county relocation is to achieve enrichment and enhancement of livelihood capital, reduction of livelihood risks, and optimization of livelihood outcomes. Using the sustainable livelihoods framework to analyze the livelihoods of cross-county relocated farm households can help to systematically understand the possession status of various types of livelihood capital and its changes among cross-county relocated farm households. The relationship between vulnerability context and livelihood capital is used to analyze the limiting factors affecting the livelihoods of relocated farm households, so that structural and institutional shifts can be used to compensate for them and secure their livelihoods.

### 3. LOGISTIC REGRESSION MODEL TO ANALYZE FARMERS' LIVELIHOOD CAPITAL IN THE CONTEXT OF BIG DATA

#### 3.1. INDICATOR SELECTION OF FARM HOUSEHOLD LIVELIHOOD CAPITAL LOGISTIC REGRESSION VARIABLES

After reading the literature to have an in-depth understanding of previous articles on livelihood capital, the relevant independent variables were selected on the basis of previous studies combined with the actual situation of the research content of this paper, and the independent variable indicators are shown in Table 1.

**Table 1.** Livelihood Capital Logistic Regression Variable Indicators

Primary variables	Secondary variables	Coding
Natural capital (N)	Arable land area per capita	X1
	Woodland area per capita	X2
	Quality and accessibility of arable land	X3
Physical capital (P)	Area of housing	X4
	Number of durable consumer goods	X5
	Access to water for domestic use	X6
Human capital (H)	Number of labour force	X7
	Average level of education	X8
	Level of health	X9
Financial capital (F)	Annual household income per capita	X10
	Whether the household has a loan	X11
Social capital (S)	Degree of rapport with neighbors	X12
	Number of borrowers available	X13
	Number of households visited on major holidays	X14
	Whether any relatives are working in county or above	X15
	Participation in cooperative economic organisations	X16

### 3.2. FARMERS' LIVELIHOOD CAPITAL LOGISTIC REGRESSION MODEL CONSTRUCTION

First, drawing on relevant studies, the influence relationship between livelihood capital and livelihood strategies was investigated through a binary logistic regression model. Then, according to the construction principle of binary logistic regression model, a binary logistic regression model was established with the following equation:

$$\ln(P_{y1} / 1 - P_{y1}) = b_{10} + b_{11}x_1 + \dots + b_{1m}x_m \quad (1)$$

$$\ln(P_{y2} / 1 - P_{y2}) = b_{20} + b_{21}x_1 + \dots + b_{2m}x_m \quad (2)$$

$$\ln(P_{y3} / 1 - P_{y3}) = b_{30} + b_{31}x_1 + \dots + b_{3m}x_m \quad (3)$$

In equation (1) above, if the relocated farmer is part-farm, then define  $P_{y1} = 1$ , otherwise  $P_{y1} = 0$ , the explanatory variable  $x_i$  is livelihood capital, and  $b_{10}, b_{11}, \dots, b_{1m}$  is the coefficient to be estimated. In equation (2), if the relocated farmer is a part-farmer, then let  $P_{y2} = 1$ , otherwise  $P_{y2} = 0$ . In equation (3), if the relocated farmer is a non-farmer, then let  $P_{y3} = 1$ , otherwise  $P_{y3} = 0$ . Thus, a binary logistic regression model is used to analyze the influencing factors and the degree of influence on the choice of different livelihood strategies of the relocated farmer.

## 4. EMPIRICAL ANALYSIS OF SUSTAINABLE LIVELIHOOD STRATEGIES FOR INTER-COUNTY RELOCATED FARM HOUSEHOLDS

According to the previous classification of livelihood strategies, it can be seen that the livelihood strategies chosen by relocated farmers are determined by the amount of livelihood capital they possess, which means that the choice of livelihood strategies varies according to the amount of livelihood capital they possess. Therefore, a binary logistic regression model was used to analyze the influence of farmers' livelihood capital on the choice of livelihood strategies. The results of the analysis were obtained as shown in Table 2.



**Table 2.** Results of regression analysis of sustainable livelihood strategies

Category	Variables	(B)	Wald	Exp (B)
Agricultural	N	0.387***	7.561	1.468
	P	-0.296*	2.934	0.752
	H	0.335**	4.498	1.414
	F	-0.667**	4.917	0.513
	S	-4.689**	5.387	0.005
Part-Agricultural	N	-0.269**	4.827	0.759
	P	0.006	0.002	1.003
	H	0.278**	4.068	1.328
	F	0.345**	5.367	1.402
	S	3.012**	4.067	20.338
Non-agricultural	N	0.148	1.041	1.158
	P	0.188	1.989	1.206
	H	0.297**	4.435	1.346
	F	0.565***	10.373	1.758
	S	3.456**	5.315	31.758

Note: \*\* and \*\*\* are statistically significant at the 5% and 1% levels respectively.

The correlation coefficients of natural capital and human capital possessed by inter-county relocation households are 0.387 and 0.335, respectively, which means that the choice of farming and farming livelihood strategy is favored when the farmers possess high levels of these two types of capital. The correlation coefficients of human, financial, and social are 0.278, 0.345, and 3.012, respectively, which indicate that the choice of part-farm livelihood strategy is facilitated by the higher financial capital, which means the higher income of the household. At the same time they can transfer some of their excess income to other livelihood activities to further improve their quality of life. From the analysis of the influence of the choice of non-farm livelihood strategies of farm households, human, financial and social capital positively promote the choice of non-farm livelihood strategies of farm households, with correlation coefficients of 0.297, 0.565 and 3.456, respectively. This indicates that when the possession of these three types of capital in farm households is high, it will promote their choice of non-farm livelihood strategies.

In summary, for the livelihood transition strategies of farmers relocating across counties, the influence of different capital variables will make farmers choose different livelihood strategies. However, whatever the strategy is, it can be analyzed using regression models, which also provide effective data support to better promote farmers' economic income and ensure livelihood stability.

## 5. CONCLUSION

This paper analyzes the sustainable livelihood strategies of farm households from the framework of sustainable development of cross-county relocation farm households' livelihood transformation. The model construction and variable selection were also carried out using logistic regression in the context of big data, and an example analysis was conducted in order to seek the livelihood strategies of cross-county relocation farmers. The results show that the impact of livelihood capital under the three livelihood strategies of farm-cum-farm, part-farm and non-farm types are different. The correlation coefficients were 0.387, 0.335, 0.278, 0.345, and 3.012 for the part-farm type, and 0.297, 0.565, and 3.456 for the part-farm type,

respectively, with natural capital and human capital as the main choices, The correlation coefficients are 0.297, 0.565, and 3.456, respectively, which show that the transformation of inter-county relocated farmers' livelihoods requires more human, financial, and social capital inputs, thus making the livelihoods of inter-county relocated farmers more stable and prosperous.

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## ABSTRACT

This paper firstly analyzes the relationship between digital finance and green innovation and discusses the mutuality between urban economic resilience and digital finance. Secondly, benchmark regression is introduced for model construction and good indicator selection of the model. Finally, in order to verify the relationship between digital finance, green innovation and urban economic resilience an empirical analysis is conducted. The results show that the Pearson correlation coefficient between variables is less than 0.5, the VIF value is less than 2, and the significant correlation coefficients obtained without and with control variables are 0.003 and 0.001, respectively. Thus indicating that digital finance and green innovation can effectively promote the improvement of urban economic resilience and accelerate the development efficiency of urban economy.

## KEYWORDS

Digital finance; Green innovation; Urban economic Resilience; Benchmark regression; VIF value; Pearson coefficient

## 1. INTRODUCTION

Innovation is the first driving force to promote high-quality economic development. Since the reform and opening up, China's economic construction has achieved remarkable results, but it has also caused pollution problems to some extent. We should actively innovate green production methods, vigorously carry out technological innovation, and promote the greening of production services [1-3]. As China enters a new stage of socialist development, improving green innovation capacity becomes an important guarantee for promoting high-quality economic development.

Green innovation is characterized by high technological content, huge capital demand and high uncertainty, which is a capital-intensive investment project, and it is usually difficult to meet the demand by the enterprise's own capital volume alone, and it must rely on a strong financial market to carry out financing activities [4-6]. Since the development of China's financial market is still imperfect, there had been long-term structural problems such as information asymmetry and imbalance between supply and demand.

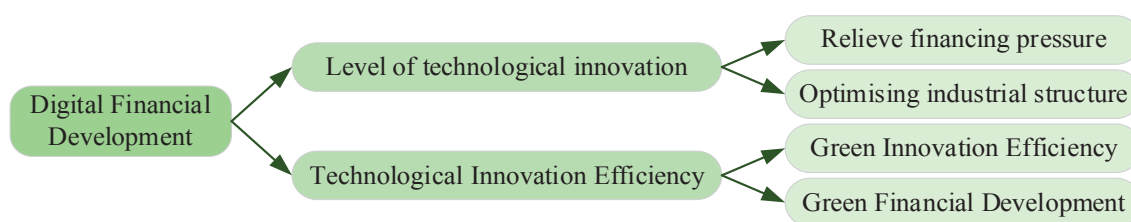
Facing the current economic development environment with frequent external shocks and accumulating internal risks, enhancing the level of resilience is the key for China's economy to maintain its competitive advantage and achieve high-quality development. The natural ecological and social environment is complex, and there are always many uncertainties in the process of economic development, and the ripple effects of economic risks are often more extensive as economic ties between countries continue to strengthen [7-9]. However, with the

advent of the digital era, digital finance, which is a combination of many advanced information technologies such as big data, the Internet, artificial intelligence and traditional finance, has emerged to provide digital solutions to many problems.

## 2. INTERPLAY OF DIGITAL FINANCE, GREEN INNOVATION AND URBAN ECONOMIC RESILIENCE

### 2.1. THE RELATIONSHIP BETWEEN DIGITAL FINANCE AND GREEN INNOVATION

Digital finance is inclusive and intelligent, and can promote technological innovation of enterprises from two aspects: easing financing pressure and optimizing industrial structure. In terms of enterprise financing, digital finance development is conducive to reducing information asymmetry in the lending process, alleviating financing constraints from the supply side, and thus improving regional innovation levels. The innovation incentive effect of digital finance is stronger for SMEs and private enterprises, which can obtain more stable funds by reducing borrowing costs and adjusting loan maturity structure. In terms of industrial structure upgrading, digital finance is conducive to optimizing industrial structure, thus promoting economic growth. At the regional level, industrial structure upgrading helps promote the optimal allocation of production factors such as technology and labor, and the influence of digital finance on industrial structure optimization is not consistent in different regions. The mutuality between digital finance and green innovation is shown in Figure 1.



**Figure 1.** The mutuality of digital finance and green innovation

Both financial development scale expansion and structural adjustment have a significant contribution to green innovation efficiency, and there is regional heterogeneity in the spillover effects of digital finance on green innovation at different levels of economic development and innovation capacity.

### 2.2. THE MUTUALITY OF DIGITAL FINANCE AND URBAN ECONOMIC RESILIENCE

Cities can achieve the enhancement of urban economic resilience by encouraging green technology innovation and industrial structure upgrading. On the one hand, the upgrading of green innovation technology is inevitably accompanied by the upgrading of technology level, which promotes the formation of green innovation system, enhances desired output and reduces non-desired output, thus enhancing the economic resilience of cities. On the other hand, the enhancement of green innovation technology can promote the transformation of enterprise development, reduce resource consumption and environmental pollution, realize internal economic development and enhance the input-output efficiency of urban economic resilience through the upgrade of industrial structure supported by it.

## 3. MODEL DESIGN OF DIGITAL FINANCE, GREEN INNOVATION AND URBAN ECONOMIC RESILIENCE

### 3.1. CONSTRUCTION OF THE BASELINE REGRESSION MODEL

Based on the previous analysis of digital finance, green innovation and urban economic resilience, it is shown that digital finance can provide convenient, diverse and perfect financial services for green innovation subjects by extending the depth of use. It helps market players to widely carry out green innovation activities, effectively promotes the transformation of urban

economic growth, promotes the healthy and sustainable development of economic system, and enhances urban economic resilience. The resulting benchmark regression model covering digital finance, green innovation and urban economic resilience is constructed as

$$\ln UECT_{it} = a_0 + a_1 \ln DIFI_{it} + a_2 \ln GRIN_{it} + a_3 \ln CONT_{it} + \varepsilon_{it} \quad (1)$$

Where,  $a_0$  represents the constant term,  $a_1$  represents the regression coefficient of digital finance,  $a_2$  represents the regression coefficient of green innovation,  $a_3$  represents the regression coefficient of control variables,  $i$  represents the city, and  $t$  represents the period.  $UECT$  represents urban economic resilience,  $DIFI$  is digital finance,  $GRIN$  represents green innovation,  $CONT_{it}$  is the control variable, and  $\varepsilon_{it}$  is the residual term.

On the basis of equation (1), the interaction term between digital finance and green innovation is introduced to further construct the model as

$$\ln UECT_{it} = b_0 + b_1 \ln GRIN_{it} + b_2 (\ln DIFI_{it} \times \ln GRIN_{it}) + b_3 \ln CONT_{it} + \varepsilon_{it} \quad (2)$$

Where,  $b_0$  represents the constant term,  $b_1$  represents the regression coefficient of green innovation,  $b_2$  represents the regression coefficient of the interaction term between digital finance and green innovation, and  $b_3$  represents the regression coefficient of the control variables.

### 3.2. SELECTION OF INDICATORS FOR THE BASELINE REGRESSION MODEL

#### (1) Explanatory Variables - Urban Economic Resilience

Urban economic resilience refers to the defensive resistance of the economic system in the event of a shock, its ability to recover during the shock process, and its resilience and transformation after the shock. The measured expressions are:

$$UECT_{it} = \frac{(Y_{it} - Y_{i,t-1}) / Y_{i,t-1} - (Y_{nt} - Y_{n,t-1}) / Y_{n,t-1}}{|(Y_{nt} - Y_{n,t-1}) / Y_{n,t-1}|} \quad (3)$$

where  $t$  represents national,  $Y_{it}$  represents urban real GDP in period  $t$ , and  $Y_{nt}$  represents national real GDP in period  $t$ .

#### (2) Explanatory variables - digital finance and green innovation

Digital finance is a new type of financial service derived from the integration of digital technology and traditional financial service industry in the context of the continuous development of the Internet, relying on artificial intelligence, big data, cloud computing, blockchain and biometric technologies to provide more inclusive and accurate financial services, which can meet the needs of green economic development.

Green innovation is to achieve green technology development as the core goal, based on innovation to provide new products and services, through reducing ecological and environmental damage, reducing natural resource consumption, and improving the allocation efficiency of resources, so as to provide power support and realization path for the high-quality development of China's green economy.

In addition, urban economic resilience cannot be influenced by digital finance and green innovation alone. Thus, this paper additionally selects indicators such as urban economic density (ECD), human capital dividend (HCD), urban industrial structure (IST), and economic development level (GDP) for comprehensive variable control.

#### 4. EMPIRICAL ANALYSIS OF DIGITAL FINANCE, GREEN INNOVATION AND URBAN ECONOMIC RESILIENCE

The explanatory variables in this paper are obtained from the official website of the World Intellectual Property Organization and the patent search and analysis platform of the State Intellectual Property Office, while the core explanatory variables and the control and mediating variables are obtained from the China Urban Statistical Yearbook and the official websites of provincial (municipal) statistical bureaus. Due to the delayed nature of data disclosure, the data collection range of the explanatory variables and core explanatory variables in this paper is from 2010 to 2020, and the data collection range of the control variables is from 2010 to 2020, and the data samples of 280 prefecture-level and above cities in China can only be collected because the samples with serious missing data of single and multiple variables are excluded. The linear interpolation method and ARIMA model method were used to fill in the data gaps and anomalies.

##### 4.1. MULTICOLLINEARITY TEST

Considering the possible problem of multicollinearity between the explanatory and control variables, which would reduce the confidence of the estimation results, Pearson correlation coefficient analysis and variance inflation factor analysis were conducted for each variable. The results of the analyses were obtained as shown in Table 1.

**Table 1.** Pearson correlation coefficient and VIF analysis results

Variables	DIFI	GRIN	UECT	ECD	HCD	IST	GDP
DIFI	1.0000						
GRIN	0.3622	1.0000					
UECT	0.4134	0.2061	1.000				
ECD	0.0157	0.0204	0.0614	1.000			
HCD	-0.0133	-0.0256	-0.0103	0.1213	1.000		
IST	0.0114	0.0214	0.0802	0.1067	0.1263	1.000	
GDP	0.0252	0.0151	0.0211	0.3108	0.2451	0.1065	1.000
VIF value	1.7081	1.5645	1.4427	1.3762	1.4937	1.3325	1.3168

The results of Pearson correlation coefficient and variance inflation factor analysis show that the absolute value of Pearson correlation coefficient between most of the explanatory variables and control variables is less than 0.4, and the VIF values of all explanatory variables and control variables are significantly less than 2. This can indicate that there is no significant multicollinearity problem between all explanatory variables and control variables for the indicators selected in this model. The relationship between digital finance, green innovation and urban economic resilience can be effectively described by these indicators to ensure the validity of this paper's model.

##### 4.2. BASELINE REGRESSION ANALYSIS

Before conducting the baseline regression analysis, the optimal model was selected using the F-test and Hausman test. Based on the test results, a double fixed-effects model was selected for regression, and the results of the benchmark regression are shown in Table 2. In the table, \*\* and \*\*\* indicate significant at the 5% and 1% levels, respectively, and the numbers in parentheses indicate the *t* statistic.

**Table 2.** Baseline regression results

Variables	(1)	(2)
	No consideration of control variables	Consider control variables
$\ln DIFI$	0.3356***(9.2613)	0.4068***(11.6547)
$\ln GRIN$	0.0982**(1.7657)	0.1012***(2.1648)
$\ln DIFI \times \ln GRIN$	0.1958**(3.8701)	0.3011***(5.5078)
Constants	-1.3207***(-30.6729)	-0.9172***(-11.5917)
Hausman test	167.38**(0.0003)	383.57***(0.0001)
$R^2$	0.6324	0.6078
Sample size	6500	6500

From the results of the baseline regression analysis of the model, it can be seen that the effects of digital finance, green innovation, and the interaction term of the two on urban economic resilience are all greater than zero, and all pass the significance test at least at the 5% level. Thus, it can be seen that digital finance, green innovation, and the interaction term of both can contribute to the improvement of urban economic resilience.

## 5. CONCLUSION

This paper starts from analyzing the interaction between digital finance, green innovation and urban economic resilience, and constructs a benchmark regression model based on it. In order to verify the validity of the model, empirical analysis is conducted to prove the relationship between digital finance, green innovation and urban economic resilience. The results show that the absolute values of the Pearce correlation coefficients between the explanatory variables and the explanatory variables of the model indicators are less than 0.4, and the variance inflation factors are significantly less than 2. Moreover, the effects of digital finance, green innovation and their interaction terms on urban economic resilience are all greater than 0, and they all pass the significance test at least at the 5% level. This indicates that digital finance and green innovation can effectively promote the enhancement of urban economic resilience and provide effective support for the further development of urban economy.

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# RESEARCH ON THE INTEGRATION AND INNOVATION OF TRADITIONAL ART DESIGN AND MODERN ART IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

In this paper, the first innovative use of traditional art design and modern art in the context of deep learning, it is necessary to make the relevant designers to comprehensively examine and understand Chinese traditional art and fully familiar with Chinese cultural ideas. Then, on the basis of mastering the modern design concept of cultural globalization, Chinese traditional art and modern art design can be better combined with each other, in order to enrich the connotation of modern art design from a new thought perspective in the context of deep learning. While there are differences between the two, they also have more commonalities, and the organic integration of the two on the basis of their differences makes modern art and design innovation have a more special artistic charm.

## KEYWORDS

Deep learning; Traditional art; Modern art; Integration; Innovation

## 1. INTRODUCTION

With the rapid development of China's economy and the improvement of people's living standards and quality of life since China's reform and opening up, the demand for Chinese modern art design among the general public in China has been rising, and due to the development of economic globalization and cultural globalization nowadays [1-2]. Various advanced art and design ideas from abroad have continuously flowed into China, which has led to the rapid development of Chinese modern art and design, and the design level has been greatly improved [3]. However, in the new situation, with the influence of the highly informative international environment and the influx of various foreign cultural trends, there has been a huge impact on Chinese modern art and design, making Chinese modern art and design increasingly influenced by the design styles and design concepts of Europe and the United States and other countries in many aspects, making Chinese modern art and design increasingly deviate from the Chinese national style [4-5]. Moreover, with the advent and development of the era of globalization, cultural differences are increasingly affirmed and

accepted by people of all ethnic groups in the world, which makes us realize more clearly that in the new situation, we should make efforts to use traditional Chinese elements in modern art design and innovate according to the requirements of the times [6-7].

The authors of the literature [8] studied the concepts and applications of modern art design and ethnic cultural symbols and analyzed the connections and interactions between them. The study aims to promote cultural heritage and innovation by exploring the relationship between modern art design and national cultural symbols, and to provide ideas and directions for promoting cultural diversity and sustainable development. The authors of the literature [9] studied the concepts and applications of environmental art design and digital media, and analyzed the relationship and interaction between them. The study aims to improve the innovation and sustainability of environmental art design by exploring the integration of environmental art design and digital media, and to provide technical support and guarantee for promoting cultural and creative industries and sustainable development.

## **2. RESEARCH ON THE INTEGRATION OF TRADITIONAL ARTS AND CRAFTS AND MODERN ART DESIGN**

### **2.1. DIFFERENCES AND CONNECTIONS BETWEEN TRADITIONAL ARTS AND CRAFTS AND MODERN ARTS AND CRAFTS DESIGN**

#### **(1) Differences between the two**

Traditional arts and crafts are born out of people's labor and are gradually formed in the process of labor. Therefore, the expression of traditional arts and crafts shows more of the agrarian civilization and reflects the wisdom and art of people in the agrarian period. During the agrarian civilization, due to the low level of technological development, the production of many crafts relied on traditional handwork, which was relatively low in terms of production quality and efficiency. Modern art was born in the period of industrial civilization, and as we all know, during this period, the level of technology was greatly improved, thus enhancing the level of craftsmanship and production efficiency, and the expression of modern arts and crafts is not only limited to people's daily life, but also derived from many new fields, and the content is more abundant.

#### **(2) The connection between the two**

Modern art design comes more from life, but with the support of modern processing technology, the expression content and expression form have been greatly improved, so modern art crafts come from life but higher than life, and the important role of modern art is to provide services for our life, including the enjoyment of art and the enhancement of cultural value. Therefore, modern art design and the development of the times are closely related, and the development of the times will also determine the development of modern art.

### **2.2. THE INFLUENCE OF TRADITIONAL ARTS AND CRAFTS ON MODERN ART AND DESIGN EDUCATION**

At present, the economic and cultural exchanges between countries in the world are more frequent, and the trend of globalization is getting stronger, so the cultural exchanges between different nationalities in the world also let multi-ethnic cultures influence each other, in this process, Chinese art and craft design must not forget the original heart, adhere to the characteristics of its own culture, on this basis, learn the excellent culture of other nationalities, enrich the connotation of its own culture, in the international community. Improve the propaganda and promotion of the national culture, increase the cultural soft power, form a good cultural influence in the world, so as to obtain a greater sense of national identity and promote the development of modern art, the influence of traditional arts and crafts on modern art and

design education is shown in Figure 1.

#### (1) Ideology and Culture of Traditional Arts and Crafts

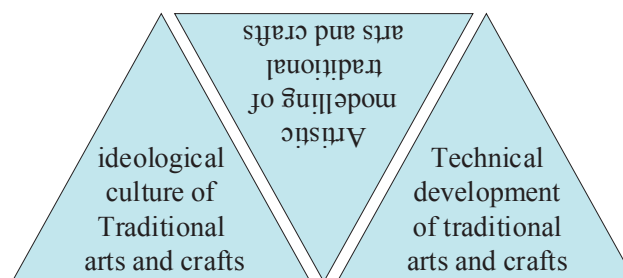
Traditional arts and crafts were born in China during the ancient farming period, and during the subsequent development of thousands of years, the mainstream cultural thought in China was Confucianism, so Confucian culture also had a positive impact on the development of Chinese arts and crafts. Under the influence of Confucian culture and Confucianism, the connotation value of traditional arts and crafts became richer and richer, forming the treasure of traditional Chinese national culture. In the traditional Chinese ideology, more importance is attached to the harmony with nature.

#### (2) Artistic modeling of traditional arts and crafts

Traditional artworks are essentially the crystallization of the wisdom of the ancient working people. No matter which form of expression, they reflect and express the daily life of the ancient working people, and the five thousand years of Chinese history have brought rich cultural deposits and provided rich contents for the development of modern art, and modern art products can be innovated on the basis of borrowing and inheriting traditional arts and crafts.

#### (3) Technical development of traditional arts and crafts

The development of history and the accumulation of culture have given birth to countless outstanding works of traditional Chinese arts and crafts. These outstanding works are the cultural crystallization made by the Chinese working people during their persistent labor production and creation process, and in the process of continuous honing, the concepts and techniques are constantly innovated, pushing forward the improvement of the aesthetic level of society and the progress and development of society.



**Figure 1.** The influence of traditional arts and crafts on modern art and design education

### **3. THE RELATIONSHIP BETWEEN MODERN ART DESIGN AND FOLK ART INTEGRATION**

#### **3.1. FOLK ART IS THE SOURCE OF MODERN ART DESIGN**

Folk beauty is not a common creation of the people, it is divided into two aspects of material and spiritual civilization. It is also an important source of national culture and art design at present. In terms of art forms, folk art is both a stream and a source: while in terms of art psychology, folk art is the embodiment and aesthetic basis of national psychology. Both ancient and modern art and design have such characteristics. Looking at the development of art and design around the world, due to the differences in economic and cultural levels and customs of each country, there are certain differences in the level of art and design, but art and design are rich in their own national heritage, and will absorb the essence of culture from folk art. In modern art design, China should pay attention to absorb the characteristics of its own folk art to enhance the characteristics of national style. Modern art design needs to obtain sufficient nutrients from a large number of folk art, and dig its essence, in order to get design inspiration to make art design sustainable development.

### 3.2. COMMONALITY OF CULTURAL CONNOTATION BETWEEN MODERN ART DESIGN AND FOLK ART

There are certain differences between traditional folk art and modern art design, but there is also an obvious intrinsic correlation between them, and they can achieve integration in essence.

#### (1) Commonality of humanistic spirit

However, both in terms of time and space, folk art is usually closely related to human activities. It has a high humanistic connotation and has a clear inheritance value for humanistic spirit, which is what modern art design pursues. Nowadays, art design is mostly a fusion of national characteristics and world trends, traditional culture and modern thinking, and other factors such as material basis and spiritual pursuit.

#### (2) Commonality of natural view

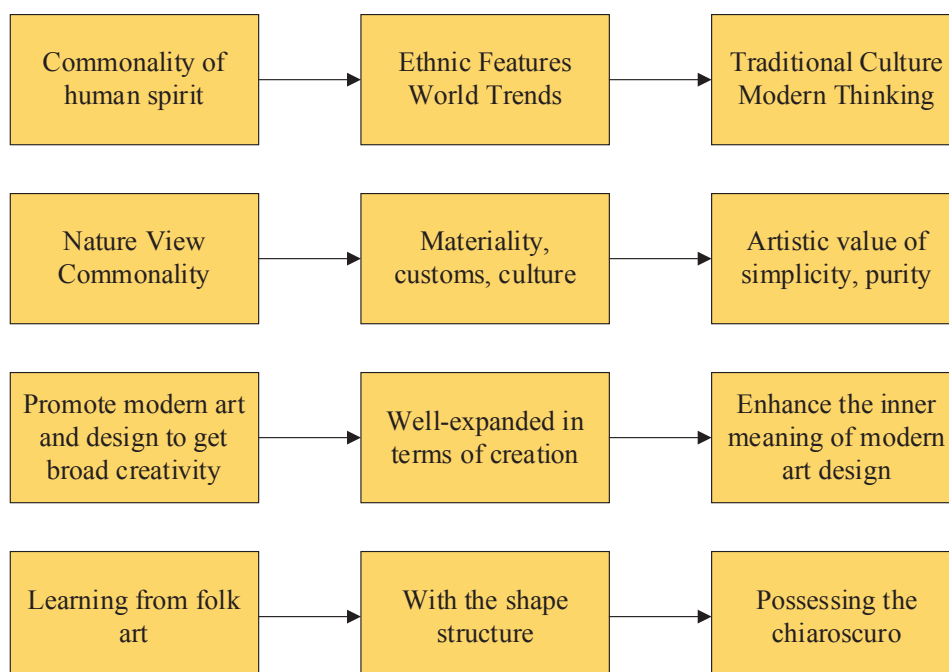
The inspiration of folk art comes from local material, customs and culture, all of which can be used as reference for modern art design and provide new inspiration for modern art design. Adopt the objects that can be found everywhere in life and give them artistry through simple processing. The main characteristic of folk art is to give full play to the morphological characteristics and material properties of raw materials.

#### (3) Folk art promotes the broad creativity of modern art and design

Folk art can inspire modern art design effectively, and the inspiration can come from many angles and levels. Folk art contains rich traditional mother culture, which is a source of creation for modern art design, and can make modern art design expand well in terms of creation.

#### (4) Learning from folk art

When adopting elements of Chinese folk art in modern art design, it is necessary to select items that are in line with modern aesthetic art so that the essence of folk art and the cultural connotation contained in it can be carried forward and reasonably applied in modern art design. The items involved in folk art can be used in modern art design mainly in two aspects: on the one hand, the shape structure of things, and on the other hand, the atmosphere of things, which usually contains and expresses the spiritual nourishment of the picture.



**Figure 2.** Modern art design and folk art cultural connotation commonality

#### **4. CONCLUSION**

In modern art design, the effective penetration of relevant elements in folk traditional art can, to a certain extent, make use of the shape and color characteristics of folk traditional art itself, while helping to shape distinctive modern art works. The essence of traditional folk art in modern art design can improve design skills, enrich design themes, deepen the connotation of works, and promote the effective inheritance and development of traditional folk culture in contemporary society. Designers should continue to borrow the essence of elements from traditional folk art and culture, actively inherit Chinese culture, and take it as the eternal pursuit of artistic creation career.

#### **FUNDING**

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# EXPLORATION OF CROSS-BORDER E-COMMERCE MARKETING STRATEGY BASED ON STATISTICAL ANALYSIS

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## ABSTRACT

In this paper, we first segment the cross-border e-commerce marketing market through demographics and customer needs, based on market positioning strategies, from which we can develop appropriate marketing strategies. Then, customer-centric product and service strategies, customer satisfaction-based pricing strategies, vertical sales-based distribution strategies, and the implementation of marketing strategies that take advantage of the company's unique strengths, as well as the management and control of merchants and products, are used to ensure the effective implementation of marketing strategies and improve the customer shopping experience. This study explores the need for companies to constantly change with the changing market in order to stay on top of the e-commerce market.

## KEYWORDS

Demographics; Cross-border e-commerce; Marketing market; Pricing strategy; Service quality strategy; Vertical sales strategy

## 1. INTRODUCTION

Small and medium-sized enterprises are relatively less competitive in the brick-and-mortar retail industry surviving under the impact of the epidemic is very difficult. In addition, from the industry situation, since the rise of e-commerce industry and new retailing in China, online shopping and new retailing have become important channels for consumer consumption, resulting in the development of traditional supermarket industry is cold [1-3]. Facing the new situation under the epidemic, some supermarkets have started to devote themselves to marketing programs that enhance consumers' shopping experience for supermarket stores, covering both emotional and rational factors of consumers, gradually adjusting and optimizing the marketing strategy programs of supermarket stores, using differentiation and gradually improving market competitiveness [4-5]. However, in today's rapidly changing market, it is indeed not easy for the traditional supermarket industry to avoid the vicious circle of business dilemma and enhance market competitiveness [6-7].

The authors of the literature [8] studied the concept and application of social commerce and proposed an optimized marketing channel and strategy to achieve the goal of increasing sales and revenue in social commerce. The study aims to improve the marketing effectiveness and efficiency of social commerce by designing suitable algorithms and strategies to achieve the best marketing channel and strategy selection, and provide technical support and guarantee for sustainable development. The authors of the literature [9] studied the current market situation and development trend of LED lighting products and proposed a dual-channel

integrated marketing strategy to achieve the goal of increasing the sales and market share of LED lighting products in the competitive market. The study aims to achieve the balance and coordination of dual-channel integrated marketing by designing suitable strategies and measures to improve the brand awareness and market competitiveness of LED lighting products and provide technical support and guarantee for sustainable development.

## 2. CROSS-BORDER E-COMMERCE MARKETING MARKET SEGMENTATION

### 2.1. SEGMENTATION ACCORDING TO THE CUSTOMER'S PRODUCT FOR THE DESIRED

This is the most basic market segmentation, whether for C2C, B2C or B2B, because we first need to know the products our customers want, and then we can further understand the price, brand, specifications and other special requirements of the products it needs, which is further market segmentation. Tmall has done a good job of product segmentation by dividing the products into sixteen categories, such as apparel, shoes and bags, beauty and cosmetics, jewelry and accessories, etc. For each category, there is a more detailed classification, which seems to be clear at a glance, so that customers can limit the products they need to a small area, and in this small area they can find the products they need and related products, which is very convenient, and to a large extent, also improves the customer experience to a large extent.

### 2.2. DEMOGRAPHICS

In the market segmentation, Tmall takes into full consideration the characteristics of customers and makes a detailed classification in terms of age, gender, income and purchasing behavior, etc. To develop different markets for different customers and adapt to different customer groups by providing different grades of products, the classification of online shopping user needs is shown in Table 1.

**Table 1.** Online shopping user needs classification

Gender	Age	Revenue	Mental Behavior	Internet Shopping
Male	Young single Young married with no children	Low	Special discounted, practical goods practical	Game cards, phone cards, discount products digital products
		Medium	low-end and mid-range brands, focusing on popular	brand clothing, outdoor sports, shoes and bags
		High	Personalized, high-end brand goods	High-end digital, home appliances, high- end clothing
	Young single Young married with no children	Low	Cheap, promotional, practical goods	Game point card, phone card, special price clothing
		Medium	Practical, fashion oriented, popular	Popular clothing, digital products
		High	Personalized products	Brand clothing, high-end digital products
Female	Young single Young married with no children	Low	Focus on price product style lack of brand loyalty	Low-end products, do not pay attention to the brand, buy good quality and inexpensive goods, food
		Medium	More focus on brand, product effect	Cosmetics, accessories, food, clothing, luggage, mid-range brand products
		High	High brand loyalty, focus on personalized products	Brand clothing, high-end cosmetics, digital products, shoes and bags
	Young single Young married with no children	Low	Cheap, practical products	Home accessories, discount clothing
		Medium	Practical, home products	Branded clothing, home textiles, cosmetics
		High	Personalized products	Branded clothing, jewelry, home textiles

### 2.3. ONLINE MERCHANT SEGMENTATION

Consumers should be classified, and for suppliers engaged in e-commerce sales should also be classified, which is crucial for selecting what kind of merchants to be stationed in Tmall for business, online merchants are subdivided as shown in Figure 1.

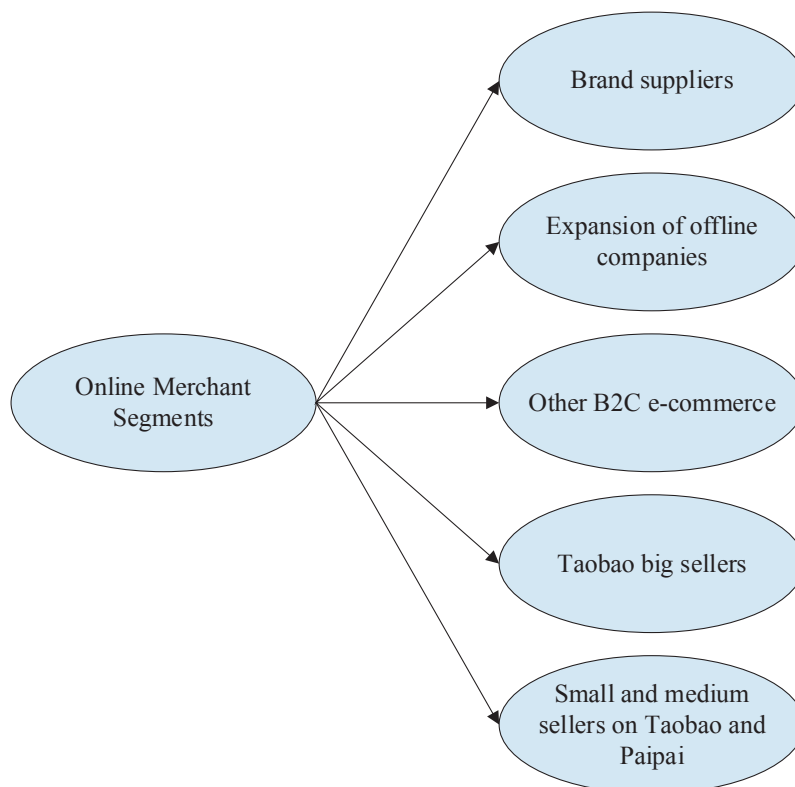
(1) Brand suppliers, manufacturers with their own brands or suppliers authorized by brands, where well-known brands have strong operational capabilities, sufficient funds, standardized services and guaranteed quality after sales.

(2) Traditional offline enterprises ready to expand e-commerce, more and more traditional offline enterprises recognize the development of e-commerce, and online shopping is the advantage, into the Internet to expand their business. Generally use two methods kind is to establish their own B2C website, one is to cooperate with other e-commerce sites online.

(3) other B2C e-commerce, there are independent domain name server of the independent operation of the B2C e-commerce, such as Jingdong Dangdang, Vancl, One Store, Yintai network, Kuba, McCallum, eXchange, Le Tao, New Egg, good buy, red child, go show net, Vipshop, etc..

(4) The original Taobao brand or Taobao big sellers, and some Taobao in the big sellers, hope to further enhance the business strength of the enterprise, hope to enter a better platform to play themselves.

(5) Taobao and pat small and medium-sized sellers. Weak strength no brand, or rely on Alibaba or Tmall distribution platform supply, or offline wholesale market. Low profits, store operations and services are not formal, many counterfeit products are mostly sold by these stores.



**Figure 1.** Online Merchant Segmentation



### **3. THE DEVELOPMENT OF CROSS-BORDER E-COMMERCE MARKETING STRATEGY**

#### **3.1. SERVICE QUALITY STRATEGY**

Consumers put their own ideas and product requirements through the Internet to communicate with enterprises interactive enterprises understand the needs and desires of consumers to provide products and services, the Internet era to make this personalized customization is possible. At the same time, customers do not only buy books, cosmetics and other small goods on the Internet, but also want to buy more goods, while hoping to buy goods quality assurance to eliminate fake goods, network payment means more secure and fast, after-sales service is more in place, logistics and transport safety and fast.

#### **3.2. PRICING STRATEGY**

Price is a very important factor for customers' purchasing decisions. Customers want to buy the best quality, best service and lowest price through selection and comparison. In network marketing, the price strategy generally has the following kinds:

(1) Cost-of-ownership pricing method. This method is based on the cost of production to increase a certain profit margin and in the network era such profit margins continue to reduce, the use of such methods of pricing companies are gradually reduced.

(2) Competition-based pricing method. This method is also often used by e-commerce enterprises, like Taobao B2C price comparison network has emerged, intensifying price competition. Therefore, e-commerce companies should have enough flexibility in formulating pricing strategies to adapt to market competition, but also to ensure that the company has the right profit in the fierce market competition.

(3) Customer-led pricing method. The so-called customer-led pricing, is to meet customer demand, customers through full market information to choose to buy or customize the production of their own satisfaction with the product or service, while obtaining these products or services at minimal cost, is to maximize the value of the customer, the customer at a minimum cost to obtain maximum benefit.

(4) Free price strategy. Free price strategy is a common marketing strategy in marketing, it is mainly used for promotion and promotion of products, this strategy is generally short-term and temporary. But in network marketing, free price is not only a promotional strategy, it is also a very effective pricing strategy for products and services.

#### **Vertical sales strategy**

The traditional marketing channel consists of independent producers, wholesalers and retailers. Each member acts as an independent business entity to maximize its own profits, and no one channel member has total or sufficient control over the others. A vertical marketing system, in contrast, is a unified consortium of producers, wholesalers, and retailers. A channel member owns the property rights of other members, or a special agency relationship, or a channel member has considerable strength, the other members are willing to cooperate, vertical marketing system is conducive to control the channel, eliminate the conflict caused by the pursuit of their own interests and the benefits of the channel members.

### **4. CONCLUSION**

E-commerce marketing strategy is also constantly adjusted with the fierce market competition, but the center is the same, that is, everything is customer-centric and adjusted to allow customers to have a better customer experience. Develop a suitable marketing strategy, which is customer-centric products and services strategy, customer satisfaction as the

standard pricing strategy, vertical sales as a platform for distribution strategy, communication as the core of the promotion strategy. So far it is still in a relatively successful. Of course, with the development of time, the market continues to change, corporate marketing strategy will continue to adjust the changes.

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# STUDY ON THE APPLICATION OF MULTIMEDIA COMPUTER INTERACTIVE EDUCATION IN PIANO TEACHING

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## ABSTRACT

In this paper, in the Internet era, various industries are highly integrated with the Internet, and education is forming new forms of teaching and learning, and schools at all levels are actively reforming. It first examines piano teaching based on interactive theory in the Internet+ era and discusses the new changes brought about by the Internet+ era to piano teaching. Then the characteristics and use of online piano teaching mode and offline piano teaching mode and teaching interaction analysis are studied, and the choice of interactive mode to interactive teaching can be used to cultivate music literacy for students with the help of piano learning. This study is based on the Internet + era based on interactive theory of piano teaching to prompt students to learn piano better and to lay a solid foundation for students' subsequent piano learning and even music learning.

## KEYWORDS

Internet; Piano teaching; Interactive; Online and offline; Interactive analysis

## 1. 1 INTRODUCTION

With the socio-political, economic, cultural, and educational developments in China in the 21st century, music education has received the attention of the educational community and even the whole society [1-2]. Instrumental music education, especially piano education, is widely chosen by parents and students, and the piano has become an important tool for most students to learn music [3]. Piano education for students is an integral part of music education, which is important for the development of students' personality, the development of intelligence and ability, the improvement of musical aesthetic ability, as well as the cultivation of sentiment and the perfection of personality [4-5].

The authors of the literature [6] studied the concept and application of piano education and mental health education, and analyzed the connections and interactions between them. The study aimed to promote the development of children's mental health and improve the quality and effectiveness of piano teaching by infusing mental health education into children's piano teaching. The authors of the literature [7] studied the concept and application of artificial intelligence and proposed an exploration and innovative approach to the development direction of piano performance teaching based on artificial intelligence in order to achieve the goal of improving the quality and effectiveness of piano performance teaching in higher education.

The study aims to explore and innovate the development direction of piano performance teaching through the use of artificial intelligence technology to improve the teaching effectiveness and teaching quality of piano performance teaching, and provide technical support and guarantee for sustainable development. The authors of the literature [8] studied the concept and application of complex networks and multimedia technologies, and proposed a method for the penetration of multimedia technologies based on complex networks in piano teaching and performance to achieve the goal of improving learning effectiveness and performance quality in piano teaching and performance. The study aims to achieve the penetration and application of multimedia technology in piano teaching and performance by designing suitable algorithms and strategies.

## **2. PIANO TEACHING BASED ON INTERACTIVE THEORY IN THE INTERNET+ ERA**

### **2.1. INTERACTIVE TEACHING**

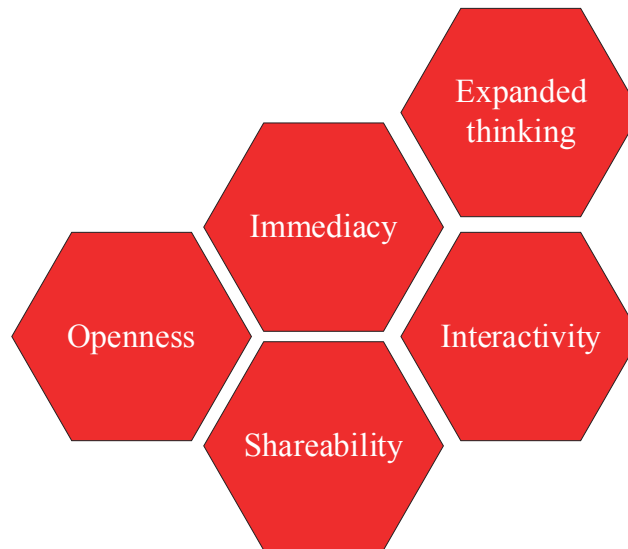
Interactive teaching method refers to a two-way, multi-directional and equal communication and interaction between teachers and students, and between students around a topic or content. In the teaching process, the teacher needs to put the students as the protagonists and needs to adopt appropriate teaching strategies according to the learners' cultural background and knowledge level to make the learners generate endogenous power, stimulate their enthusiasm and promote the understanding, digestion and application of new knowledge. With the principle of fostering students' intrinsic motivation, students are the main actors and teachers are the leading actors, and through teaching strategies, learners are encouraged to complete the construction of knowledge and self-construction.

### **2.2. INTERACTIVE OFFLINE PIANO TEACHING**

The interactive teaching concept can be used not only in online teaching mode, but also in offline piano teaching, where it is more fully used, more active and adjustable. Offline teaching is a face-to-face interaction. Interactive teaching emphasizes the student as the main character, and the student and the teacher are equally important. In the Internet+ era of offline teaching, teachers' teaching ideas have also changed. In the offline teaching process, teachers often let students go to understand the background of the work before class and preview the problems they think are difficult in the work, or the areas they do not understand. In the class, the teacher will let students be the little teacher to sort out the background of a work and discuss with them the problems that arise, reflecting the characteristics of interactive teaching as the main body and equal communication. When solving difficult problems, the teacher will let students discuss in small groups, think about how to solve problems, and improve problem-solving skills.

### **2.3. ONLINE INTERACTIVE PIANO TEACHING**

The integration of "Internet+" with piano teaching has brought a new model of online teaching, which is richer and more diversified, and the teaching results can be data-driven. From the use of online teaching, it is becoming more and more acceptable to students and parents, which has a great relationship with its own advantages. The advantages of online teaching are summarized in Figure 1 after the survey and data review. Students can have the APP play one voice part and play one voice part by themselves to enhance their familiarity and memory of the melody of each voice part and to clarify the relationship between each voice part. The smart APP also has a beautiful, animated interface that can mobilize students' interest in learning, stabilize their persistence of interest in learning, and increase internal motivation.

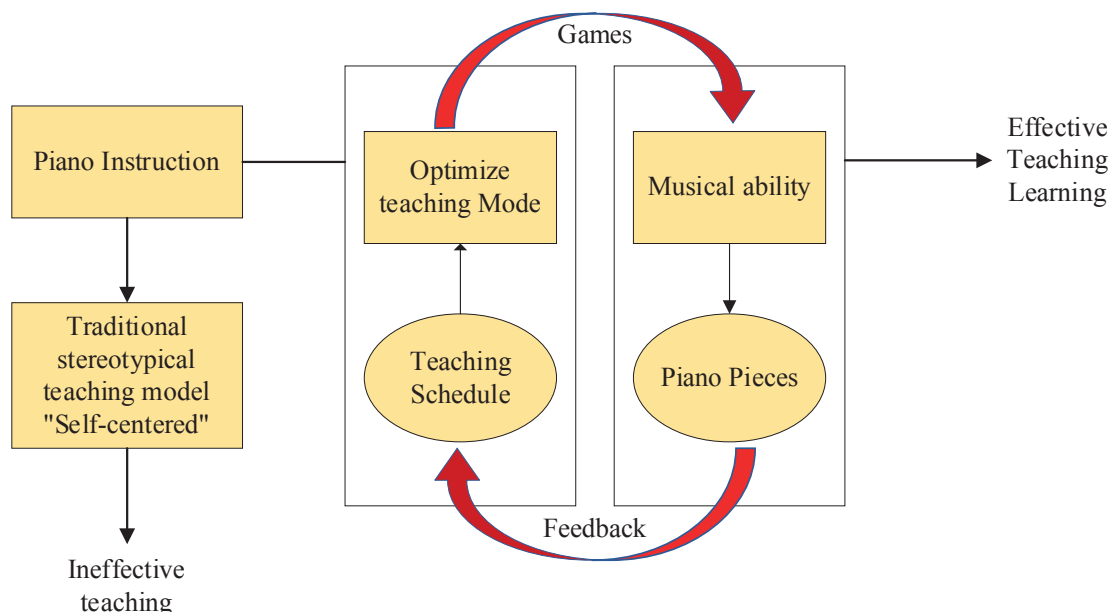


**Figure 1.** Advantages of online teaching

### 3. INTERNET+ ERA ONLINE AND OFFLINE COMBINATION OF INTERACTIVE PIANO TEACHING MODE

#### 3.1. INTERACTIVE ANALYSIS OF INTERACTIVE PIANO TEACHING

In piano teaching, if teachers consistently uphold the traditional stereotypical educational approach, teaching will tend to be ineffective development such as piano teaching, both sides are self-centered, teachers never innovate teaching methods, just be a reciter or exporter of musical knowledge, and insensitive to students' poor reflections, when there is negative feedback, teachers do not respond sensitively to interactive piano teaching interaction. The analysis is shown in Figure 2. The effective way of teaching is that the teacher himself has a certain musical literacy, and is taught in a way that is acceptable to the child when the basic knowledge and basic skills are well mastered by the child, which is a teaching process. And the knowledge and skills mastered by the school children gradually form part of their own music literacy, and the performance of the school children's music literacy in the classroom is simultaneously analyzed and considered by the teacher, optimizing the teaching mode, creating new teaching materials, and improving the teacher's own musicianship, which is a feedback process.



**Figure 2.** Interactive analysis of interactive piano teaching

### 3.2. INTERACTIVE TEACHING OF INTELLIGENT PIANO GROUP LESSONS

Smart Piano is a product of Internet + technology, which integrates the concept of online and offline teaching. The advantages of interactive teaching of smart piano are shown in Figure 3. In the teaching process according to the principle of two-way nature of interactive teaching, the teacher can set up pre-tutorial assignments through the interactive teaching module before class, and students can also find background information of the works through the smart piano. Students can upload their homework through their cell phones, and the teacher can automatically correct and analyze the homework through the system and cloud data. During the lesson the teacher can play a video of the demonstration piece or play it himself so that the students can see the teacher's playing posture, fingering, etc. When students are noisy, the teacher can control the students' instruments to be in mute state. When students practice, they can put on their own headphones without disturbing each other, which improves the efficiency of practicing. Students can also record their own performance and send it to the teacher for review. The system also comes with its own accompaniment, so students can interact with each other and play along with the accompaniment to increase the fun of playing the piano.

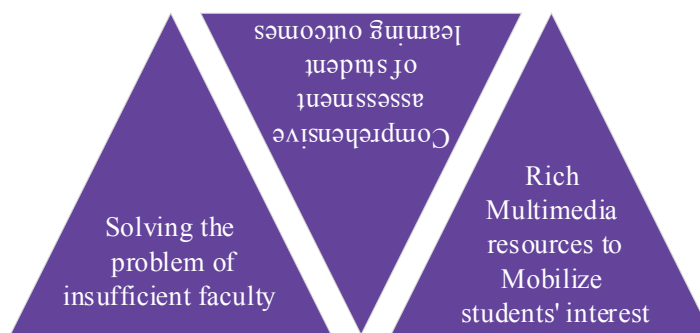


Figure 3. Smart Piano Interactive Teaching Benefits

### 4. CONCLUSION

The exploration of interactive teaching plays a positive role in piano learning. On the one hand, in terms of teaching effectiveness, the effect of practice can be found that instead of increasing students' piano lesson time, it is better to improve students' learning efficiency, and students in the international class clearly outperformed the regular class in the final repertoire. On the other hand, according to social interaction theory, the interaction between the subject's cognitive factors and the environment determines the shaping of learning behavior. The most frequent interaction in piano classroom teaching is teacher-student interaction, and the interaction between them provides students with a real environment to communicate with music, so that students not only learn music knowledge itself, but also learn to use music to express their emotions. By analyzing the implementation of interactive teaching theory in piano teaching, especially in the Internet+ era when both online and offline teaching have their own advantages and shortcomings, it is concluded that online teaching is suitable for teaching theory and offline teaching is suitable for teaching technical skills.

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# RESEARCH ON THE PATH OF HIGH-QUALITY DEVELOPMENT OF RURAL REVITALIZATION LED BY GRASS-ROOTS PARTY BUILDING BASED ON DEEP LEARNING BACKGROUND

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## ABSTRACT

In the context of comprehensively promoting the rural revitalization strategy, this paper firstly proposes that the Party Central Committee should attach great importance to the construction of rural grass-roots party organizations in ethnic areas, so as to provide a strong leadership core for the realization of rural revitalization in ethnic areas. Then, with the general requirements of rural revitalization strategy as the guide, unique and successful practices are explored through various channels and according to local conditions, such as Party building leading ethnic regions to develop special industries, Party building leading ethnic regions to protect ecological environment, Party building leading ethnic regions to make villagers' life rich, etc. The development results achieved in tourism promote ethnic regions to preserve special culture, protect special architecture, cultivate special industries, narrow the urban-rural development gap, and is the main position for implementing rural revitalization. In the process of comprehensively promoting rural revitalization in ethnic areas, it is necessary to give full play to the leading role of grass-roots party building in rural revitalization in ethnic areas, so as to effectively promote rural revitalization in ethnic areas.

## KEYWORDS

Internet; Grassroots party building; Ethnic areas; Tourism; Rural revitalization

## 1. INTRODUCTION

With the completion of the poverty eradication campaign as scheduled, China has solved the historical problem of absolute poverty, and the aspirations of the masses of farmers of all ethnic groups for a better life are getting stronger day by day. Moreover, with the deepening of comprehensive reform, the agricultural and rural development in ethnic areas has entered a period of transition, and the revitalization of rural areas in ethnic areas is facing many troubling factors, which poses a contemporary challenge to the Party building at the grassroots level in ethnic areas [1-3]. The Party Central Committee has proposed that “the key to doing a good job in rural areas and achieving rural revitalization lies in the Party” [4]. The grass-roots Party organizations in ethnic areas are the strong bastions of rural revitalization in ethnic areas, leading the revitalization of rural areas in ethnic areas [5].

The authors of the literature [6] studied the concept and application of big data technology and cloud computing technology, and proposed an approach based on big data-driven co-management mechanism for rural revitalization and its implementation using cloud computing technology to achieve the goal of improving rural economic and social development in rural revitalization. The authors of the literature [7] studied the concept and significance of



environmentally friendly land use and rural revitalization, and proposed a coupling analysis-based approach to explore the relationship between them in order to achieve the goal of promoting environmentally sustainable development in rural revitalization. This study aims to explore the relationship between environmentally friendly land use and rural revitalization through an empirical study in Hainan Province, and provide some theoretical and empirical basis for the formulation of sustainable development strategies and policies. The authors of the literature [8] examined the concept and meaning of rural revitalization and proposed an integrated research approach that encompasses theoretical, technical, and managerial aspects to achieve the goal of promoting rural economic and social development in rural revitalization. The study aims to investigate in depth the intrinsic mechanism and reality of rural revitalization by studying the theoretical, technical and managerial aspects of rural revitalization and development in China, and to provide some theoretical and empirical basis for formulating rural revitalization strategies and policies.

## **2. LEADING RURAL REVITALIZATION IN ETHNIC AREAS WITH GRASSROOTS PARTY BUILDING IN THE INTERNET ERA**

### **2.1. PRACTICAL EXPLORATION OF LEADING RURAL REVITALIZATION IN ETHNIC AREAS BY GRASSROOTS PARTY BUILDING IN THE INTERNET ERA**

The general requirements of the rural revitalization strategy were put forward in the report of the 19th Party Congress: prosperous industry, pleasant ecology, civilized countryside, effective governance, and rich living. In recent years, grass-roots party organizations in ethnic areas have respected the local natural laws, drawn up a development blueprint with unique regional characteristics, and conducted useful practical exploration under the leadership of grass-roots party building in the region.

#### **(1) Party building leads ethnic regions to develop special industries**

Since the reform and opening up, ethnic regions have been developed and developed rapidly, especially since the 18th CPC National Congress, ethnic regions, under the leadership of grass-roots party organizations, have made full use of the unique natural endowments of ethnic regions and the unique folk customs and ethnic culture of ethnic regions to vigorously develop the characteristic industries of ethnic regions. First of all, we develop special agriculture, animal husbandry and fishery, etc., and enlarge the related industrial chain.

#### **(2) Party building leads ethnic regions to protect ecological environment**

China's vast ethnic areas, especially those in the northwest and southwest, are densely distributed with grasslands, mountains, forests and rivers, which are not only rich in natural resources, but also the water source areas of China's great rivers, ecological barrier areas and areas prone to natural disasters, so not only is the ecological environment in these areas quite fragile and the level of ecological environmental protection still needs to be improved, which requires the grassroots Party building in ethnic areas to Leading the construction of ecological civilization.

#### **(3) Party building leads the construction of civilized countryside in ethnic areas**

Culture is the root and soul of a nation, and in order to realize rural revitalization in ethnic areas, it is significant for grass-roots party building to lead the construction of civilized countryside. General Secretary Xi Jinping pointed out that "attention should be paid to the protection and inheritance of minority cultures." The villages and hamlets of ethnic minorities in China are different and have their own characteristics. The village architecture and living environment of ethnic minorities reflect their spiritual pursuit and inheritance of history and culture, and the grass-roots party organizations in ethnic areas strengthen the construction of

rural style “soul casting” project through various forms.

(4) Party building leads rural good governance in ethnic areas

Rural governance is an important part of national governance, and a harmonious and stable rural social environment is essential to promote rural revitalization in ethnic areas in the Internet era. Therefore, grass-roots party building must lead ethnic areas to realize rural good governance.

(5) Party building leads villagers in ethnic areas to live a rich life

Although China has completed the battle against poverty in 2020, based on the harsh natural environment and the thin development base in ethnic areas of China, our Party should lead the majority of farmers in ethnic areas to do a good job in preventing poverty return and make an effective connection between poverty eradication and rural revitalization.

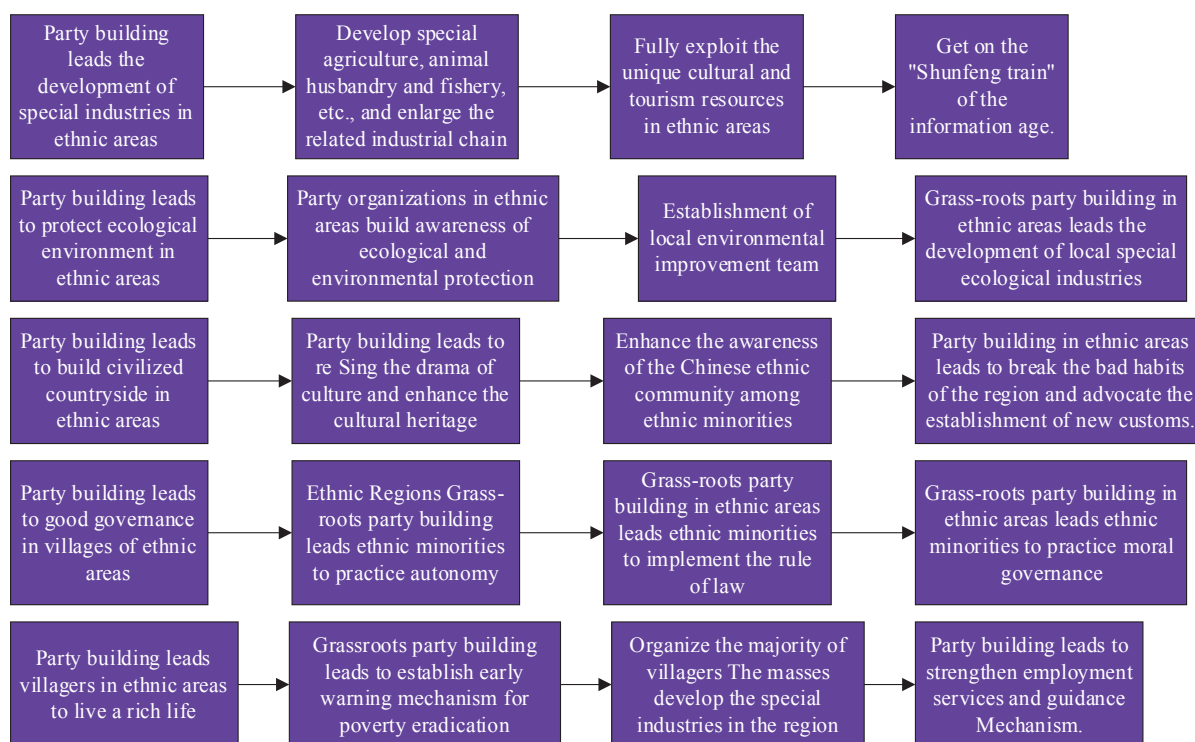


Figure 1. Practical Exploration of Rural Revitalization in Ethnic Areas

**2.2. GIVE FULL PLAY TO THE LEADING ROLE OF PARTY BUILDING IN RURAL REVITALIZATION IN ETHNIC AREAS**

“To revive the nation, the countryside must be revitalized”, and the revitalization of the countryside plays an extremely important role in the great rejuvenation of the Chinese nation as shown in Figure 2. To lead rural revitalization in ethnic areas with grass-roots party building, the key lies in the party and the key lies in people, so it is necessary to strengthen the construction of grass-roots party organizations in ethnic areas and optimize the grass-roots party cadres to provide guarantee for rural revitalization in ethnic areas. In order to play a long-term role, the service-oriented grass-roots party organizations in rural ethnic areas must improve the institutional mechanism and rely on this guarantee function to better play and maintain the function and role of service-oriented grass-roots party organizations.



**Figure 2.** The role of rural revitalization in the great rejuvenation of the Chinese nation is reflected

### 3. RESEARCH ON THE PATH OF HIGH-QUALITY DEVELOPMENT OF TOURISM IN RURAL REVITALIZATION

#### 3.1. POSITIONING OF HIGH-QUALITY TOURISM DEVELOPMENT IN ETHNIC AREAS

##### (1) Strategic positioning

Relying on the unique natural and humanistic environment of ethnic areas, the strategic positioning of high-quality development is to make tourism the focus of development in ethnic areas, upgrade and develop tourism through ethnic villages, let the development of tourism in ethnic villages pull the economic growth of ethnic areas, promote tourism to alleviate poverty, and become an important breakthrough to realize tourism to enrich the people. Through tourism to drive the integration and development of related industries to achieve industrial revitalization. To achieve ecological revitalization by improving the living environment of villages and protecting the tourism environment. Through the training of villagers and the introduction of talents, it realizes the revitalization of village talents, improves the management system of villages and implements a reasonable management system of tourism to improve the participation of villagers and realize the revitalization of organization.

##### (2) Market positioning

From the current situation and future trend of tourism development in ethnic areas, the main market is still from the province and the surrounding cities, and the existing market needs to be maintained: while the out-of-province source market, which is a secondary market, needs to be further expanded to form a pattern where the in-province market and the out-of-province market go hand in hand. Given the unique ethnic culture of ethnic areas and the tradition of spontaneous governance of villages, it is advantageous to carry out study tours outside of the province or abroad, and to actively expand the scope of the tourism audience market.

##### (3) Product positioning

Ethnic area tourism is still stuck in the low level of sightseeing tours, such as watching shows, visiting villages, taking pictures and other single forms. In response to the lack of tourism products and single form of the status quo, to clarify the positioning of ethnic areas product, the formation of core products - special tourism products - extended products three levels of product standards.

#### (4) Image positioning

Ethnic regions form an environment native, people simple and less commercialized according to their original ecological characteristics, and shape a distinctive market image. The natural geographical features, history and culture, and folk culture here are different from other Miao villages, which can realize differentiated tourism image positioning. The audience of tourists in this region are mainly group outings, family and parent-child tours, and study tours.

### **3.2. ETHNIC TOURISM HIGH-QUALITY DEVELOPMENT PATH OPTIONS**

(1) Implementation of industrial cultivation projects to promote the revitalization of the tourism industry in ethnic villages

The core goal of high-quality development of ethnic village tourism is to achieve industrial and product upgrading, the current lack of tourism product development in ethnic villages, the number of tourism projects is not enough, the integration of the tourism industry and the lack of driving force is to achieve industrial upgrading to overcome the difficulties, but also the inevitable requirements of the implementation of industrial cultivation project. As far as possible, local resources into products, the formation of brands, and strive to achieve a unique “one village, one product”, reduce the similarity with other ethnic villages, the formation of advantages and create a competitive brand to achieve the development of cultural industries, agriculture, manufacturing industry in ethnic areas.

(2) Implementation of organizational optimization project to realize the revitalization of ethnic village tourism organization

To achieve high-quality development of ethnic village tourism in the context of rural revitalization, the organization optimization project must be implemented. The organization optimization project of ethnic villages can be started from the following points: 1) the government strengthens industry management and carries out rule of law propaganda, 2) various organizations innovate business methods and coordinate benefit distribution, and 3) realize village autonomy and moral governance projects.

(3) Implementing cultural protection and innovation projects to ensure the revitalization of tourism culture in ethnic villages

The culture of ethnic villages is an advantageous resource that drives the development of tourism industry, enhances economic benefits and shows the charm of the villages. The spiritual civilization of ethnic villages is concentrated in the traditional culture, customs and habits of the villages, and the culture of ethnic villages can be revitalized only through the integration and interaction between rural revitalization and traditional culture.

(4) Implementing talent-driven project to guarantee the revitalization of tourism talents in ethnic villages

Talent is the key to the development of ethnic village tourism, and is the booster to promote the rapid development of village tourism. The quality and quantity of talent determines whether the development of tourism industry can achieve horizontal extension and vertical depth. The current development of tourism is in a talent-poor situation, the high-quality development of ethnic village tourism must be based on the long-term, the implementation of a planned, purposeful and focused talent training mechanism, so as to respond to the various tourism needs of tourists.

## **4. CONCLUSION**

The grass-roots Party organizations in rural ethnic areas are the strong bastions of rural revitalization in ethnic areas, leading the revitalization of rural areas in ethnic areas. Party

members and cadres at the grassroots level in rural ethnic areas should realize that “iron needs to be hardened by itself” and seriously learn about economic development and rural revitalization so that they can have a deep theoretical foundation to comprehensively promote rural revitalization and enhance their self-confidence so that they will not be frightened when things go wrong. Party members and cadres at large should also actively study the latest science and technology, apply new technologies flexibly to rural revitalization, use modern information technology platforms to solve the problems in rural revitalization and accelerate the pace of rural revitalization. Therefore, by enhancing the capacity of grass-roots party organizations in ethnic areas, we can empower and increase the effectiveness of rural revitalization in ethnic areas.

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# RESEARCH ON THE TRANSFORMATION OF UNIVERSITY ADMINISTRATORS' CONTINUING EDUCATION IN THE CONTEXT OF DEEP LEARNING

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## ABSTRACT

Firstly, under the popularization of the concept of national learning and lifelong learning and the inculcation of learning society, the continuing education of college administrators has become more and more important, and how to transform the continuing education of college administrators to meet the educational objectives in the context of deep learning is an important issue in the field of education reform in China at this stage. Then, in view of the fact that the field of continuing education for college administrators still encounters multiple layers of difficulties to meet the new requirements put forward in the context of deep learning, it is necessary to realize the transformation of continuing education for college administrators in the context of deep learning from various aspects such as institutional mechanism, regulations and systems, lifelong education, information technology, evaluation and monitoring and external communication.

## KEYWORDS

Deep learning; Universities; Managers; Continuing education; Transformation

## 1. INTRODUCTION

With the continuous popularization of higher education from elite education and increasingly into mass education, improving the quality of talent cultivation is the focus of attention from all walks of life [1-2]. As the frontline of talent cultivation, college administrators play an important role in promoting the construction and development of colleges and universities [3]. Driven by such a background demand as well as the learning boom, the continuing education of college managers has received unprecedented attention [4]. Therefore, it is of great practical significance to continuously research and explore the problems and strategies of continuing education for college managers to comprehensively promote the professional development of college managers and the connotation construction of higher education institutions [5-6].

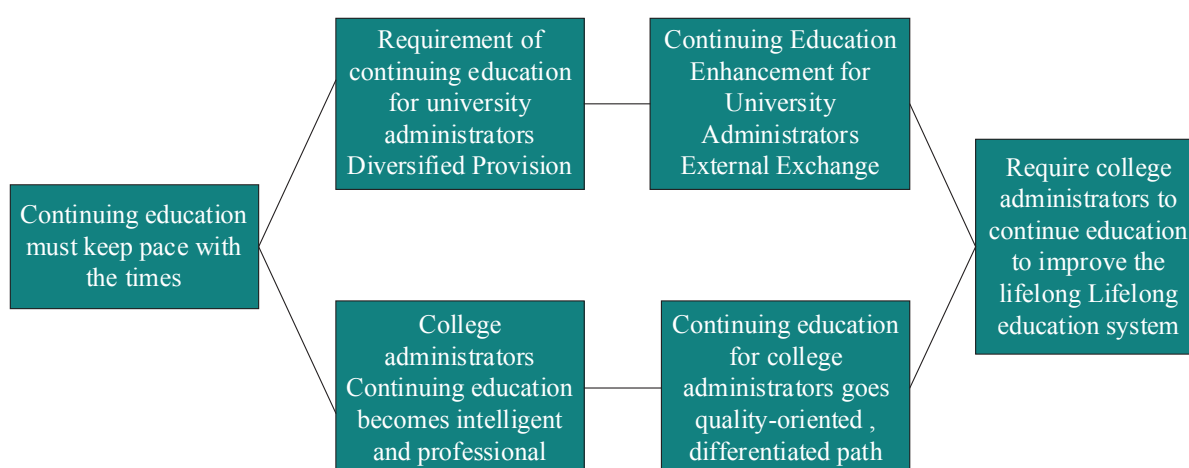
The authors of the literature [7] studied the importance of continuing nursing education programs and proposed a method of quality indicators applied to high complexity university hospitals to assess the effectiveness and quality of the program. The focus of this paper is on assessing attendance indicators to analyze the attendance of participants in nursing continuing education programs in order to provide a basis for improving the effectiveness and quality of the program. The study aims to assess the effectiveness and quality of the continuing nursing education program by applying a quality indicator approach and to provide support and assurance for improving the sustainability of the continuing nursing education program. The authors of the literature [8] studied the importance of forestry continuing education programs and compared forestry continuing education degree programs for different schools in order to

understand their differences and characteristics. The focus of this paper is to compare the differences in curriculum, teaching methods, tuition fees, and other aspects of forestry continuing education degree programs in different schools and to analyze their advantages and disadvantages. The literature [9] analyzes the impact of sustainability learning and interdisciplinarity in higher education on the development of competencies needed for students to solve complex problems, as well as the development and assessment of these competencies, through an interdisciplinary research study. The study aims to provide a basis for improving educational methods and assessment systems in the field of higher education through investigation and analysis in order to promote sustainable development of higher education and improve the overall quality of students.

## 2. NEW REQUIREMENTS AND DILEMMAS OF CONTINUING EDUCATION FOR UNIVERSITY ADMINISTRATORS IN THE CONTEXT OF DEEP LEARNING

### 2.1. NEW REQUIREMENTS FOR THE CONTINUING EDUCATION OF COLLEGE ADMINISTRATORS IN THE CONTEXT OF DEEP LEARNING

In the context of deep learning, “consumer demand pattern”, “import and export pattern”, “production factors”, “production capacity and industrial organization mode” and “market competition pattern” have changed. The changes of “consumption demand pattern”, “import and export pattern”, “production factors”, “production capacity and industrial organization mode” and “market competition pattern” have put forward new requirements for the continuing education of college administrators as shown in Figure 1. The change of consumption demand mode requires diversified supply of continuing education for college managers. Under the background of new deep learning, the stage of imitative consumption has basically ended, and personalized and diversified consumption has gradually become mainstream. To increase external communication and improve the overall level of college teaching management team, it is inevitable to require college teaching managers to continuously improve their own quality and ability, and establish and improve the lifelong education system to meet the reform and development requirements of the times. It is necessary to gradually pay attention to the market-oriented attributes of continuing education, and realize the breakthrough innovation of continuing education by introducing market competition mechanism and by taking the quality-oriented and differentiated path.

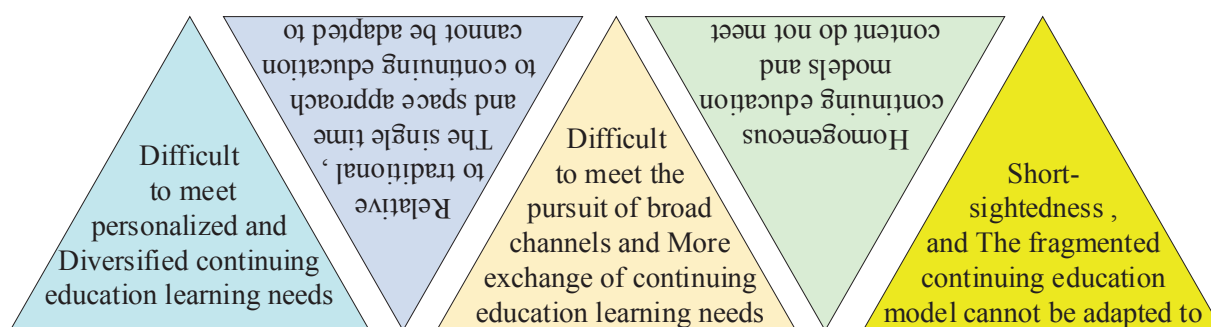


**Figure 1.** Continuing education requirements in the context of deep learning

### 2.2. THE DILEMMA OF CONTINUING EDUCATION FOR COLLEGE ADMINISTRATORS IN THE CONTEXT OF DEEP LEARNING

However, looking at the development of continuing education for college administrators in recent years, although some progress has been made in continuing education, and there are

improvements in the degree of attention and actual operation, the field of continuing education for college administrators still encounters multiple layers of difficulties as shown in Figure 2, and it is difficult to meet the new requirements put forward in the context of new deep learning, which has been due to the difference in the nature of work, compared with the research and teaching-oriented college teachers, the academic level of college teaching administrators is relatively lower. Due to the difference of work nature, the academic level of university teaching managers is relatively lower and the structure of academic level is more complicated than that of research and teaching teachers. Under this circumstance, the continuing education of teaching managers in colleges and universities has been in a relatively closed internal circulation mode for a long time, and there is a lack of learning and communication with external society and colleges and universities. For a long time, the continuing education based on academic compensation is more for direct and temporary goals such as title evaluation and promotion assessment, which makes the content and mode of continuing education short-sighted and fragmented, and has not yet created the learning atmosphere of lifelong education.



**Figure 2.** The dilemma of continuing education for college administrators

### **3. TRANSFORMATION STRATEGIES OF CONTINUING EDUCATION FOR COLLEGE ADMINISTRATORS IN THE CONTEXT OF DEEP LEARNING**

#### **3.1. STRENGTHEN THE IMPORTANCE OF EFFORTS**

“Teachers are the decisive factor of teaching quality in colleges and universities, and college managers are the core force of college management level. All levels should change their concepts and realize the importance and necessity of continuing education for managers in colleges and universities. From the state, society, universities and individuals, we should pay more attention to it in order to form a perfect system from top to bottom. College management personnel are the backbone of college management and the important support of comprehensive strength of college. Only with a high level management team, the education level of colleges and universities can have a major breakthrough. Therefore, it is important to strengthen the attention to the continuing education of college managers and give special financial, technical and personnel support back.

#### **3.2. ESTABLISHING REGULATIONS AND LAWS AND REGULATIONS**

In order to ensure the correct and orderly promotion of continuing education for college managers, it is necessary to establish scientific and sound rules and regulations and relevant laws and regulations, so that the promotion of continuing education for college managers can be followed by rules and laws, and the rights and obligations of college managers to participate in continuing education can be guaranteed. The establishment of the system should not only ensure that the issue of continuing education for college managers is not neglected, but also ensure that the normal management of the school is not affected. It is necessary to provide opportunities for college managers to improve their own quality, and to include the improvement of school management in the overall planning.



### **3.3. BUILDING A LIFELONG EDUCATION SYSTEM**

It is a good way to combine the continuing education of college teaching managers with the development strategy of colleges and universities, the management innovation of colleges and universities and the cultural construction of colleges and universities, to build a lifelong education system for college teaching managers, to effectively play the basic role of continuing education in the lifelong learning of college teaching managers, and to fully realize the integration of high-quality education and teaching resources from all walks of life.

### **3.4. USE MODERN INFORMATION TECHNOLOGY TO BROADEN LEARNING TIME AND SPACE**

Modern information technology represented by the Internet undoubtedly provides an important education and teaching platform for continuing education. The continuing education of college teaching managers should conform to the new form of next-generation Internet and location service to realize a new type of continuing education with diversified terminals, personalized services, precise marketing and networked payment. In order to realize the new requirements of continuing education that everyone, everywhere and all the time can learn.

### **3.5. CONDUCTING EVALUATION AND MONITORING**

Successful continuing education for university teaching managers cannot be separated from scientific evaluation and monitoring. With the proposition of lifelong learning and lifelong education, we should grasp the stage effect of continuing education by formulating a reasonable evaluation and monitoring system, and control the progress degree of individual lifelong education at any time to ensure that continuing education does not deviate from the main line and completes the stage and overall goal in due time.

## **4. CONCLUSION**

Continuing education of college management personnel is a significant, time-critical and extensive research topic and task, which is an inevitable requirement for the development of college librarians under the environment of network era. In a word, in today's rapidly changing network, in order to serve the teaching and research of teachers and students with high efficiency, high level and high quality, universities should pay attention to the continuing education of university management personnel, formulate scientific system and comprehensive continuing education plan and incentive mechanism, so that they can master modern library management technology, operation means and service skills, and provide the latest, fastest and most complete for teaching and research. The most up-to-date, fastest and comprehensive documentary information service for teaching and research.

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**RESEARCH ON THE DEVELOPMENT OF GUANXIANG CULTIVATION AND  
PROCESSING EXPERIENCE SYSTEM BASED ON VR TECHNOLOGY FROM  
THE PERSPECTIVE OF LEISURE AGRICULTURE**

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## **ABSTRACT**

Leisure agriculture is a novel rural industrial form in line with modern society. This paper analyzes the development history of Guanxiang cultivation and processing, and proposes a development strategy for Guanxiang cultivation and processing under the vision of leisure agriculture. Combining Steam VR technology, Unity UI interaction technology and VR technology of collision detection, a Guanxiang cultivation and processing experience system based on VR technology is constructed, using and improving the handle detection technology to realize the interaction function of VR handle with virtual objects and UI. Through the VR technology-based Guanxiang cultivation and processing experience system from the perspective of leisure agriculture, we can experience the process of Guanxiang cultivation and processing and understand the culture of Guanxiang cultivation and processing in the virtual reality environment.

## **KEYWORDS**

Leisure agriculture; Guanxiang cultivation and processing; Guanxiang culture; Handle detection technology; VR technology

## **1. INTRODUCTION**

Intangible cultural heritage is an indispensable and important part of the excellent Chinese traditional culture with a history of more than 5,000 years, and is an inseparable national cultural gene [1-2]. With the development of national economy, people's material living standard has gradually improved, and the demand for spiritual aspects such as inheritance and development of excellent Chinese traditional culture has become increasingly strong, and the intangible cultural heritage industry has gradually taken root and grown with the development and growth of the tertiary industry [3-4]. People are the most decisive factor in the process of industrialization of NRM. The mastery and transmission of the essence of ancient folk cultural knowledge and skills by NRM bearers gives a realistic and reliable carrier for the inheritance,

continuation and industrialization of NRM, and is an important driving force for the industrialization of NRM [5]. Leisure agriculture is a novel rural industrial form in line with modern society and a new way to promote rural revitalization [6]. The resource base of leisure agriculture is based on the “three rural areas”, the business content is integrated with the “three industries”, and the service purpose is located in the “three lives”. As intangible cultural heritage, Guanxiang production techniques are closely related to people’s production and life, and are an indispensable part of traditional culture [7]. In people’s daily production life, the cultural attributes and skills value of Guanxiang production techniques are mainly reflected through the production process. This paper explores the heritage of Guanxiang culture by combining leisure agriculture and VR technology.

## **2. CULTIVATION AND PROCESSING OF GUANXIANG FROM THE PERSPECTIVE OF LEISURE AGRICULTURE**

### **2.1. DEVELOPMENT HISTORY OF GUANXIANG CULTIVATION AND PROCESSING**

Guanxiang is the most famous product in Dongguan, and it is produced from the Guanxiang tree, which is a Grade II protected plant in China. From transplanting, breaking branches, breaking roots, opening incense doors, cultivating incense to picking incense, managing incense, picking incense, making incense and combining incense, there are as many as 30 procedures, all of which follow the production techniques of the Song Dynasty, and the whole process spans more than ten years or even decades, and many processes are inherited from ancient methods. At the beginning of the 20th century, Dongguan redirected its attention to the Guanxiang industry, vigorously explored the historical and cultural connotations of Guanxiang and cultivated Guanxiang saplings in order to revive the excavation and research of local Guanxiang techniques. In 2012, Dongguan Intangible Cultural Heritage Protection Center and other relevant protection units successfully declared the Guanxiang production techniques to be included in the list of recommended projects of the fourth batch of provincial intangible cultural heritage, and in 2014, promoted the Guanxiang

production techniques to be included in the list of representative projects of national intangible cultural heritage, so that it has a solid guarantee mechanism on the road of inheritance and development.

## 2.2. LEISURE AGRICULTURE

The resource base of leisure agriculture is based on the “three rural areas”, the business content of leisure agriculture is integrated with the “three industries”, and the service purpose of leisure agriculture is located in the “three lives”. The definition of leisure agriculture is shown in Table 1. Leisure agriculture is a new form of rural industrial development that integrates rural natural resources and agricultural production conditions with technology and art to create tourism, leisure and travel. The development of leisure agriculture can deeply develop the potential of agricultural resources and bring consumers the pleasure of sightseeing, fruit picking, vacationing, accommodation and experiencing local culture based on regional characteristics.

**Table 1.** Definition of leisure agriculture

<p>“Three rural” is the foundation of leisure agriculture development</p>	<p>(1) In terms of agriculture, the development of leisure agriculture has implanted leisure functions in the countryside and stretched the agricultural industry chain</p> <p>(2) In terms of farmers, the development of leisure agriculture has fully absorbed the surplus rural labor force</p> <p>(3) In rural areas, the development of leisure agriculture drives local economic development</p>
<p>The integration of “three industries” is a new form to develop leisure agriculture</p>	<p>(1) Taking into account the development of traditional agriculture, but also combined with the integration of different types of modern industrial development of new forms of industry</p> <p>(2) Leisure agriculture takes leisure as the development orientation and “agriculture” as the development basis to create a new form of rural industry with the integrated development of “three industries”</p> <p>(3) New forms of rural development in which “three industries” complement each other and promote each other</p>
<p>Leisure agriculture takes the integrated development of “three life” as the integration point</p>	<p>(1) The integrated development of leisure agriculture in production, life and ecology meets the popular consumption demand</p> <p>(2) Consumers in the leisure park can experience the combination of traditional production of agricultural products with modern technology and other projects</p> <p>(3) Revitalize natural and agricultural resources in rural areas High-quality development of leisure agriculture to promote agricultural efficiency, drive farmers to increase capital and add rural green.</p>

### **2.3. DEVELOPMENT STRATEGY OF GUANXIANG CULTIVATION AND PROCESSING FROM THE PERSPECTIVE OF LEISURE AGRICULTURE**

(1) Standardize seedling production, strengthen the awareness of good seeds and improve the quality of seedlings

Good seed and strong seedlings is the key and foundation of the healthy development of Guanxiang planting industry, cities and counties should effectively strengthen the awareness of good seed. First, strengthen seedling law enforcement, standardize nursery management, eliminate inferior seeds, from the source of the gatekeeper, improve the rate of good seeds. Second, increase investment in science and technology, accelerate research on seedling breeding techniques, strengthen the selection of good seeds, and improve the quality of seedlings.

(2) Strengthen technical research, service industry development, one is to strengthen the camping and planting technology and pest control technology research, to solve the problem of Guanxiang canopy year after year by pests and diseases, to improve the quality of forest stands. Second, to strengthen the research and application of artificial incense technology, to improve the incense rate, the amount of incense and the quality of white wood incense. Third, the construction of artificial incense technology model base, the promotion of advanced artificial incense technology.

(3) Combined with the actual situation, according to local conditions, scientific development of Guanxiang planting industry Guanxiang development of white wood incense planting industry, should follow the principle of local conditions, suitable for the land and trees, on the basis of full respect for the wishes of investors, to guide their scientific and rational development of planting. First, encourage enterprises and planting households to play their own advantages to carry out large-scale planting, professional management and industrial operation. The second is to promote the right tree for the right place, to create mixed forests. Third, make full use of forest land, plant Guanxiang in secondary forest land, sparse forest land and residual forest land, first easy and then difficult, and gradually promote, so that Guanxiang planting industry can

be effectively developed. Fourth, to build demonstration bases in the main production areas in the province to demonstrate and promote planting.

### 3. VR RELATED TECHNOLOGY

The Steam VR Unity Plugin, developed by Valve, is a bridge between the HTC Vive headset and the Unity development engine. The VR Camera provided in Steam VR converts the normal camera that comes with Unity into a VR camera, and the visuals are converted to Vive imaging, while the Steam VR library also provides features such as grabbing and teleportation, and users can customize button and motion bindings through the Steam VR Input System to provide a richer interaction. The Steam VR library is compatible with the library platform between HMDs and encapsulates functionality into a prefabricated body that developers can use directly.

Unity has a complete GUI system built in, which provides users with a set of GUI layout design solutions. Unity officially provides UGUI components and integrates them into the compiler, which are more flexible and easier to operate than the previous GUI. UGUI components include canvas, image, text, button and other controls, which basically meet the development needs of developers. Table 2 shows the common components in GUI.

**Table 2.** Common components in the GUI

Control name	Control function
Canvas	The basic unit of rendering, all UI components are child objects
Image	Map display control, usually used to display non-interactive images
Tex	Text display controls provide labels, titles, and descriptions other GUI controls
Button	Respond to event components by clicking to initiate or confirm user actions
Scroll View	Scroll display component, you can scroll in horizontal, vertical display content

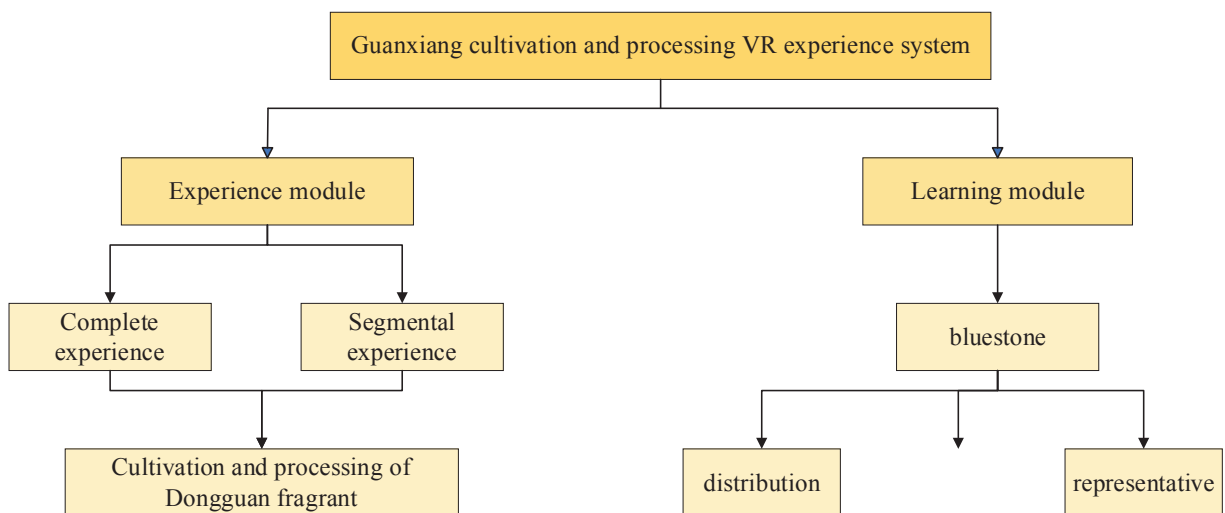
Within the virtual reality environment, collision detection can be used to determine whether two or more objects occupy the same area at the same time, and if they occupy the same area then a reasonable event response is required, otherwise penetration will occur and reduce user immersion. Collision detection is an important part of virtual reality project development.



## 4. VR TECHNOLOGY-BASED GUANXIANG CULTIVATION AND PROCESSING EXPERIENCE SYSTEM

### 4.1. OVERALL SYSTEM ARCHITECTURE DESIGN

According to the demand for practicality, application and immersion of Guanxiang cultivation and processing VR experience system, the architecture of Guanxiang cultivation and processing experience system is shown in Figure 1. The system is divided into an experience module and a learning module. The experience module is divided into a complete experience and a sub-section experience for the tea-making process, and the learning module mainly introduces the knowledge of Guanxiang. In the Guanxiang cultivation and processing VR experience system, users use HTC Vive virtual reality game equipment to experience the Guanxiang cultivation and processing process and understand the culture of Guanxiang in the virtual reality scene.

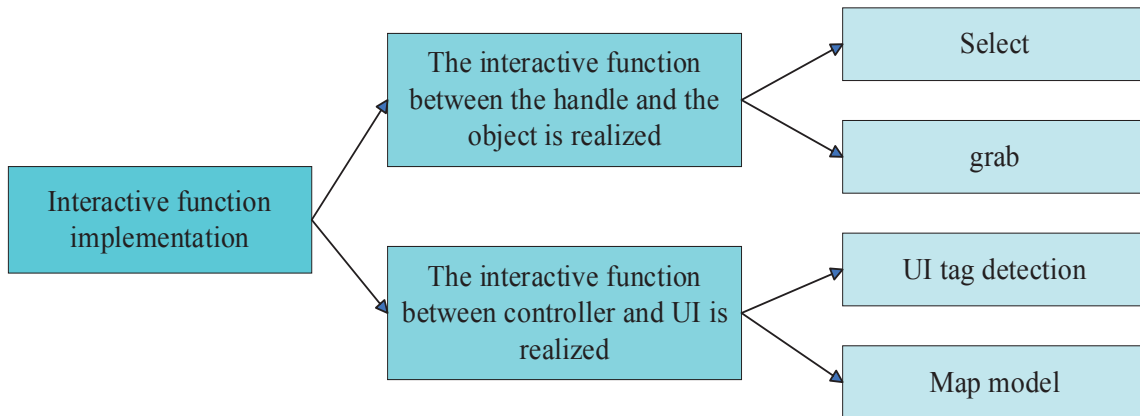


**Figure 1.** Structure of Dongguan fragrant cultivation and processing experience system

### 4.2. INTERACTION FUNCTION IMPLEMENTATION

Figure 2 shows the implementation of the interaction function. The process of interaction between the handle and the object mainly includes the selection and grasping of the object by the handle. The Guanxiang culture science is the main content of the learning module in this paper, and the user uses the handle to interact with the UI interface. The learning module mainly uses the map model to visually

display the place of origin of Guanxiang and introduce its detailed information through graphics and text. When you enter the learning module, you can learn about the representatives of Guanxiang planted in different regions and their detailed information by clicking on the UI of the provinces in the map.



**Figure 2.** Implementation of the interaction function

## 5. CONCLUSION

Leisure agriculture is the future trend of agricultural development. By analyzing the development history and strategies of Guanxiang cultivation and processing from the perspective of leisure agriculture, this paper combines VR technology to build a system of Guanxiang cultivation and processing based on VR technology and realize the interactive function. The system is mainly divided into two parts: the first part is an experience module about the Guanxiang cultivation and processing process, and the second part is a learning module to understand the cultural knowledge of Guanxiang cultivation and processing. Through these two modules, users can experience the process of Guanxiang cultivation and processing and understand the culture of Guanxiang cultivation and processing in the virtual reality environment.

## FUNDING

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# RESEARCH ON THE THEORY AND PRACTICE OF CIVIC EDUCATION IN UNIVERSITIES BASED ON BIG DATA

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## ABSTRACT

At present, there is a problem of deviation from the goal in the educational work related to ideology and politics in schools. In order to solve this problem, this paper clarifies the theoretical mechanism of this education based on big data, clarifies its educational concept, innovates teaching and develops excellent resources. The theoretical mechanism is verified through practice, the theory-based educational integration assessment and evaluation system is explored, and the significance of educational theory and the value of practice are studied. Educators are cautioned to be good at analyzing and mining data rationally, maintaining correct values and positive curriculum concepts, working scientifically and rationally, and applying educational theories positively.

## KEYWORDS

College political education; Theoretical mechanism; Assessment and evaluation system; Resources for political education

## 1. INTRODUCTION

National ideological and politically relevant education is an important channel for the dissemination of the dominant ideology and has an important modern value in shaping the mindset and behavior of citizens [1-2]. To resist various erroneous views and trends, it is necessary to secure the main channel and main position of the national ideology [3-4]. With the wide application of higher technologies and the significant progress of precision thinking in national governance and other aspects, more and more universities have started to explore new models of innovation [5-6]. Precision thinking, as an important part of national governance thinking, has an important guiding role in dealing with problems in various fields of our society and is an important way to govern the country under the new situation [7]. Precision thinking

is the application of educational content related to ideology and politics in the field of education, and under the leadership of precision thinking, an educational model that collects, processes, and analyzes information about students' learning needs and behavioral changes through highly intelligent technologies to help students solve various specific problems [8-9]. This paper explores the theory and practice of college ideological education based on big data.

## **2. THEORETICAL MECHANISM OF COLLEGE CIVIC EDUCATION BASED ON BIG DATA**

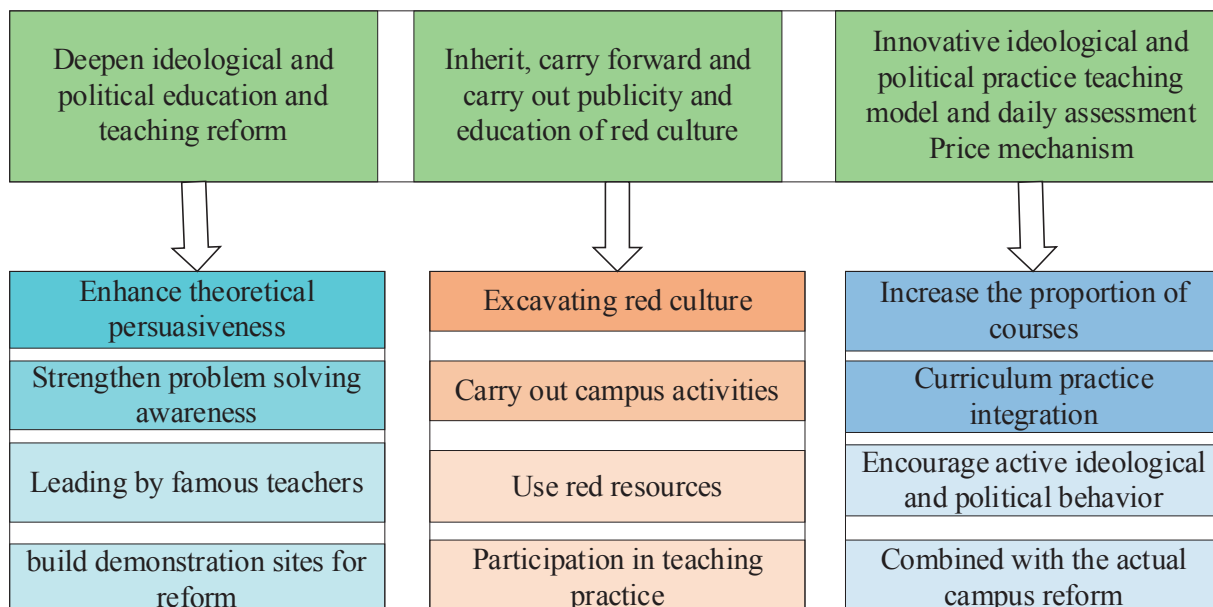
Higher education in the period of big data will certainly carry the historical mission of washing the ideological and political soul of college students. The educational work of education needs to follow the basic laws of belief generation mechanism, main thought needs and ideological and political work of college students through the Chineseized and practical Marxist position, viewpoint and method, and comprehensively construct the practical innovation mechanism to enhance the contemporary view, mission and effectiveness of ideological and political education work.

### **2.1. ESTABLISHING THE GOAL SYSTEM OF MARXIST IDEAL BELIEF EDUCATION IN COLLEGES AND UNIVERSITIES**

In order to strengthen ideological leadership, cultivate college students' firm scientific beliefs and internalize Marxist theory education into college students' thoughts, beliefs and action guidelines, universities in the new era should clearly grasp the target level and orientation of ideal and belief education. First, based on the goal of establishing moral education, we should see that the multipolarity of the world and cultural pluralism inevitably depend on the reality of different social beliefs, ideologies and cultural trends, and solve the problem of "for whom to train people". Secondly, the education work should get out of the standardized and unified mode and misunderstanding, and solve the problem of "how to cultivate people". Thirdly, based on the goal of establishing moral education, the education work should be based on the construction of "all-round integrated" training mode, and closely connected with the goal of personal struggle and the realization of social value, so as to solve the problem of "what kind of people to cultivate".

### **2.2. REFORM AND INNOVATE THE LARGE SYSTEM OF TEACHING CIVIC THEORY CLASS IN COLLEGES AND UNIVERSITIES**

Figure 1 shows the big system of teaching ideological and political theory class based on big data. What colleges and universities need to do now is to build an internal and external system of ideological education that can carry out the ideals and beliefs of college students into specific programs and realistic scenes, and finally transform them into "unity of learning, thinking and application, knowledge, faith and action".



**Figure 1.** University ideological and political theory teaching system

### 2.3. DEVELOP MULTI-POLAR RESOURCES OF EDUCATION NETWORK IN COLLEGES AND UNIVERSITIES

With the rapid development of big data technology, the amount of information provided by electronic products and network media for students is much larger than the amount of educational information in classroom disposable time, therefore, the time and way to carry out ideological education for college students should keep pace with the times, make full use of and give full play to network educational resources, and explore the new path and large space of “Internet+Education”. Therefore, the time and way to carry out college students’ ideological education should be improved, make full use of the network education resources, and explore the new path and space of “Internet+education”. Firstly, colleges and universities should promote the implementation of the action plan of “Internet+student ideological and political education” and “Internet+cultivation of ideological talents”, through “touching the Internet, using the Internet and borrowing the Internet” to research and judge the students’ ideological dynamics, and make use of the professional advantages to carry out the “Internet+education”. By “touching the Internet, using the Internet and borrowing the Internet”, we can judge the ideological dynamics of students, play our professional advantages to explain and solve the problems, guide students to participate in positive network interaction, and build a new mode of college ideological education and a new mechanism of education in the Internet era. Secondly, colleges and universities should overcome the new technical barriers of network big data research and network behavior data analysis, pay attention to the data analysis of political tendency, ideological condition, psychological health and behavior hotspots of college students at fixed points, and establish a dynamic research database of college students’ ideological and political conditions. Thirdly, universities should build “resources+teaching+learning+practice” integrated online education and teaching platform of Civic Science course and red ideology propaganda campus cloud media.

## 3. PRACTICE BASED ASSESSMENT AND EVALUATION SYSTEM OF COLLEGE CIVIC EDUCATION

### 3.1. BIG DATA-BASED ASSESSMENT AND EVALUATION OF EDUCATIONAL INTEGRATION

Table 1 shows the connotation of assessment and evaluation of ideological education in colleges and universities based on big data.

**Table 1.** Connotation of ideological and political education evaluation in colleges and universities

Examination and evaluation	Specific content
The main body	(1) The subject of assessment and evaluation can be divided into management subject and education subject (2) The main body of management is the evaluation of the education department and the evaluation of education and teaching in colleges and universities (3) The subject of education is the implementer of the curriculum, the organizer of the activity and the object of education
The object	(1) Students' learning situation, cognitive level, emotional state and ideological and moral quality (2) The establishment of educational ideas, the establishment of educational systems and the exploration of educational methods
The method	(1) Data collection and statistics (2) Reliability detection of data (3) Establish data model (4) Result analysis and strategy formulation

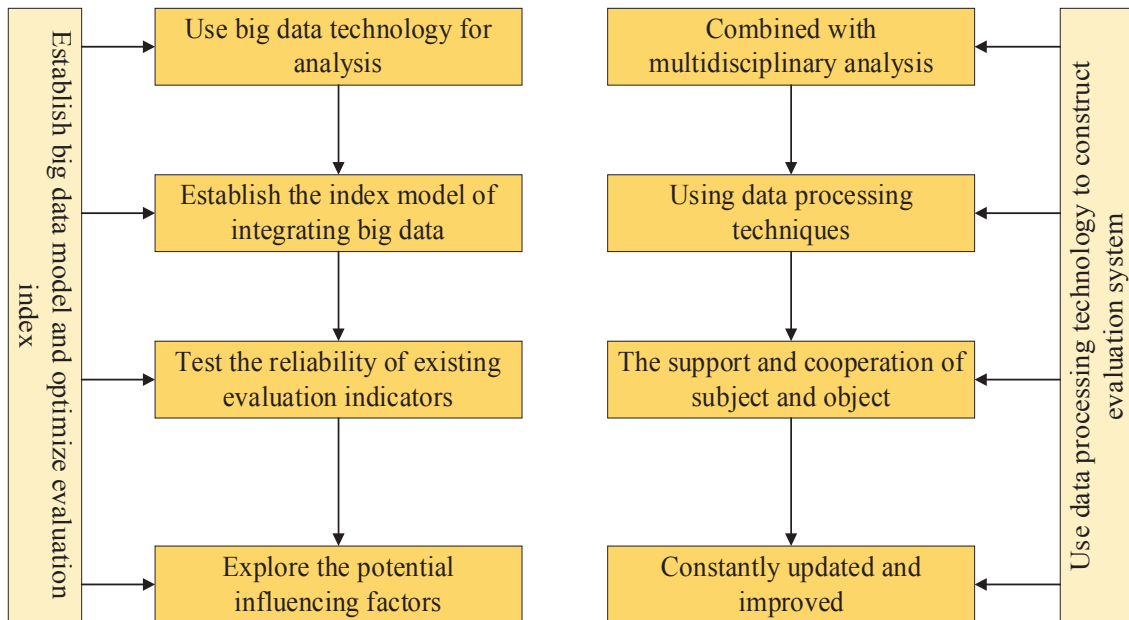
### **3.2. THE DILEMMA OF CONSTRUCTING THE ASSESSMENT AND EVALUATION OF THE INTEGRATION OF CIVIC AND POLITICAL EDUCATION IN UNIVERSITIES BASED ON BIG DATA**

In recent years, the construction and development of the integration assessment and evaluation system has achieved remarkable results, but still faces difficulties. On the one hand, many problems only remain on the surface phenomenon, lacking systematic summary and reflection, reflecting the immaturity of the construction of the evaluation system, and on the other hand, the lack of sufficient attention makes its overall construction process lag behind the development of the current Civic Education practice and does not really play the role of cultivating and practicing The role of socialist core values. There are problems in terms of single objective, single structure and poor relevance.

### **3.3. THE METHOD OF ASSESSMENT AND EVALUATION OF THE INTEGRATION OF CIVIC AND POLITICAL EDUCATION IN UNIVERSITIES BASED ON BIG DATA**

Figure 2 shows the methodological innovation of the assessment and evaluation of the integration of Civic and Political Education with Big Data. What comes along with the era of big data is not only new technology, but also new values and methodology, which will trigger a change in people's thinking. Deeply understanding the important role of big data, carefully collecting and storing all kinds of data information, and using the results of data analysis to improve the effectiveness of education integration assessment and evaluation is an urgent practical problem that practice has put forward to us.





**Figure 2.** Evaluation methods of ideological and political education integration in universities

#### 4. THEORETICAL SIGNIFICANCE AND PRACTICAL VALUE

By making full use of big data to extract, summarize and sort out the laws of education in the massive information, it can effectively anticipate the future. Through the application of big data, educators can understand the ideological dynamics of students more clearly, so as to carry out education in a targeted manner. Currently in the era of information explosion, students receive all kinds of information in the network from time to time. Educators should be good at analyzing and mining data rationally, maintaining correct values and positive curriculum concepts, and working scientifically and rationally.

#### 5. CONCLUSION

Civic education is a process of continuous development and change, this process should be closely combined with the development of society students' ideological situation and changes in political consciousness, only in the ideological constantly improve their consciousness, in order to better put theory into practice in action. Only in the continuous strengthening of students' own worldview, outlook on life and values transformation can they effectively improve their political theory and work ability. This paper explores the education assessment and evaluation system based on practice and analyzes the significance of education theory and the value of practice based on big data. It is conducive to expanding the research field of ideological education, enriching the content of college education, strengthening the "three-dimensional" and "systematic" understanding of all aspects of education, and improving and perfecting the education methods.

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# EFFECTIVE APPLICATION OF BIG DATA INFORMATION TECHNOLOGY IN ARCHIVES MANAGEMENT

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## ABSTRACT

This paper analyzes the connotation and basic characteristics of big data, concludes that big data information technology consists of data analysis technology, data processing technology, and data storage technology, and explores its effective application in archives management. At the same time, the problems and considerations in the application of big data information technology in archives are analyzed, and solutions are made to deepen the effective application of big data information technology in archives management. Through multi-dimensional analysis and perspective, the needs related to archival data and information are presented to relevant managers in an all-round way, which effectively improves the accuracy of archival management and promotes the reform of archival management in the era of big data.

## KEYWORDS

Data analysis; Data processing; Data storage; Archival management; Big data information technology

## 1. INTRODUCTION

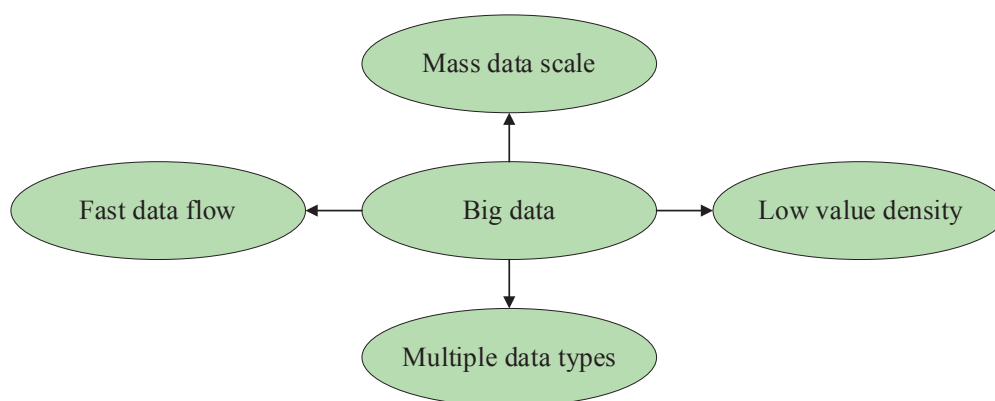
With the rapid development of social economy, the level of development of Internet information technology is also increasing, and at the same time, big data is also developing rapidly, but at the present stage of the actual development of various industries, archives management work also occupies a more important position in the process [1-2]. Archival management has undergone a series of changes, and archival information resources have been developed in depth, and the service role played by archival management for society is more obvious [3-4]. Big data information technology can effectively promote the optimization of the archival management process and realize the purpose of centralized management of archives, and at the same time, it can deeply explore archival data and provide the people with services that meet their needs [5-6]. However, according to the relevant survey data, most of the current archive management work often has some unreasonable problems in the case of using big data information technology, in which case, it is necessary for the relevant departments and staff to increase their attention to it [7]. And to analyze and study the problems that exist in it, take scientific and reasonable control measures to ensure that big data information technology can give full play to its own role and value, so as to guarantee that the level of archives management work can be further strengthened [8].

## 2. APPLICATION OF BIG DATA INFORMATION TECHNOLOGY IN FILE MANAGEMENT

### 2.1. BIG DATA

Big data is a kind of aggregate with massive data information, which encompasses a very large amount of data and cannot be collected, stored and analyzed with the help of traditional database software tools. The characteristics of big data are reflected in four aspects, and the basic features of big data are shown in Figure 1. The application of big data does not focus on acquiring and storing huge amount of information, but its core is to effectively process, process

and mine the data, so that the data becomes valuable for utilization. Big data technology requires a combination of many assistive technology tools, databases and systems to better process and extract valuable data information.



**Figure 1.** Basic characteristics of big data

## 2.2. BIG DATA INFORMATION TECHNOLOGY

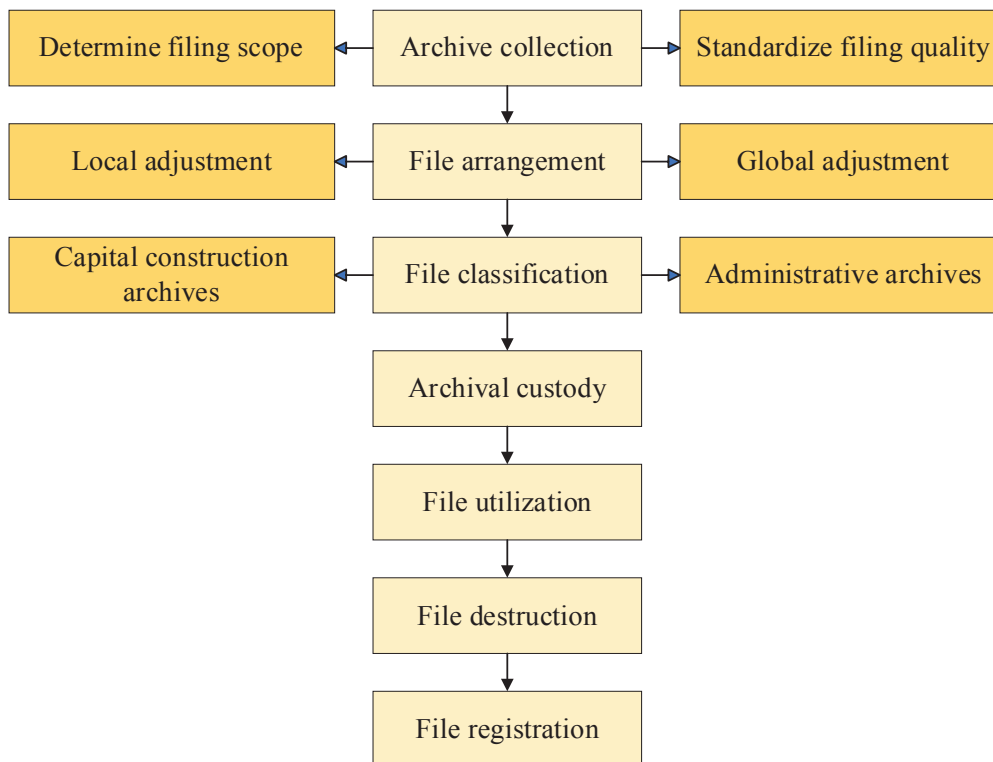
Big data information technology consists of data analysis technology, data processing technology, and data storage technology. In the application of big data information technology, all three technologies can be applied in the file management. In the specific implementation process, large-scale application and processing database, data mining technology, distributed database, cloud computing platform, Internet technology, and combined with distributed file system, scalable storage system, etc. are required. The collection of massive data and data transmission work are carried out, and then data mining analysis is carried out to achieve the purpose of efficient processing of data information.

## 2.3. THE EFFECTIVE APPLICATION OF BIG DATA INFORMATION TECHNOLOGY IN THE MANAGEMENT OF CONTEMPORARY RECORDS

Figure 2 shows the general process of file management, and big data information technology can help file managers to standardize the format of files for centralized file management, such as the conversion of paper files into electronic files after scanning technology for data format, so as to facilitate the unified and centralized file management, and the effective application of big data information technology in file management is as follows:

(1) strengthen the integrity of archival information data, archival management work itself has the characteristics of complexity, but the traditional period in the process of archival management work, will continue to have data, but the data storage capacity has a limit, which requires the deletion of relevant data, in such a case, it will lead to the problem and phenomenon of data loss. But in the current stage of big data archive management work, it can control the relevant problems, not only can store a large amount of data, but also can backup the relevant data, thus ensuring that the integrity of archival data information can be strengthened.

(2) In the process of traditional archives management, paper archives are generally adopted, which will lead to inconvenience in the process of searching, and if a little loss occurs, it will consume a lot of time and increase the workload of the staff themselves. But in the process of archives management in the big data environment, it is possible to control the relevant problems, but also to facilitate the search of relevant data, to avoid the problem and phenomenon of data loss, so as to ensure that the needs and standards of all aspects can be met.



**Figure 2.** General flow of file management

### **3. BIG DATA INFORMATION TECHNOLOGY IN ARCHIVES MANAGEMENT STATUS AND CONSIDERATIONS**

#### **3.1. PROBLEMS WITH THE APPLICATION**

(1) Lack of professional talents, most units still adopt traditional management methods in the process of actually carrying out archive management work, which will lead to the inability to process and analyze the relevant data, and the lack of professional processing personnel.

(2) Uniform backup of data is not possible. At present, each unit in each region manages its own records in its own way and is not able to manage records uniformly throughout the country, which affects the level and efficiency of records management and leads to frequent problems of information security.

(3) There are security problems in file management. The current security system of file management is poor, and the traditional form of file management is adopted, which will not only increase the difficulty of file management, but also lead to the problem and phenomenon of information loss, thus leading to the data not being able to give full play to its own role and value.

#### **3.2. PRECAUTIONS FOR APPLICATION**

(1) When archives managers use big data information technology for archives management, they should use a dynamic eye view of big data information technology, and at the same time, they should selectively apply big data information technology according to their actual work situation. At the same time, after the introduction of big data information technology and its application in archives management, the relevant units should increase the support for archives management, and also do a good job of promoting the knowledge of big data information technology among archives managers, actively cultivating professional talents of big data information technology, introducing more advanced equipment related to big data information technology, and improving the application level of big data information technology in the units.

(2) The staff of relevant units should systematically apply big data information technology as a whole when they carry out archive management work, so that the greatest advantages of big data information technology can be brought into play. At the same time, each unit should do a good job of the corresponding training, and also analyze the relationship between the various elements of the file management work, so as to achieve a systematic macroscopic file management. In addition, the archives management department should also strengthen the connection with other departments, do a good job in the management of various information resources, and also improve the quality of archives services.

#### **4. DEEPEN THE EFFECTIVE APPLICATION OF BIG DATA INFORMATION TECHNOLOGY IN ARCHIVE MANAGEMENT**

##### **4.1. IMPROVING THE APPLICATION OF BIG DATA INFORMATION TECHNOLOGY IN ARCHIVE MANAGEMENT**

The use of big data information technology in archives management can solve the drawbacks of traditional archives management itself, so it is necessary to apply big data information technology to archives management and improve the application of big data information technology in archives management. Table 1 shows the measures to improve the application of big data information technology in archives management. It is necessary to have a large enough space to store a large amount of data information as well as various archives, and to analyze the stored information systematically so that the value behind the big data information can be discovered. Big data information technology is used to systematically classify information and then manage it in a unified and centralized manner, while users can search through the unified database with big data information technology and find the information they need.

**Table 1.** Measures to improve big data information technology in archives management

Build cloud storage	1.Improve the level of information sharing platform construction 2.Promote the construction of digital archives
Improve data analysis skills	1.Improve traditional ideas 2.We will increase the use of advanced technologies
Strengthen data retrieval capabilities	Improve the management system

##### **4.2. DEEP MINING OF ARCHIVAL DATA**

The multidimensional analysis and perspective can present the needs of archival data and information to the relevant managers in a comprehensive manner. It can effectively improve the accuracy of archival management, prevent the omission of various key data information, and effectively promote the reform of archival management in the era of big data. When big data information technology is applied to archives management, it mainly includes the flexible use of semantic search engine to analyze and predict the changing trend of people's needs when deep mining of archival data information is carried out.

#### **5. CONCLUSION**

The current rapid development of science and technology has promoted the rapid development of big data, which has also been widely promoted and used in various industries, but at this stage, some departments are still using the traditional file management methods and concepts in the process of carrying out file management. With the rapid development of big data information technology, it is necessary to pay attention to the application of big data information technology in archives management. The article explores the effective application of big data information technology in archives management, and analyzes the current situation of big data technology in archives management as well as precautions, and proposes

measures to deepen the application.

## FUNDING

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# THE POSITIVE IMPACT OF THE DEVELOPMENT OF TEACHING EVALUATION SYSTEM OF COLLEGE CIVICS CLASS ON STUDENTS' BEHAVIOR IN THE ERA OF BIG DATA

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## ABSTRACT

In the era of big data, the teaching evaluation of college Civics class integrating big data is important to comply with the changes of Civics class teaching. Based on the basic principles of teaching evaluation index system construction, this paper constructs the basic framework of teaching evaluation system of Civics and Political Science class, and analyzes the shortcomings of teaching evaluation system of Civics and Political Science in colleges and universities in the era of big data, puts forward corresponding strategies, and explores the influence on students' behavior. The results show that the concentration of students' classroom attention behavior has increased by 0.2, the participation of classroom participation behavior has increased by 0.21, the interaction of classroom interaction behavior has increased by 0.18, and the learning of classroom learning behavior has increased by 0.21, and there is a positive impact.

## KEYWORDS

Big data; Civics teaching evaluation; Evaluation principles; Student behavior; Classroom behavior

## 1. INTRODUCTION

The ideological and political theory course is the key course to implement the fundamental task of establishing moral education, and is the soul course to strengthen and improve the thinking and government work in colleges and universities, and has been highly valued by the Party and the State [1-2]. In this context, theory courses can effectively arm the minds of young college students and build a firm ideological foundation [3-4]. It can be seen that it is significant and honorable to promote teaching reform and improve teaching quality, university courses integrating modern information technology present new characteristics of teaching [5]. Traditional teaching evaluation methods have clearly failed to adapt to education under the changing times, and it is only by conforming to the changes in teaching and deepening curriculum reform that we can promote the modernization of education [6]. A correct understanding of the opportunities and challenges brought by the development of technology in the new period on the evaluation of teaching and learning of college and university Civics courses is necessary to propose a more scientific and effective strategy for proposing relevant courses [7-8].



## 2. THE BASIC FRAMEWORK OF CIVICS TEACHING EVALUATION SYSTEM

### 2.1. BASIC PRINCIPLES FOR THE CONSTRUCTION OF TEACHING EVALUATION INDEX SYSTEM

The basic principles of the five aspects can ensure that the evaluation index system can play its guiding and evaluating role objectively and fairly, help schools achieve their teaching purposes, and establish an advanced evaluation system for teachers of theory courses. First, the principle of politics, the purpose of teaching college Civics class is to train students to become people with correct political beliefs, the establishment of a practical evaluation system for teaching Civics class in colleges and universities should clearly reflect the value orientation of socialism with Chinese characteristics. Second is the principle of systemic, education evaluation itself is a system, in practice, should be the process evaluation and result evaluation, qualitative evaluation and quantitative evaluation organic combination, so as to fully ensure the objectivity and fairness of the evaluation results. Third is the principle of scientificity, evaluation is a value judgment activity based on objective facts, reflecting the real situation of education, and can correctly handle and reflect the relationship between all aspects of education. Fourth is the principle of feasibility. Feasibility is an important principle for judging whether an indicator system is perfect. The indicator system should be simple and easy to implement. In the design of the indicator system, the progressiveness of students' growth and the ambiguity of thinking levels must be taken into account, and some indicator systems should be fuzzy and quantitative. Fifth is the principle of dynamism, the purpose of strengthening the construction of the Civics course is not only to enable students to obtain certain basic theoretical knowledge, and more importantly, starting from theoretical education, using theory to guide the shaping of students' values and specific behavior, which is a long-term process.

### 2.2. BASIC FRAMEWORK OF THE EVALUATION SYSTEM

Table 1 shows the basic framework of the evaluation system of Civics and Political Science teaching.

**Table 1.** Basic framework of ideological and political teaching evaluation system

Primary index	Secondary index
Evaluation of teaching objectives	Value goal
	Operational target
	Comprehensive objective
Evaluation of teaching activities	Syllabus index
	Teaching progress indicator
	Lesson plan index
	Teaching classroom index
Teaching ability evaluation	Teaching attitude index
	Teaching method index
	Teaching organization index
Teaching feedback evaluation	Teacher feedback indicator
	Student feedback index

(1) Teaching objectives are pioneering and decisive, and the fundamental purpose of the construction of teaching evaluation index system of college Civics class is to achieve specific teaching objectives. Therefore, the reasonable choice of teaching objectives evaluation indexes is in the first place in the construction of the basic framework of teaching evaluation index system of Civics and Political Science class.

(2) Teaching activity is the main object of teaching evaluation and the core of the evaluation system, around the syllabus, syllabus progress, teacher syllabus, classroom lectures, syllabus evaluation and other key links to select teaching activity evaluation indexes, targeted comprehensive evaluation of Civics and Political Science class teaching activities and their effects.

(3) Teaching ability evaluation Teaching ability plays a fundamental role in the improvement of teaching quality of Civics and Political Science class. Teaching ability is a comprehensive concept, and should focus on the comprehensive evaluation of the teaching attitude, teaching methods and teaching organization of Civics and Political Science teachers.

(4) Civics teaching is a subtle process. The real teaching effectiveness of the Civics class is never represented by the examination results of several courses, and sometimes the examination results can cover up the problems in the teaching of Civics class. Teaching feedback can effectively find the implicit deficiencies in the teaching of Civics and Political Science class, which is an important part of the organization and implementation of Civics and Political Science class.

### **3. THE DEVELOPMENT OF THE EVALUATION SYSTEM N THE ERA OF BIG DATA**

#### **3.1. INADEQUACY OF THE EVALUATION SYSTEM**

(1) The evaluation system of college Civics teaching is unreasonable. In the past, most of the evaluation work of college Civics teaching was to evaluate teachers' teaching effect and students' learning outcomes. When evaluating teachers' teaching, some schools mainly look at whether teachers have carried out Civics teaching to students, because it is difficult to evaluate students quantitatively due to the influence of the number of hours, so they mostly evaluate students qualitatively, that is, teachers evaluate students according to their Civics reports. Under this kind of Civics teaching evaluation system, its whole evaluation method is very lagging behind, and it is difficult to effectively play a positive role in evaluation.

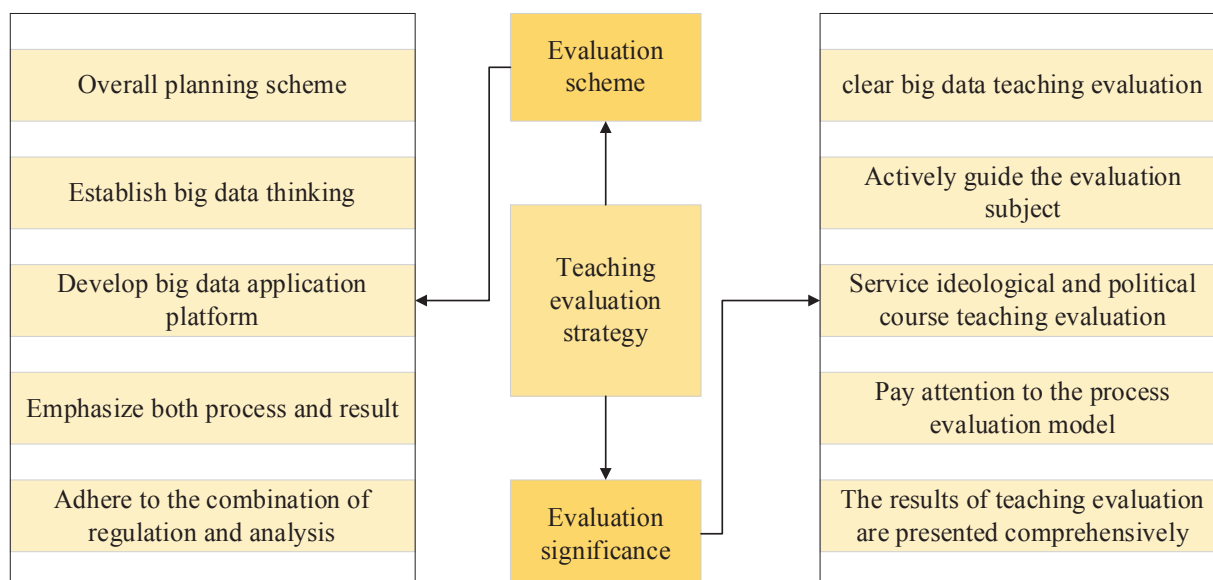
(2) The content of the evaluation of college Civics teaching is one-sided. In today's evaluation of college Civics teaching, most of the evaluation contents are focused on the textual materials submitted by students, but ignore the performance and actual effect of students' Civics practice, and the evaluation of students' innovation consciousness, practical ability, ideal beliefs and other aspects is obviously insufficient. Under this one-sided situation of the evaluation content of college Civic and Political Science teaching, it is especially important to make a good reform of college Civic and Political Science teaching evaluation.

(3) The evaluation mechanism of college Civics teaching needs to be improved. In the process of college Civics education and teaching, teaching evaluation can be considered a very important link. With regard to the actual situation of teaching evaluation of college Civics class, that is, the teaching evaluation mechanism is not standardized enough, lacking a perfect and scientific evaluation system, and there is no corresponding evaluation standard in the specific evaluation, or even no corresponding evaluation standard is formulated, while some schools have formulated but not strictly enforced, and the whole teaching evaluation mechanism is not operable, which leads to the teaching evaluation is superficial.

#### **3.2. STRATEGIES FOR TEACHING EVALUATION**

The more difficult part of the implementation of formative assessment in Civics is the evaluation criteria. Civics courses focus on students' ideological and moral cultivation and political literacy, and these requirements are difficult to distinguish obviously between good and bad students' assignments, and students' roughly equal levels, which can cause the problem of subjectivity and ambiguity in formative evaluation. Figure 1 shows the strategy of

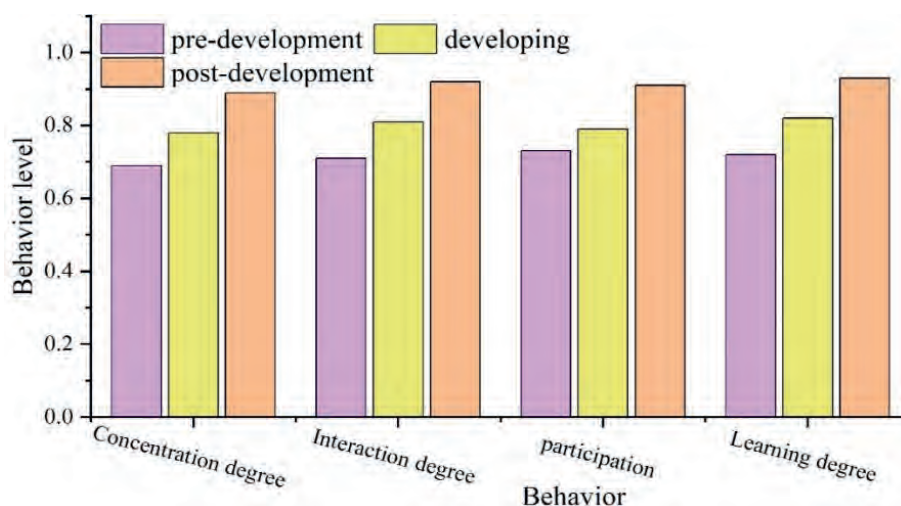
teaching evaluation of college Civics course in the era of big data. In the era of big data, facing all the challenges of applying big data to carry out teaching evaluation of college Civics class, colleges and universities need to seize the opportunity to improve the scientific and comprehensive teaching evaluation of Civics class, and need to take a macro view and plan the scheme of applying big data to teaching evaluation of Civics class as a whole.



**Figure 1.** Teaching evaluation strategies of ideological and political courses in colleges

#### 4. THE POSITIVE IMPACT OF THE DEVELOPMENT OF THE EVALUATION SYSTEM ON STUDENT BEHAVIOR

Examining students' learning attitudes and study habits. The traditional assessment mode for students' learning attitudes and habits is limited to attendance, classroom speech and homework completion, which cannot fully mobilize students' enthusiasm, and the passive learning attitude cannot help students form good learning habits.



**Figure 2.** Behavioral changes of students in the development of the evaluation system

Figure 2 shows the changes in students' behaviors in the development of the teaching evaluation system of a classroom Civics class. The concentration level of students' classroom attention behavior increased from 0.69 to 0.89, an increase of 0.2, and the participation level of students' classroom participation behavior increased from 0.71 to 0.92, an increase of 0.21. The interaction level of students' classroom interaction behavior increased from 0.73 to 0.91, an increase of 0.18, and the learning level of students' classroom learning behavior increased

from 0.72 to 0.93, an increase of 0.21. The positive classroom behaviors of students have increased by 18%-21%, therefore, the development of evaluation system can promote students' positive classroom behaviors, that is, the development of evaluation system of college Civics class teaching in the era of big data has an impact on students' behaviors.

## 5. CONCLUSION

This paper explores the basic framework of the evaluation index system of Civics teaching, analyzes the development of the evaluation system of Civics teaching in colleges and universities in the era of big data, and explores the influence of the development of the evaluation system on students' behaviors in the era of big data. The concentration degree of students' classroom attention behavior increased from 0.69 to 0.89, the participation degree of classroom participation behavior increased from 0.71 to 0.92, the interaction degree of classroom interaction behavior increased from 0.73 to 0.91, and the learning degree of classroom learning behavior increased from 0.72 to 0.93. Therefore, the development of the evaluation system of college Civics teaching in the era of big data has a positive influence, and big data can promote the teaching of Civics.

## ABOUT THE AUTHOR

Zhuqing Wang (1979-), female, Han nationality, Shanxi Zuoquan, master, associate high school. Her research interests include teacher professional development, teaching evaluation.

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# THE TURN AND IMPACT OF POSTMODERNIST VISUAL COMMUNICATION DESIGN IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper analyzes postmodernism and visual communication, and explores the development trend and development path of postmodernist visual design in the context of big data through the dilemma faced by the turn of postmodernist visual design in the context of big data. It realizes the design turn of postmodernist visual communication design from elitism to popular culture, the gender category turn from patriarchy to feminism, and the design concept turn from functional rationality to acceptance aesthetics in the context of big data. The new postmodern realist visual communication design is more adaptable to people's demand for material and spiritual culture, and plays a role in promoting social development.

## KEYWORDS

Postmodernism; Visual communication design; Big data; Design turn; Design influence

## 1. INTRODUCTION

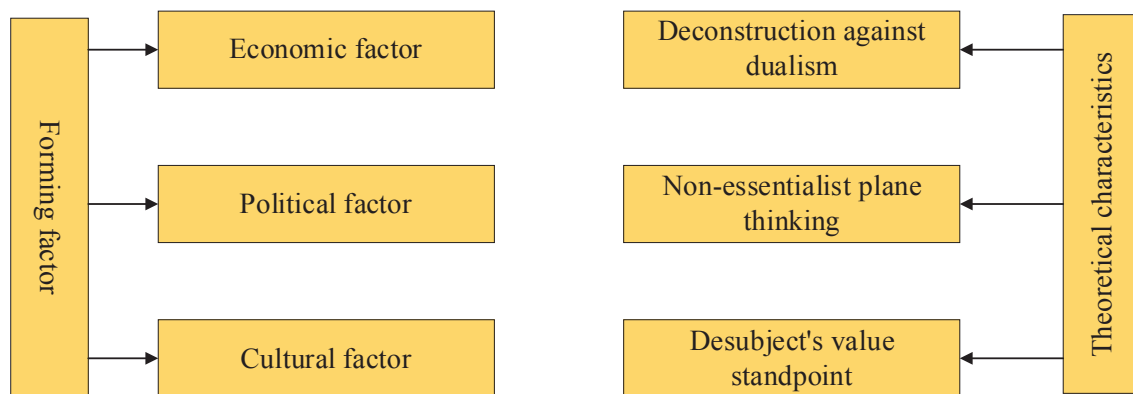
With the rise of popular culture in the mid-twentieth century, consumerism and popular aesthetics prevailed among the vast emerging middle class, and visual communication design logically replaced architecture in the postmodernist stage as the role of laying the foundation and guidelines for design [1-2]. The essence of visual communication design is to process and disseminate information effectively, but as the standard of living and quality of life in Western societies continue to improve, visual symbols that satisfy the basic communication function can no longer meet people's growing emotional needs and individual differences [3-4]. As a result, based on the inner interpretation and self-reinforcement of certain modernist ideas, visual communication design has turned to the postmodernist stage to find answers [5]. Focusing on the "irrational" value and emotional expression of design, exploring the relationship between design and culture, forming a dialogical and interventional aesthetic form of daily life, etc., these changes also became the driving force of postmodernism and the future development of visual communication design [6]. At this time, visual communication design tries to meet new needs while creating new desires, developing a more diversified, elegant and humanistic design paradigm, making up for past absences while forming a variety of critical synthesis, trying to break free from the shackles of function and rationality, and seeking a new life after breaking [7]. In this paper, the turn and impact of postmodernist visual communication design in the context of big data.

## 2. POSTMODERNISM AND VISUAL COMMUNICATION

### 2.1. POSTMODERNISM

Postmodernism is a design ideology that emerged after modernism, in the late 1960s and

early 1970s, as a product of the post-industrial and information society. Postmodernism is a design movement that first emerged from architecture and gradually developed into other fields. In academic circles, it is generally regarded as “a design style that makes extensive use of historical decorative motives for eclectic decoration based on modernist design. The ideological foundation of post-modernist design is based on the anti-modernist design form, which strongly opposes the design principle of “less is more” and emphasizes the design viewpoint of “less is more”, proposing that design should not only meet the function, but also need to show different colorful visual presentation in its form. It is proposed that the design should not only satisfy the function, but also show different colorful visual presentation effects, and meet the aesthetic requirements of different consumers. The formation factors and characteristics of postmodernism are shown in Figure 1. Postmodernism design advocates the theory of “urban history fusion revival”, emphasizing that the new era design needs to use new materials and technologies to overcome the unique technical characteristics of history and tradition, to show the continuity of historical culture, to explore new forms of creation without the limitations and constraints of traditional logical thinking, and to reflect the individuality and unique design style of designers in the era. The post-modern design in the design practice to achieve the Postmodern design has realized complex and diverse characteristics in design practice, and different types, styles and schools of design have emerged.



**Figure 1.** Formation factors and characteristics of postmodernism

## 2.2. VISUAL COMMUNICATION DESIGN

Visual Communication Design is a direct translation of Visual Communication Design, which was first used in the 1920s and formally developed in the 1960s. Visual communication design includes the two basic concepts of “visual symbols” and “communication”, and refers to the design that uses visual symbols to communicate information. “Visual symbols” refers to symbols that can be seen with the eyes and express certain properties of things, such as words, pictures, colors, commercials, TV shows, movies, landscapes, etc. The so-called “communication” refers to the process of using symbols to convey information from the sender to the receiver. In short, visual communication design is “the design that shows and informs”, and its main purpose is to convey information. The components and contents of visual communication design are shown in Table 1.

**Table 1.** Components and contents of visual communication design

Constituent elements and contents	Concrete performance
Text	Text is the most commonly used visual symbolic element
graph	Graphic design includes illustrations and graphic logos
arrange	According to the main idea conveyed, various visual elements are scientifically arranged and organized
hue	Colors often have their own associations and symbolic meanings
content	Newspapers and books design, packaging design, advertising design, logo design, corporate image design, software interface and web design, visual oriented design, display design, film and television design, etc. Graphic design includes newspaper and book design, packaging design, advertising design, logo design, corporate image design

### **3. THE TURN OF POSTMODERNIST VISUAL COMMUNICATION DESIGN IN THE CONTEXT OF BIG DATA**

#### **3.1. THE DILEMMA FACED**

With the advent of the big data era, visual communication design has entered a new stage of development, and the demand for composite talents is increasing. Educational practice should focus on cultivating students' practical innovation ability and strengthening the cultivation of data analysis and digital content creation, so as to meet the needs of modern design disciplines. The traditional thinking and mode of visual communication education has been unable to adapt to the demand for applied talents in the era of big data. Influenced by the work experience in various aspects, the traditional visual communication design education mainly suffers from such shortcomings as the teaching concept and teaching mode are too old, not combined with modern information network technology, not fully connected with the market, and insufficient innovation and competition consciousness. Secondly, the lack of industry standards for talents is also a pressing issue, which makes many media publish disorganized content, many media videos are chaotic, and the produced content lacks creativity or even proliferates, which also indirectly affects the development of the industry.

#### **3.2. DEVELOPMENT TREND AND DEVELOPMENT PATH**

Post-modernist visual communication design in the context of big data has a history of more than thirty years of development and has gradually formed a perfect system. The initial visual communication design was decoration design, which gradually developed into graphic design and digital media design. The development path of post-modern visual communication design innovation in the background of big data is shown in Table 2. In the teaching of visual communication art discipline, it is necessary to follow the law of natural development, align with the times, seek diversified development paths, adopt the mode of integration and development of multiple disciplines, expand new teaching resources, on the one hand, aggregate new teaching basic resources, on the other hand, expand new teaching auxiliary resources.

**Table 2.** Innovative development path of post-modern visual communication design

Innovation in virtual and interactive technologies	With the rapid development of virtual interaction technology, visual communication design forms will be more abundant
Achieve cross-border form innovation	The use of new digital media holographic technology in visual communication design
Leading concept innovation	Comprehensive innovation in all interactive areas of visual communication

### **3.3. STEERING IN THE CONTEXT OF BIG DATA**

#### **(1) The design turn from elitism to popular culture**

Postmodernist visual communication design effectively produces a connection with the living world, highlighting the uniqueness of the individual. Designers try to establish an aesthetic connection between elegance and vulgarity, break the old dichotomy between good and bad, pursue the complete liberation and freedom of human nature, and emphasize the integration of elite culture and popular culture. At the same time, design achieves the extension and crossing between multiple fields and becomes a systematic way that can gather social influence.

#### **(2) The shift of gender category from patriarchy to feminism**

After the 1960s, the post-modernist visual communication design trend with clear attitudes and the pursuit of equal liberation gradually diluted the rational design model, and female culture re-emerged to influence design. This has led to a trend of diversification in the field of visual communication design, which no longer relies on the reference to the one-way aesthetic model of men to define the status of women's identity.

#### **(3) From functional rationality to the design concept of aesthetic acceptance**

After the satisfaction of material life, the consciousness of human subjects gradually awakened, and the design approach lacking emotion and interest was criticized. Postmodernist visual communication design criticized the pre-determined model of modernism and the closedness and self-sufficiency of aesthetics, and turned the living world into a stage full of "theatricality", in which everyone is a participant who does not care about the performance of others, and promoted the multi-dimensional development of visual communication design after postmodernism.

### **4. THE INFLUENCE OF POSTMODERNISM VISUAL COMMUNICATION DESIGN IN THE CONTEXT OF BIG DATA**

The impact of big data era on postmodernist visual communication design is shown in Table 3. Due to the innovative progress of technology, big data gradually became the main tool of graphic design. Postmodernist designers began to devote themselves to exploring the potential of big data and developing the design language embedded in the new media, so that the postmodernist tendency in graphic design finally evolved into a trend of the times. The use of big data has brought a new change to type design. New typefaces have been developed like never before, and many commercial and non-commercial research institutions specializing in typeface innovation have emerged in the West. In terms of font application, with the unprecedented power of big data, post-modern designers can adjust the shape, size, thickness, position, and color of text at will, and control the density of text coverage. As a result, fonts have risen from being information carriers in the traditional sense to being the constituent elements of graphic design. Although this has somewhat weakened the recognition of text, it has created an extremely powerful visual impact. These post-modernist designs reflect the spiritual essence of post-modernism, where what people need is both physical and spiritual content, rather than the purely physical content emphasized by internationalism.



**Table 3.** Influences of big data era on visual communication design

<b>influence</b>	<b>Challenge</b>	<b>Development direction</b>
Big data promotes multi-dimensional visual communication design in postmodern realism	Postmodern visual communication design needs to be more diverse	Adopt digital design scheme
Big data promotes the heterogeneity of post-modern realism visual communication design	The content of postmodern visual communication design needs to be continuously enriched	Promote the integrated development of multiple media
Big data virtualizes post-modern realist visual communication design	The screening ability of post-modernism visual communication design needs to be improved	Constantly innovating forms of artistic expression

## **5. CONCLUSION**

This paper analyzes the development of postmodernist visual design in the context of big data, analyzes postmodernism and visual communication design, and explores the turn and influence of postmodern visual communication design in the context of big data. In the context of big data postmodernism visual communication design turns from elitism to mass culture design, from patriarchy to feminism gender category turn, from functional rationality to acceptance aesthetics design concept turn. Under the influence of big data, postmodern realist visual communication design has been newly developed, and the new postmodern realist visual communication design is more adaptable to people's needs for material and spiritual culture, and has played a role in promoting social development.

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# IMAGE COMMUNICATION OF TRADITIONAL VILLAGES IN THE AGE OF SELF-MEDIA AND ITS SIGNIFICANCE

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## ABSTRACT

By classifying the forms of image dissemination in the era of self-media, this paper elaborates on the WeChat public website, short video platform and live streaming platform. The process of growth, proliferation and degradation of traditional village images in the process of dissemination on the self media platform is constructed. The significance and value of traditional village image dissemination in the era of self-media is summarized, and the importance of the protection and inheritance of traditional village culture is emphasized. The discussion in this paper helps to better understand the current situation and future development trend of traditional village image dissemination in the age of self-media, and provides new ideas and new methods for traditional culture preservation and innovation.

## KEYWORDS

Self-media; Image dissemination; Short video platform; Traditional villages; Degradation process; Traditional culture

## 1. INTRODUCTION

With the popularity of Internet technology and the ease of information dissemination, self-media has become an important way of information dissemination, which has produced new influences and changes on the image dissemination of traditional villages [1-2]. In this paper, we will study the following two aspects: first, the current situation and characteristics of traditional village image dissemination in the era of self-media [3]. The second is to explore the significance and impact of self-media on traditional village image dissemination [4]. The current situation and characteristics of traditional village image dissemination in the era of self-media have become a hot spot for research [5-6]. In recent years, relevant scholars have conducted a series of studies and researches on this issue. Some scholars have analyzed the current situation and challenges of traditional village image dissemination in the age of self-media and proposed that the platform construction and content innovation of village image dissemination should be strengthened [7-8]. To sum up, traditional village image dissemination has become

an important research area in the era of self-media.

## **2. IMAGE COMMUNICATION OF TRADITIONAL VILLAGES IN THE AGE OF SELF-MEDIA**

### **2.1. THE FORM OF IMAGE COMMUNICATION IN THE AGE OF SELF-MEDIA**

#### **2.1.1. WECHAT PUBLIC**

WeChat is one of the most popular forms of image dissemination in the age of self-media. Through WeChat public numbers, images of traditional villages can be quickly disseminated to a wider audience. For example, the beauty of a traditional village can be photographed by a photographer and then released through WeChat public number. In this way, more people can browse these images through their cell phones or computers and learn about the beauty and charm of traditional villages, which in turn will stimulate their interest in tourism.

#### **2.1.2. SHORT VIDEO PLATFORM**

Short video platforms have now also become one of the important forms of image dissemination in the age of self-media. For example, short videos can be uploaded on platforms such as Jitterbug and Crypto to show the beauty and culture of traditional villages. These videos can be quickly spread to a wider audience, attracting more people to pay attention to traditional villages and thus promoting the tourism development of traditional villages.

#### **2.1.3. LIVE STREAMING PLATFORM**

Live streaming platform is also one of the important forms of image dissemination in the era of self-media. For example, some travel bloggers can show the beautiful scenery and culture of traditional villages to viewers in real time through the live streaming platform, so that viewers can understand the charm of traditional villages more intuitively. The interactive nature of the live streaming platform also allows viewers to interact with the bloggers, ask questions or share their opinions, further promoting the spread and development of traditional villages.

### **2.2. THE SIGNIFICANCE OF COMMUNICATION OF CULTURAL VALUES OF TRADITIONAL VILLAGES**

The dissemination of cultural values of traditional villages is not only an inheritance and promotion of traditional culture, but also an inspiration and education for contemporary society. Traditional villages represent the essence of Chinese traditional culture, and the dissemination of their cultural values can promote people's awareness and understanding of traditional culture and enhance cultural self-confidence. At the same time, traditional villages are also an important resource for contemporary society, and their unique cultural values can provide inspiration and reference for contemporary society. Through the dissemination of the cultural values of traditional villages, we can promote the inheritance and innovation of traditional culture, and promote the development and prosperity of Chinese culture.

## **3. THE PROCESS OF SPREADING THE IMAGES OF TRADITIONAL VILLAGES ON THE SELF-MEDIA PLATFORM**

Taking Rongjiang Pingxiang Miao Village in Guizhou as an example, we analyze the dissemination process of a video material. First, the characteristics of the short video spreading within the self-media platform are comprehensively considered, and a GDC spreading model containing growth, diffusion and degradation processes is established. Secondly, for the dissemination process of the short video of the traditional village Pingxiang Miaozhai, we consider the independence of the dissemination of a short video, take the dissemination within the Jitterbug platform as an example, use the web crawler technology to collect relevant data,

and carry out simulation according to the GDC model. Its propagation process is simulated by MATLAB software, and its growth process is analyzed using a logistic model.

### 3.1. THE GROWTH PROCESS OF SHORT VIDEOS SPREADING IN SELF MEDIA PLATFORMS

The diffusion process of the short video of Pingxiang Miao village in the network can be referred to Fick's second law, which is defined as a non-stationary diffusion process in which the rate of change of concentration with time at a distance  $x$  is equal to the negative of the rate of change of diffusion flux with distance at that location. Let  $C$  be the volume concentration (atomic number/m<sup>3</sup>) of the diffusing substance (group element),  $t$  be the diffusion time (in s), and  $x$  be the distance (in m).

Let  $I(x, t)$  be the number of affected nodes with distance  $x$  from the information source  $S$  at time  $t$ .  $r$  is the growth rate of affected users, which reflects the information dissemination speed in the growth process.  $K$  is the carrying capacity and  $\partial$  is the bias sign. The mathematical model of the growth process of propagation is

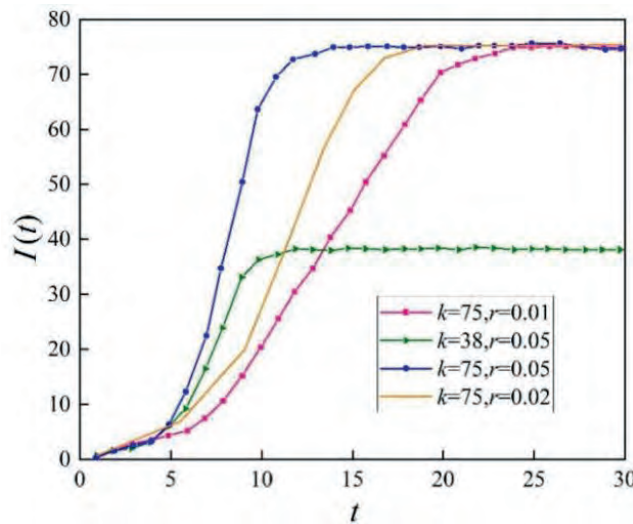
$$\frac{\partial I(x, t)}{\partial t} = rI(x, t) \left( 1 - \frac{I(x, t)}{K} \right) \quad (1)$$

Integrating equation (1) yields

$$I(t) = \frac{K}{1 + e^{\sigma - rt}} \quad (2)$$

where  $\sigma$  is a parameter.

It is assumed that the growth rate remains constant throughout the process. Different values of  $r$  are taken, and MATLAB is used to visualize the change process, and the model simulation results are shown in Figure 1.



**Figure 1.** Growth Model Curve with Fixed  $r$

It can be seen that the growth rate  $r$  reflects the steepness of the curve, and the higher the value of  $r$ , the faster the growth process reaches the end state.  $K$  has an influence on the value of the end state reached, and the maximum value that  $I(x, t)$  can reach is positively related to the value of  $K$ . In practice, however, the growth rate is not constant, but follows the same trend as the classical population growth model, i.e., the growth rate tends to decrease as  $I(x, t)$  increases, and it is not possible to have a growth process that reaches the maximum

carrying capacity.

### 3.2. THE DIFFUSION PROCESS OF SHORT VIDEOS IN THE SELF MEDIA PLATFORM

Let  $d$  be the diffusion coefficient, which reflects the speed of information propagation in the diffusion process. The mathematical model of the diffusion process is

$$\frac{\partial I(x,t)}{\partial t} = d \frac{\partial^2 I(x,t)}{\partial x^2} \quad (3)$$

The main consideration in the diffusion process is the parameter  $x$ . According to the established model, the diffusion curves under different  $d$  values can be made as shown in Figure 2.

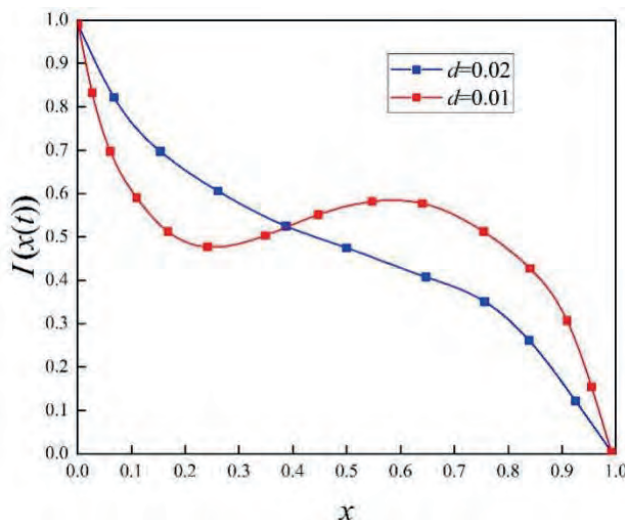


Figure 2. Diffusion model curve

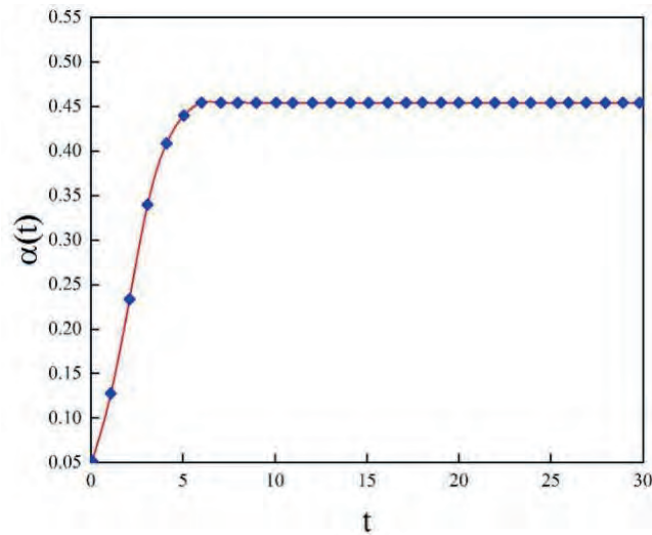
It can be seen that the diffusion curves corresponding to different diffusion coefficients are somewhat different, showing that the larger the  $d$  is in the beginning time, the larger the diffusion density is. However, as the diffusion process proceeds, the increasing trend of the nodes involved is very obvious because the diffusion distance becomes larger, which will lead to a gradual decrease of the diffusion density, and there may be a situation where the diffusion coefficient  $d$  is smaller and the diffusion density is larger.

### 3.3. THE DEGRADATION PROCESS OF SHORT VIDEOS SPREADING IN SELF MEDIA PLATFORMS

In the propagation network, the propagation time has an effect on the propagation of short videos. Let  $\omega$  be the intrinsic degradation factor,  $\varepsilon$  be the degradation growth factor, and  $\rho$  be the initial growth rate. The degradation probability function of the disseminator is

$$\alpha(t) = \frac{\omega}{1 + e^{\rho - \varepsilon t}} \quad (0 < \omega \leq 1, \quad \rho > 0, \quad \varepsilon > 0) \quad (4)$$

Obviously, the larger  $\rho$  is, the smaller  $\alpha(t)$  is. When  $\rho = 0$ ,  $\varepsilon = 0$ ,  $\alpha(t) = \frac{\omega}{2}$  degenerates to a fixed degeneracy probability as shown in Figure 3.



**Figure 3.** Degradation probability curve

It can be seen that the degradation probability  $\alpha(t)$  increases with the increase of the propagation time  $t$ . The degradation probability increases gradually with time, which reflects that the message will gradually lose its propagation ability in the process of propagation, which is consistent with the realistic message propagation law.

#### 4. CONCLUSION

In this paper, the following conclusions can be drawn from the discussion of traditional village image dissemination in the age of self-media:

In the era of self-media, the dissemination of traditional village images has shown a diversified and rapid development trend. Self-media platforms such as WeChat public number, short video platform, and live streaming platform have provided new channels and means for the dissemination of traditional village images, and also accelerated the inheritance and protection of traditional village culture.

However, in the process of on dissemination, traditional village images also face some problems, such as the degradation process of short videos spreading in the self-media platforms, which need to be addressed in a targeted manner. Therefore, the dissemination of traditional village images needs to focus on quality and effect, as well as on platform construction and content innovation. Through the reasonable use of self media platforms, the dissemination of traditional village images can be better developed and promoted, thus promoting the inheritance and innovation of traditional culture.

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# EXPLORATION OF MULTIPLE RESEARCH METHODS FOR TUNNEL ENVELOPE CLASSIFICATION BASED ON DEEP LEARNING MODELS

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## ABSTRACT

In this paper, we extract information related to the rock classification from the pictures of the surrounding rock palm faces of highway tunnels by using a deep learning model. Combining deep learning technology and edge detection method, the number and spacing of the surrounding rock joints are counted to describe the structural surface integrity, and then the rock hardness is described by using the color space model to determine the rock type. Finally, the discriminative factors of perimeter rock grading are converted into BQ values for grading, and the final results of perimeter rock grading are obtained. The results show that by loading the accuracy of the tunnel surrounding rock grading system based on the deep learning model, 88.2%, 83.7% and 85.9%, respectively, the deep learning model is applicable to the tunnel to identify different morphological characteristics of surrounding rock for grading.

## KEYWORDS

Deep learning model; Tunnel envelope classification; Edge detection; Color space; BQ value

## 1. INTRODUCTION

Tunnel envelope classification is a very important issue in tunnel engineering, which is related to the safety and efficiency of tunnel construction [1-2]. Traditional tunnel envelope grading methods are mainly based on manual experience and intuition, which have the problems of high subjectivity and uncertainty [3]. Therefore, it is of great practical significance and scientific value to study the tunnel envelope classification method based on deep learning model [4-5]. At present, many scholars have conducted in-depth research and exploration in this field [6]. For example, many scholars have achieved certain results by applying convolutional neural network (CNN) method to classify and identify tunnel surrounding rocks [7]. In addition, some scholars have also discussed the problems and challenges in the practical application of tunnel envelope grading methods based on deep learning models, such as insufficient amount of data and insufficient model robustness [8-9]. Taken together, the problem of tunnel envelope classification based on deep learning models is an area worthy of in-depth research, and this research will effectively improve the efficiency and safety of tunnel construction.

## 2. DEEP LEARNING MODEL EXTRACTION OF GEOTECHNICAL BOUNDARIES AND TYPES

There are many types of rocks, and it is difficult to identify them only by images. This paper proposes to take the typical rocks in the region as the main category, such as the tunnel project on which this paper is based is located in the area of County H. The surrounding rocks in the region are basically limestone (sedimentary rocks). Due to the differences in lime



content there will be different types of limestone: dolomitic limestone, ordinary limestone, clay limestone, etc. The two most important features for geotechnical identification are color and texture, and because of the strong variability of texture, color is the main breakthrough point to identify the surrounding rock types using deep learning boundary extraction technology.

## 2.1. DEEP LEARNING MODEL FOR EDGE DETECTION

In image processing, the convolution of an image with a convolution kernel is actually a filtering process:

$$f(x, y) * w(x, y) = \sum_s \sum_t w(s, t) f(x - s, y - t) \quad (1)$$

where  $f(x, y)$  is the gray value of point  $(x, y)$  on the image, and  $w(x, y)$  is the convolution kernel, also called the filter.

The convolution operation provides a weight template that slides over the image and aligns the center with each pixel in the image in turn. All pixels covered by this template are then weighted, and the result is used as the response of this convolution kernel at that point on the image. Convolution operations can be used to do edge detection, sharpening, blurring, etc. on an image.

Single convolution kernel detection often exhibits high noise and unclear boundaries, while the process of deep learning is the superposition of multiple convolution layers, and the convolution of multiple layers will gradually remove the noise and highlight the boundaries of different objects. We can obtain rock edges to count the joints and determine more parameters in the rock by deep learning model based on convolution.

## 2.2. PRIMARY COLORS AND HIS COLOR SPACE

Both RGB and HIS values are basic vectors describing color characteristics, and HIS color space has the advantage of low correlation of color covariates compared with RGB color space. Especially between the covariates I and H and S, there are more inert features to the external environment. Therefore, we only need to analyze H and S to cut down the influence of lighting and other external factors on the sampled images. The RGB values of the image are obtained, and the H, S and I values are obtained after conversion as

$$H = \begin{cases} \theta & G \geq B \\ \theta + \pi & G < B \end{cases} \quad \text{where } \theta = \frac{\pi}{2} - \tan^{-1} \left( \frac{2R - G - B}{\sqrt{3}(G - B)} \right)$$

$$S = \frac{2}{\sqrt{6}} \times \sqrt{(R - G)^2 + (R - B)(G - B)} \quad (2)$$

$$I = \frac{R + G + B}{\sqrt{3}}$$

After conversion, it was possible to classify four types of geotechnical soils. The specific classification and characteristics of limestone are: dolomitic concentration of 20% to 50% in dolomitic limestone(gray-white), ordinary limestone(light-gray), clay minerals concentration of 10% to 30% in low clay limestone(dark-gray), clay minerals concentration of 30% to 50% in high clay limestone(gray-black). Generally, limestone has a high-density crystal structure. Lime bulk density is about 2.7g/cm<sup>3</sup>, Moh's hardness is 3.0 to 5.0, and compressive strength is 10 to 100MPa. The amount of limestone mixed with dolomite or clay will affect rock properties. Therefore, we can further obtain the basic physical and mechanical properties through rock type.

### 3. DEEP LEARNING MODEL BASED ON TUNNEL ROCK CLASSIFICATION

The method used in this paper needs to go through several major steps of surrounding rock feature identification, geotechnical identification to derive the saturated uniaxial compressive strength  $R_c$ , rock integrity factor  $K_v$ , groundwater condition correction factor  $K_1$ , and structural surface yield influence correction factor  $K_2$ , respectively.

(1) Pre-process tunnel palm faces images and obtain the basic parameters of the surrounding rock classification, including depicting the main types of structural surfaces, whether water surges occur, whether joints and fissures exist, and whether the composition is single.

(2) Using color processing technique obtain the HIS value of the surrounding rock image, used to identify the kind. The hardness of the kind of rock is derived against the universal hardness coefficient table, and infer the saturated uniaxial compressive strength  $R_c$  of rocks by hardness.

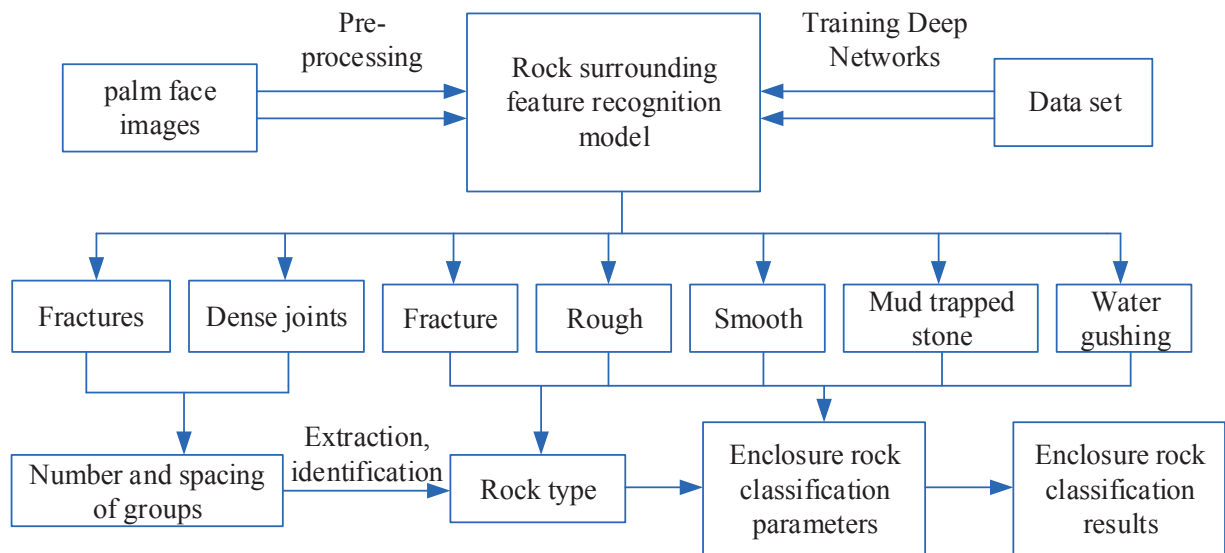
(3) Using deep learning technology to extract the boundary between the rock and soil and using fracture feature extraction technique and morphological parameter analysis method to calculate the number of groups and spacing of joints and obtain the degree of structural surface development. Therefore, the value of rock integrity factor  $K_v$  and structural surface yield influence correction factor  $K_2$  of the surrounding rock can obtained.

(4) step (1) has been judged in the state of whether the emergence of gushing water, because this paper selected the enclosing rock grading lot is located in the area of county H, the area is rich in groundwater, rarely dry environment. Therefore, the groundwater state can be divided into three states: moist, gushing water and obvious gushing water, the  $K_1$  value is determined by this. Due to the shallow depth of tunnel burial, temporarily disregard the impact of the initial stress, therefore the  $K_3$  value is zero.

(5) The median-taking method is designed to quantify the qualitative envelope classification parameters to deal with them. The disadvantage of the treatment is that there will be errors in the values, but there is not much change in the final envelope grade determination. The calculation of BQ value and [BQ] value is as

$$\begin{aligned} BQ &= 100 + 3R_c + 250K_v \\ [BQ] &= BQ - 100(K_1 + K_2 + K_3) \end{aligned} \quad (3)$$

The harder rock is taken 50 MPa as  $R_c$  value and 0.6 as  $R_v$  value, and the calculated BQ value is 400, while the median value method corresponds to a BQ value of 397.5, resulting in the uncorrected surrounding rock grading results are all Class III. Referring to the engineering rock grading standard, the final grading of the surrounding rock is finally obtained as shown in Figure 1.



**Figure 1.** Flow chart of deep learning of surrounding rock mass classification

According to the principle and steps of this surrounding rock grading, the author established an automatic surrounding rock grading system with python as the platform, loaded a total of 306 pictures of three tunnels in excavation in H County A, B and C for testing, and compared the recognition results with the BQ grading of the parameters obtained by traditional methods to verify its accuracy, Table 1 shows the grading results of some examples. It can be found that by loading the accuracy of the tunnel envelope grading system based on the deep learning model, it reaches 88.2%, 83.7% and 85.9%, respectively. Overall, the method can better meet the requirements of surrounding rock classification in this region.

**Table 1.** Results of tunnel envelope classification for tunnels in County H

Location	Grading Method	R <sub>c</sub>	K <sub>v</sub>	BQ value	K <sub>1</sub>	K <sub>2</sub>	[BQ] value	Corrected grading
A-825	Deep learning	46	0.653	401.25	0.2	0.5	331.25	Class IV
	Traditional	49	0.705	423.25	0.3	0.5	343.25	Class IV
B-173	Deep learning	51	0.252	316.00	0.5	0.3	236.00	Class V
	Traditional	23	0.457	283.25	0.4	0.4	203.25	Class V
C-515	Deep learning	60	0.651	442.75	0.3	0.1	402.75	Class III
	Traditional	58	0.575	417.75	0.2	0.1	387.75	Class III

#### 4. CONCLUSION

In this paper, we use the deep learning model for tunnel envelope feature recognition. By loading the accuracy of tunnel envelope rock grading system based on deep learning model, it reaches 88.2%, 83.7% and 85.9% respectively, which indicates that the deep learning model is suitable for tunnel identification of different morphological characteristics of envelope rock for grading. In the research process, we found that the tunnel envelope classification method based on the deep learning model has high recognition accuracy and classification precision, which can effectively improve the efficiency and safety of tunnel construction. At the same time, we also found that the method still has some problems and challenges, such as insufficient amount of data and insufficient model robustness. The study shows that the tunnel envelope classification method based on deep learning model is an effective research method with broad prospect and application value in practical application, and also needs further in-depth research and exploration.

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# A STUDY ON THE EVOLUTION OF LANDSCAPE CULTURE COMMUNICATION METHODS AND PUBLIC ART FORMS BY APPLYING HIERARCHICAL ANALYSIS

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## ABSTRACT

In the section of landscape culture communication methods and public art forms, this paper classifies the landscape culture communication methods and discusses the evolution and significance of public art forms. The AHP hierarchical analysis method is used to construct a method for determining the combination weights. Finally, the historical evolution and creative concepts of public art forms were analyzed. The results show that public art has gradually transformed from the initial monumental and decorative art to a carrier that carries social information and spreads the cultural values of the landscape. The results of this study are important for promoting the development of landscape culture communication and public art.

## KEYWORDS

Landscape culture; Public art; Hierarchical analysis; Portfolio weights; Historical evolution; Cultural value

## 1. INTRODUCTION

With the acceleration of urbanization, the design of urban environment and public space is becoming more and more important [1-2]. As an important part of urban culture, landscape culture communication and public art play a vital role in the inheritance and development of urban culture [3-4]. In order to better promote the development of landscape cultural communication and public art, it needs to be studied and explored in depth [5]. The application of hierarchical analysis is a popular decision analysis method, which can compare and evaluate different options and provide theoretical support for the development of landscape culture communication and public art [6-7]. In terms of landscape culture communication, research in recent years has focused on the connotation of landscape culture, the ways of landscape culture communication and landscape culture innovation [8]. As for the research on the evolution of public art forms, it mainly focuses on the historical evolution, creative concepts and media forms of public art [9]. In addition, some scholars have combined landscape culture dissemination and public art to promote the development of urban culture by comparing and discussing the two.

## 2. LANDSCAPE CULTURE DISSEMINATION METHODS AND PUBLIC ART FORMS

### 2.1. CLASSIFICATION OF LANDSCAPE CULTURE COMMUNICATION METHODS

Landscape culture communication methods can be classified according to the aspects of communication media, communication forms and communication purposes. Among them, according to the different communication media, landscape culture communication methods

can be divided into the following three categories:

(1) Written communication, written communication refers to the dissemination of landscape culture through written forms such as text and diagrams. For example, landscape designers can convey the concept and ideas of landscape design through design manuscripts, technical drawings and other written forms.

(2) Oral communication, oral communication refers to the dissemination of landscape culture through oral forms. For example, landscape designers can convey the ideas and concepts of landscape design through speeches, lectures and other forms.

(3) Visual communication, visual communication refers to the dissemination of landscape culture through visual forms. For example, landscape designers can show the results and ideas of landscape design through design exhibitions, videos and other forms.

According to the different forms of communication, landscape culture communication methods can be divided into the following three categories:

(1) Educational communication, educational communication refers to the dissemination of landscape culture through educational institutions and educational activities. For example, landscape designers can deliver the concept and ideas of landscape design by offering courses, lectures and other forms.

(2) Media communication, media communication refers to the dissemination of landscape culture through news media, network media and other channels. For example, landscape designers can deliver the concept and ideas of landscape design by publishing articles, displaying design works and other forms.

(3) Community communication, community communication refers to the dissemination of landscape culture through community organizations, community activities and other forms. For example, landscape designers can participate in community activities, organize community design competitions and other forms to convey the concept and ideas of landscape design.

## **2.2. PUBLIC ART FORMS**

Public art forms are artworks that are displayed in public places; they are not only artworks, but also a medium for interaction with the public. There are various types of works in public art forms, including sculptures, murals, and installations. Artists of public art forms need to consider the visibility, readability, and acceptability of their works in order to achieve the purpose of interacting between art and the public and conveying artistic messages.

### **2.2.1. EVOLUTION OF PUBLIC ART FORMS**

The evolution of public art forms has undergone a transformation from traditional to modern. Traditional public art forms are mainly sculptures, murals, etc., and their expression forms are relatively single, mostly for political propaganda and historical commemoration purposes. Modern public art forms, on the other hand, are more diversified, not only in terms of single art forms, but also in terms of the interaction between art and the public and the communication of art messages, such as installation art and digital art. At the same time, modern public art forms are also more concerned with social issues and environmental protection, conveying social messages and values through artworks.

### **2.2.2. THE SIGNIFICANCE OF PUBLIC ART FORMS**

Public art forms play an important role in the urban landscape, not only beautifying the city, but also providing a platform for the public to enjoy culture, art and communication. Public art forms can become landmarks and attractions in cities, attracting tourists and foreign

populations and promoting the economic development of cities. At the same time, public art forms can also convey social messages and values, guide the public to pay attention to and think about social issues, and promote social progress and development.

### 3. HIERARCHICAL ANALYSIS OF LANDSCAPE CULTURE COMMUNICATION

#### 3.1. AHP HIERARCHICAL ANALYSIS

Landscape culture communication refers to the transmission of cultural information in the landscape to the audience through various media means. In landscape cultural communication, different levels assume different roles and meanings. In this paper, we will analyze landscape cultural communication from three levels. Assuming that the landscape culture communication judgment matrix  $A = (a_{ij})_{n \times n}$ , non-zero vector  $\omega$  is the eigenvector of matrix A about eigenroot  $\lambda$ , the weight calculation steps of this judgment matrix are:

(1) Calculate the maximum eigenroot value of judgment matrix A:

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^n \frac{(Aw)_i}{w_i} \quad (1)$$

(2) Calculate the consistency index CI as:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (2)$$

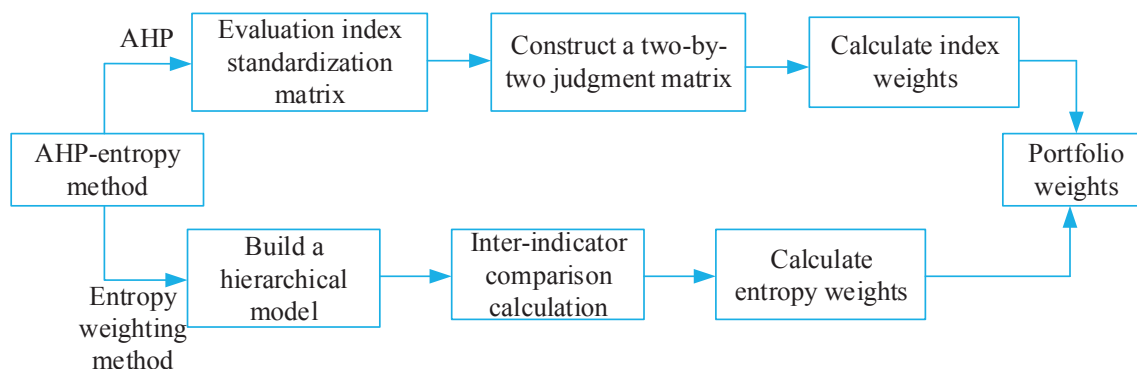
(3) Calculate the consistency ratio CR, as

$$CR = \frac{CI}{RI} \quad (3)$$

When  $CR < 0.1$ , the judgment matrix is considered to be consistent and acceptable. Otherwise, it is adjusted appropriately until the value of CR is less than 0.1. According to the judgment matrix A, the hierarchical single ranking is calculated first, and the results of the hierarchical single ranking are synthesized to obtain the ranking weight  $\omega_{ahp}$  of each layer element to the total target.

#### 3.2. DETERMINATION OF PORTFOLIO WEIGHTS

Hierarchical analysis is a direct comparison method that combines experts' experience with quantitative analysis, and is also a commonly used method for calculating index weights. AHP-entropy method is an objective assignment method based on the principle of information entropy to determine the weights based on sample data, and the combined assignment of AHP-entropy method can avoid the difference of experts' experience and the phenomenon that the objective assignment results do not match the actual one.



**Figure 1.** The technical route of AHP-entropy weighting method combination

The smaller the sum of squared deviations between the combined weights and the AHP weights and entropy weights respectively is used as the objective to establish the function, the more reasonable the calculation result is. Suppose  $\omega'_j$  is the weight of the  $j$ th index of the combination of hierarchical analysis and entropy weight method, and the objective function is established as

$$\text{Min } O = \sum_{j=1}^n \left[ (\omega'_j - \omega_{ahp})^2 + (\omega'_j - \omega_j)^2 \right] \quad (4)$$

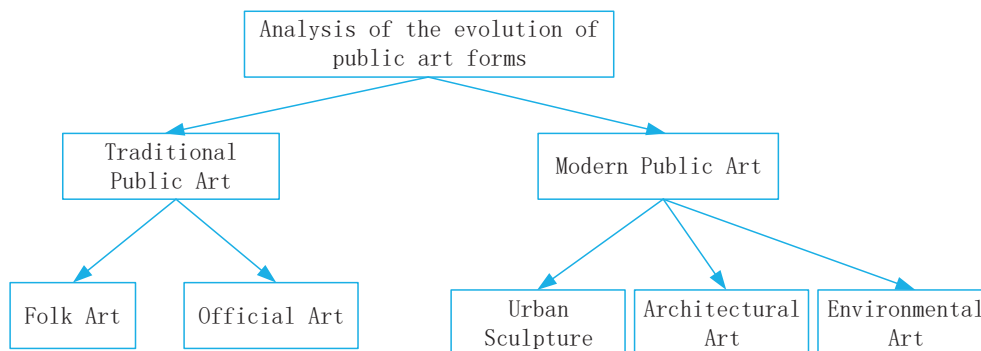
Finding the first order derivative and making it 0, and calculating  $\alpha = 0.5$ , yields

$$\omega = 0.5\omega_{ahp} + 0.5\omega_j \quad (5)$$

It is calculated that the coefficients of the optimal combination weights are 50% each of the weights of the hierarchical analysis method and the weights of the entropy method, respectively, under the convention that the deviation sum is minimal, and the resulting combination weight is  $\omega = [\omega_1, \omega_2, \omega_3, \dots, \omega_n]^T$ .

#### 4. ANALYSIS OF THE EVOLUTION OF PUBLIC ART FORMS

Public art refers to an art form that expresses public interests and social values through art forms. The evolution of public art forms is closely related to the development and changes of society. The evolution of public art forms is shown in Figure 2, and this paper will analyze the evolution of public art forms from 2 aspects: traditional and modern.



**Figure 2.** Evolution of traditional and modern public art forms

##### (1) Functional evolution of public art forms

Public art has gradually changed from the initial monumental and decorative art to a carrier that carries social information and conveys cultural values. In contemporary society, public art is not only for beautifying the urban environment, but also as a way to meet people's spiritual and cultural needs.

##### (2) Media evolution of public art forms

The medium of public art forms is also constantly changing. From urban sculpture and urban landscapes in the beginning to digital art, virtual art and other forms of media, public art is constantly expanding its forms of expression.

##### (3) Evolution of the creative concept of public art forms

The creation concept of public art is also constantly changing and innovating. From the initial commissioning by the government or institutions, to the current community participation



and private creation, the creation concept of public art is also increasingly focused on the participation and sharing of the people.

## 5. CONCLUSION

This paper explores the relationship between landscape culture transmission methods and the evolution of public art forms and their impact on urban culture by applying the hierarchical analysis method. The analysis leads to the following conclusions:

(1) The evolution of both landscape culture dissemination and public art forms are inseparable from the urbanization process. With the acceleration of urbanization, the importance of landscape culture communication and public art has been highlighted.

(2) The evolution of both landscape culture communication methods and public art forms are closely related to social development and change. Landscape culture communication methods are constantly being updated, and public art forms are constantly innovating and changing.

(3) The application of hierarchical analysis is an effective decision-making analysis method that can provide theoretical support and practical guidance for the development of landscape culture communication and public art.

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# THE CONSTRUCTION OF ENTERPRISE ACCOUNTING MANAGEMENT SYSTEM COMBINED WITH THREE-DIMENSIONAL MATRIX MODEL

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## ABSTRACT

In this paper, the three-dimensional value management evaluation system of financial accounting is combined with the three-dimensional matrix evaluation model to build an enterprise accounting management system that adapts to the modern market demand. In the simulation evaluation model of three-dimensional value of financial accounting, the methods of index value calculation and data pre-processing, and determination of index weights are used. In the matrix evaluation model of three-dimensional value of financial accounting, the evaluation and management of three-dimensional value of financial accounting through matrix evaluation model is discussed. The results show that this paper combines the three-dimensional matrix model to complete the evaluation of three-dimensional value of financial accounting, which further improves the accounting management of enterprises and has important practical significance and promotion value.

## KEYWORDS

Financial accounting; Management evaluation system; Three-dimensional matrix model; Data pre-processing; Indicator weights

## 1. INTRODUCTION

With the change of business environment, the accounting management system also faces many challenges [1]. The traditional accounting management system can no longer meet the needs of enterprise development, so it is necessary to establish an accounting management system that meets the requirements of modern enterprise management [2-3]. To this end, this paper proposes a method for building an enterprise accounting management system that combines a three-dimensional matrix model [4]. A number of scholars have already conducted research on the construction of enterprise accounting management system. Among them, some scholars have proposed various different construction methods and models from the theoretical level [5]. Some scholars, on the other hand, have proposed an accounting information management model [6]. Some other scholars have proposed some accounting management system construction methods with practical significance by investigating and analyzing the actual situation of enterprises from the practical point of view [7-8]. These research results provide an important theoretical and practical basis for the study of this paper, and provide useful reference and inspiration for the construction of enterprise accounting management system.

## 2. FINANCIAL ACCOUNTING THREE-DIMENSIONAL VALUE MANAGEMENT EVALUATION SYSTEM

Enterprise is a community of values, interests and relationships. It needs to provide valuable

goods and services through continuous input of resources to achieve value conversion, value addition and value redistribution. The value creation of an enterprise is not isolated and static but a dynamic process of spiral change, which requires not only the support of capital, technology, human and material resources but also the collaboration of shareholders, customers, suppliers, government and other stakeholders.

## 2.1. FINANCIAL 3D VALUE SIMULATION EVALUATION MODEL

Financial 3D value evaluation uses computer simulation technology to collect data from the consolidated balance sheet, consolidated income statement and consolidated cash flow statement by industry according to the evaluation index system constructed in 3 dimensions. After entering the raw data into the computer, the index value calculation, index pre-processing and index weighting calculation are carried out, and the target value is derived from the evaluation model, and then the evaluation ranking and matrix analysis are performed.

Let there be  $n$  enterprise within the enterprise, i.e., domain  $U = \{u_1, u_2, \dots, u_n\}$ , the vector set of financial 3D value evaluation indicators is  $X = \{X_1, X_2, X_3\}$ , the indicator vector is  $X_i = \{x_{i1}, x_{i2}, \dots, x_{iS_i}\}$ , and the weight vector is  $W_i = \{w_{i1}, w_{i2}, \dots, w_{ij}\}$ . Then the financial accounting 3D value simulation evaluation model is

$$u_{ki} = \sum_{j=1}^{S_i} x_{ij} w'_{ij} \quad (1)$$

The integrated simulation evaluation model is:

$$u_k = \sum_{i=1}^3 \sum_{j=1}^{S_i} x_{ij} w_{ij} \quad (2)$$

Where,  $S_i$  is the number of indicators in 3 dimensions,  $i = 1, 2, 3$  denotes dimensions.  $k = 1, 2, \dots, n$  denotes the  $k$ th firm in the industry.  $u_{ki}$  denotes the evaluation value of the  $i$ th dimension of the  $k$ th firm in the industry.  $u_k$  denotes the composite evaluation value of the  $k$ th firm in the industry.

## 2.2. CALCULATION OF INDICATOR VALUES AND DATA PRE-PROCESSING

After obtaining the raw data from the consolidated balance sheet, consolidated income statement and consolidated cash flow statement of the enterprise. The calculation is performed by the computer according to formula (1) to obtain the calculated values of the indicators. Due to the influence of the scale and the large differences in the calculated values of the indicators, the calculated values of the indicators must be normalized and standardized. The calculated values of the indexes of the enterprises in the industry are transformed by the computer to the extreme difference, and the standardized index values are limited to the range of  $x_{ij} \in [0, 1]$ .

Let  $v_{ij}$  be the  $j$ th original indicator of the  $i$ th subsystem, the corresponding pre-processed indicator  $x_{ij}$ , and  $v_{j\max}$  be the industry maximum or sample maximum of the  $j$ th indicator.  $v_{j\min}$  be the industry minimum or sample minimum of the  $j$ th indicator. Then the preprocessing model of indicators is as follows:

For the positive indicator dimensionless processing model is as follows:

$$x_{ij} = (v_{ij} - v_{j\min}) / (v_{j\max} - v_{j\min}) \quad (3)$$

For the inverse indicator dimensionless treatment model is:

$$x_{ij} = (v_{j\max} - v_{ij}) / (v_{j\max} - v_{j\min}) \quad (4)$$

### 2.3. DETERMINATION OF INDICATOR WEIGHTS

In order to eliminate the influence of subjective factors on the evaluation of the three-dimensional value of the enterprise objective assignment method is used. The main methods of objective assignment are entropy weighting method, standard deviation method and CRITIC method. Since the CRITIC assignment method not only considers the influence of the size of indicator variation on the indicator weights, but also takes into account the conflicting nature among indicators. Therefore, the CRITIC method is used, and the CRITIC method is based on the comparative strength and conflict of indicators, and the comparative strength indicates the size of the difference between the values of each evaluation scheme of the same indicator in the form of standard deviation. The conflict between indicators is reflected by the correlation coefficient between indicators, if 2 indicators have a strong positive correlation between them, it means that the conflict between 2 indicators is low.

The amount of information contained in the  $j$ th evaluation indicator of the  $i$ -th dimension is:

$$C_{ij} = \sigma_{ij} \sum_{l=1, m=1}^{s_i} (1 - r_{ij(lm)}) \quad (5)$$

where the standard deviation is:

$$\sigma_{ij} = \sqrt{\frac{1}{n} \sum_{k=1}^n (x_{ij(k)} - \bar{x}_{ij})^2} \quad (6)$$

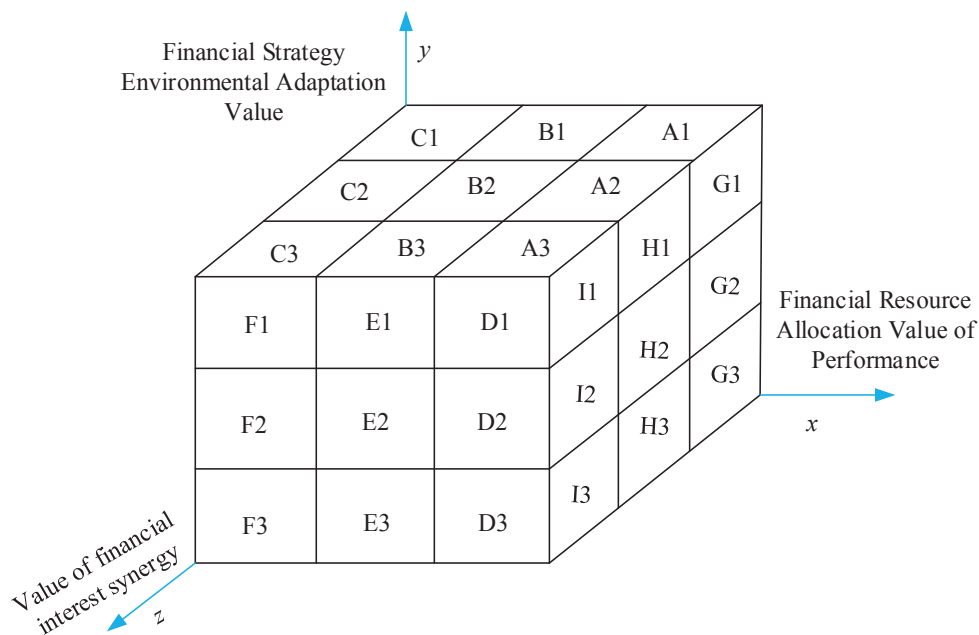
Then the objective indicator weights of the  $j$ th evaluation indicator of the  $i$ -th dimension are

$$W_{ij} = \frac{C_{ij}}{\sum_{i=1}^3 \sum_{j=1}^{s_i} C_{ij}} \quad (7)$$

where  $i, l = 1, 2, 3$  in Eq.  $j, m = 1, 2, 3, \dots, S_i$ .

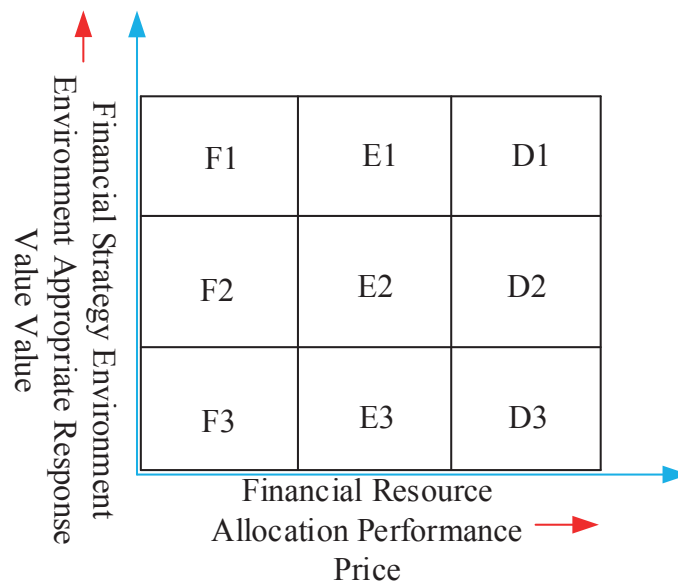
### 3. MATRIX EVALUATION MODEL OF THE THREE-DIMENSIONAL VALUE OF FINANCIAL ACCOUNTING

The three-dimensional value of financial accounting is the reflection of enterprise value in the spatial dimension, which has obvious inherent parallelism and spatial boundaries. In terms of structure, it constitutes a spatial distribution according to the dimensional hierarchy of "high, medium and low", and can be divided into high adaptive value, medium adaptive value and low adaptive value. High performance value, medium performance value, and low performance value. High relationship value, medium relationship value and low relationship value. Spatially, the financial three-dimensional value can be divided into 27 levels, and each square represents a different level of financial value as shown in Figure 1.



**Figure 1.** Spatial distribution structure of the three-dimensional financial value of the enterprise

In order to visually analyze and evaluate the three-dimensional value of financial accounting, the spatial distribution structure of enterprise value is decomposed into a two-dimensional matrix evaluation model according to the value of financial interest synergy relationship as shown in Figure 2. The model includes high synergistic relationship value evaluation matrix, medium synergistic relationship value evaluation matrix and low synergistic relationship value evaluation matrix, with financial resource allocation performance value and financial strategic environment adaptation value as the horizontal and vertical axes, respectively. And the matrix is divided into 27 squares with A1-G3 indicating different evaluation levels respectively according to the evaluation calculation data of each enterprise in the industry, which can visually reflect the evaluation results in the evaluation matrix.



**Figure 2.** Two-dimensional matrix evaluation model of financial 3D value

#### 4. CONCLUSION

In this paper, two aspects of the three-dimensional value management evaluation system

of financial accounting and matrix evaluation model are studied, and a new method of constructing an enterprise accounting management system is proposed. The following conclusions are drawn after the study:

(1) The three-dimensional value management evaluation system of financial accounting constructed in this paper has certain applicability and practicality, and can make a comprehensive assessment and analysis of the financial situation of the enterprise.

(2) The matrix evaluation model of three-dimensional value of financial accounting proposed in this paper can transform the financial accounting information into a three-dimensional matrix to visualize and evaluate the financial status of enterprises.

(3) The research results of this paper provide new ideas and methods for the construction of enterprise accounting management system, which can help enterprises to better adapt to market demand, improve accounting management level and achieve sustainable development.

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# THE CONSTRUCTION OF NETWORK SECURITY EMERGENCY MANAGEMENT SYSTEM IN THE ERA OF BIG DATA

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## ABSTRACT

This paper firstly constructs the campus network security emergency management system in the era of big data, mainly focuses on campus network security strategy, campus network security protection design, campus network security detection design, campus network exit security design on the construction of the security emergency management system, and then tests the campus network security management system, and tests whether the system modules achieve the expected functions by writing detailed test cases. This paper further improves the emergency management system of general colleges and universities, enriches the relevant research on emergency management of colleges and universities from the theoretical point of view, and provides certain reference reference for the improvement of emergency management system of colleges and universities and the improvement of emergency management capability from the practical point of view.

## KEYWORDS

Campus network; Security emergency; Management system; Design; Testing

## 1. INTRODUCTION

In the era of big data, the role of information technology for maintaining the normal operation of society is highlighted, and with the development of human society, scholars from various countries have been studying emergency management more and more deeply, and various countries and regions are paying more and more attention to emergency management [1-3]. Establishing a set of scientific and reasonable, continuous and effective information security operation trace management mechanism and regular self-inspection to retain operation records while forming positive feedback on the development of good operation habits, and relying on the operation trace management mechanism to determine the current status of information system security, extract security requirements, find weak links, and make targeted rectification and improvement [4-5].

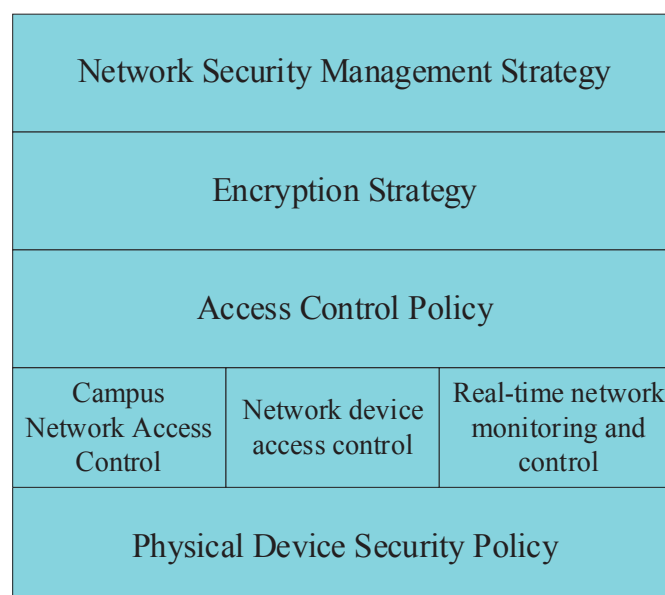
The literature [6] studied the establishment of an energy management system for an intelligent multi-energy microgrid in the Savona campus. The system aims to optimize energy production and consumption and to reduce energy waste and emissions. The article studies

the design, implementation and operation of the system and details its main functions and features. The system is based on intelligent control and data analysis technologies that allow real-time monitoring and management of the production and consumption of a wide range of energy sources, including solar, gas, and steam. The literature [7] investigates an IM/DD system for campus and data center network applications that can achieve transmission rates of more than 200 Gbit/s. The system is based on direct modulation/direct detection technology and uses high-speed electronic and optical components to achieve high-speed data transmission and processing. The article investigates in detail the design, implementation and performance testing of the system and compares it with other transmission systems. The literature [8] presents an instructional model for teaching the development of educational materials for computer networks and systems management. The model aims to help instructors and course designers to better design and develop educational materials to enhance student learning and interest. The article examines the design and implementation process of the model and details its main features and advantages. The model designs different teaching contents and materials based on three aspects: basic knowledge, applied skills and practical experience, including theoretical knowledge lectures, case studies and experimental operations. In addition, the model adopts multimedia and interactive teaching tools to improve teaching effectiveness and student participation. The article finally also investigates the practical application effects of the model and looks forward to its development and application prospects in the future.

## 2. THE CONSTRUCTION OF CAMPUS NETWORK SECURITY EMERGENCY MANAGEMENT SYSTEM IN THE ERA OF BIG DATA

### 2.1. CAMPUS NETWORK SECURITY POLICY DESIGN

The security policy of a school campus network is designed in detail in order to ensure the security and stability of the campus network. The security policy of the campus network is required to effectively prevent and defend against attacks from inside and outside the campus network and ensure the security of data information of the whole network. Based on the analysis of the current security situation in the previous Chapter 3 and the assessment results, the campus network security policy should be developed with different relevance. There are five different levels of network security policy, and the detailed design of network security policy is shown in Figure 1. The security strategy of physical devices is used to ensure that all the hardware and other basic devices in the internal network of a school in Neijiang will not be damaged by malicious attacks, which will have a relatively large impact on the existing network.

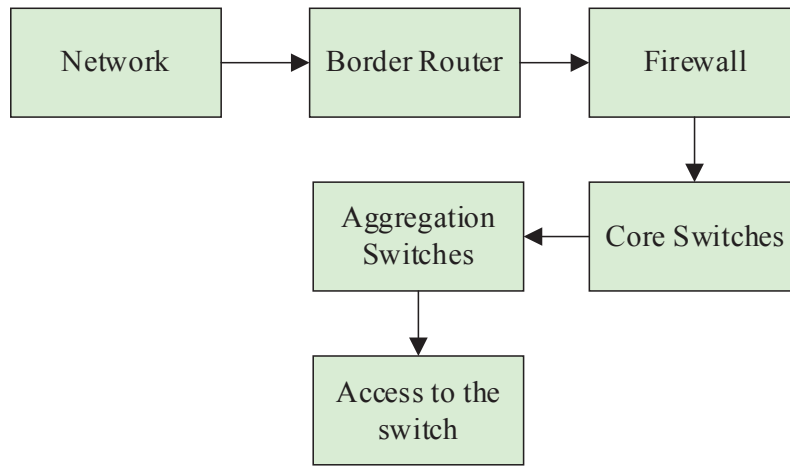




**Figure 1.** Detailed design of network security policy

### 2.2. CAMPUS NETWORK SECURITY PROTECTION DESIGN

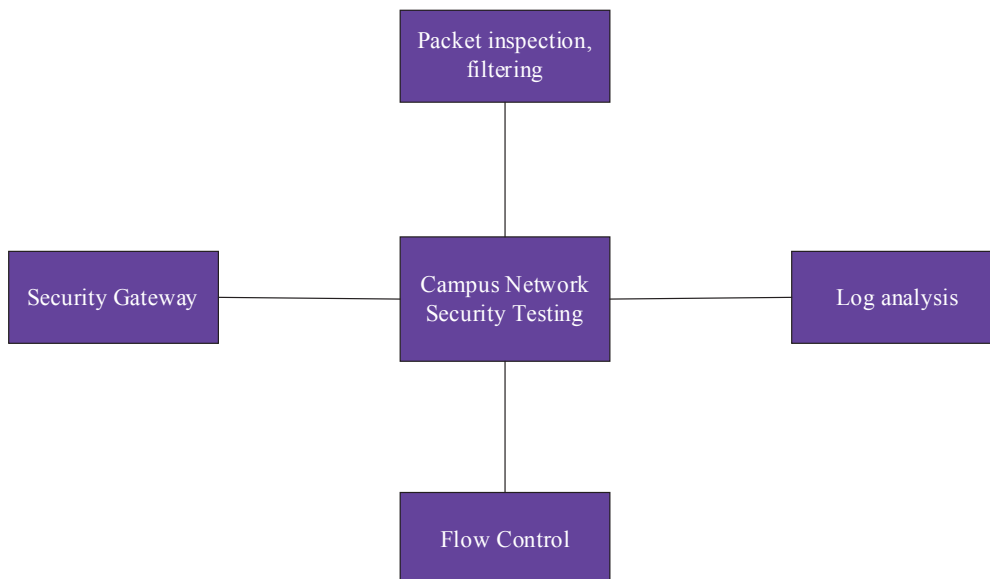
The network security protection design of a school campus network is based on the developed network security policy to open security protection for each key node of the campus network. The network security protection structure is shown in Figure 2.



**Figure 2.** Network security protection structure

### 2.3. CAMPUS NETWORK SECURITY DETECTION DESIGN

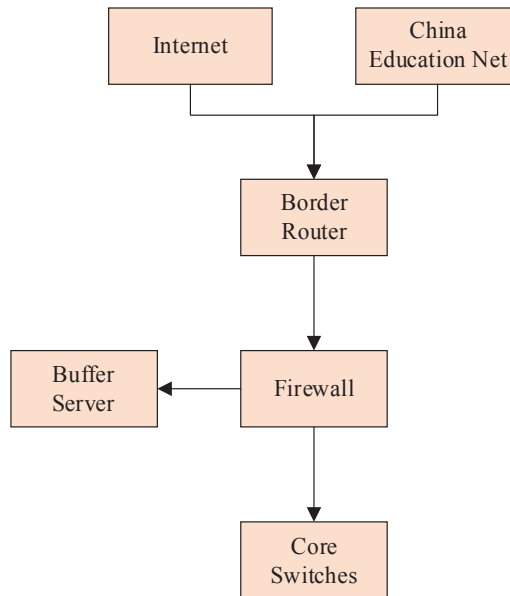
The school campus network security detection design is shown in Figure 3. The campus network security detection design includes four parts of content, which are security gateway, traffic control, log record analysis, packet detection and filtering.



**Figure 3.** School campus network security testing design

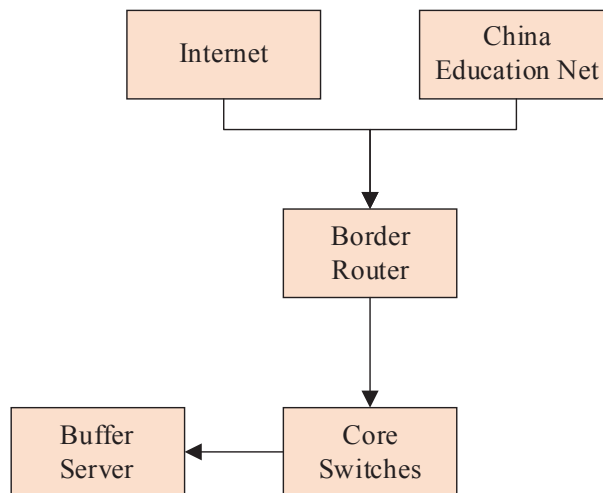
### 2.4. CAMPUS NETWORK EXIT SECURITY DESIGN

In order to have an effective and timely plan to respond in case of network security events, we designed the corresponding security response mechanism needed for the campus network to solve the current problems faced and to provide timely feedback of the processing results to the information management personnel to facilitate the understanding of the whole network operation. In the network egress security design, the egress security is ensured through the setting of devices, and the campus network egress structure is shown in Figure 4.



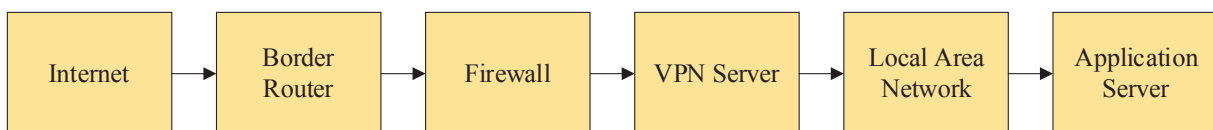
**Figure 4.** Campus Network Outlet Structure

The router used at the boundary of the school campus network is Digital China's DCRS-7608E, which has 4 Gigabit ports for connecting to the firewall, China Mobile and China Education Network respectively. The real content server is protected through a reverse proxy server, and the reverse proxy structure is shown in Figure 5:



**Figure 5.** Campus Network Outlet Structure

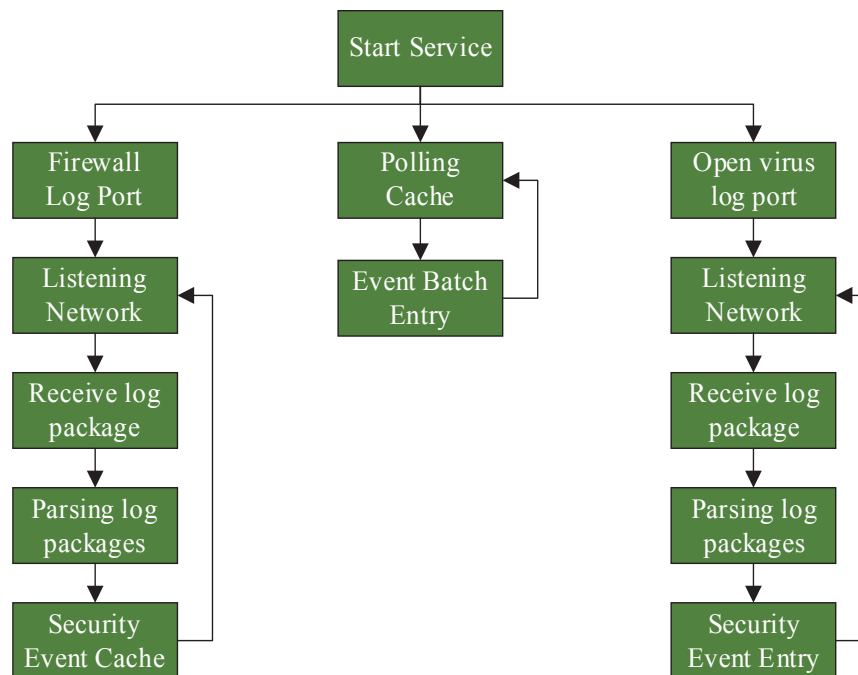
The VPN server is deployed at the boundary of the campus network to facilitate faculty and staff to access the campus network resources through the external network. At the same time, different applications are authorized, and users need to access and use the corresponding applications only when they are authorized and have open privileges. The deployment of VPN server is shown in Figure 6.



**Figure 6.** Deploy VPN server

Two levels of general agents and sub-agents are used to collect security events in this module, monitoring the overall and local operation of the network from different levels, which also makes it more comprehensive. The security event collection process is shown in Figure

7. In the campus network, the monitored computer is listed as the collection end. In order to prevent users from disconnecting from monitoring, the relevant program runs in the background, and the program is set not to be found in the task manager so that users cannot find it easily, preventing the risk caused by users deleting the program.



**Figure 7.** Security Event Collection Process

### 3. REVIEW OF CAMPUS NETWORK SECURITY EMERGENCY MANAGEMENT SYSTEM

#### 3.1. SYSTEM TEST ENVIRONMENT

The testing environment of the campus network security risk assessment system designed in this paper is:

The server is selected from DELL server with i5 processor, 12GB memory and 1TB hard disk.

The workstation is a HPZ series workstation with i7 processor, 12GB memory and 1TB hard disk.

#### 3.2. SYSTEM TESTING

According to the prior requirement analysis, test cases are written for the campus network security management system, and the steps of testing are planned in detail, and the test results of each step are recorded. In the testing process of this paper, the black-box testing method, which is the functional testing method in the test method theory, is mainly used.

The objectives of the campus network security management system testing can be summarized as follows:

(1) To discover problems and defects of the campus network security management system in time before it goes online, and to develop solutions to avoid finding similar problems after the system goes online.

(2) To test the performance of the campus network security management system designed in this paper, and to test whether the designed campus network security management system meets the predefined design performance requirements.

#### 4. CONCLUSION

In today's society, China attaches more and more importance to education, and the social influence of colleges and universities is also increasing, so when emergencies occur in colleges and universities, they often receive wide attention from all walks of life and cause greater impact. When dealing with emergencies, colleges and universities are different from other public places because of their specific properties, so it is necessary to analyze the emergency management of colleges and universities. Nowadays, many colleges and universities have their own emergency management process, but they have not formed a unified and efficient emergency management system. This paper further improves the emergency management system of ordinary colleges and universities based on relevant theories, and provides some reference for ordinary colleges and universities to improve their emergency management ability.

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# EXPLORING THE IMPACT OF FINANCIAL DIGITAL MANAGEMENT MODEL ON BUSINESS PERFORMANCE

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## ABSTRACT

The digital economy has now become the most important economic form in the world, and the digital management model of finance is also the future development direction. Then, from the value perspective, the indicators of financial digital management model are determined from five dimensions of value discovery, value creation, value transfer, value realization and digitalization respectively, and the digitalization dimension of financial digital management model is measured from the quantitative perspective with the help of text analysis method, and the corresponding financial indicators are selected to measure the value creation dimension, value transfer dimension and value realization dimension, and then the factor analysis method is used to Then, all the indicators of the financial digital management model were downscaled by factor analysis. Finally, descriptive statistical analysis and regression analysis in the empirical analysis are used to investigate whether there is a linear relationship between the financial digital management model and the performance of retail enterprises.

## KEYWORDS

Financial digitalization; Management model; Business performance; Regression analysis; Indicators

## 1. INTRODUCTION

The current digital technologies such as artificial intelligence, blockchain, cloud computing, and big data drive the rise of digital economy, which profoundly affects the industrial structure and economic growth pattern and is a new blue ocean for economic quality and efficiency [1-3]. Digital industrialization and industrial digitization have accelerated expansion and become new economic growth points [4]. Under the current general trend of industrial digitization, there are still many enterprises in the process of digital transformation, and whether improving enterprise digitization and conducting business model innovation can effectively improve enterprise performance is one of their concerns, and in this context, it is of great practical significance to study the impact of digitization and business model innovation on enterprise performance [5-6].

The literature [7] investigates the relationship between digital banking, customer experience and financial performance of banks, focusing on the perceptions of UK customers. The authors examine the importance of digital banking and customer experience to the banking industry and explore the impact of digital banking and customer experience on financial performance in the banking industry by examining the perceptions of UK customers. The focus of the article is to analyze the impact of digital banking and customer experience on the financial performance of the banking industry by investigating the perceptions of UK customers about

digital banking and customer experience and to explore how the financial performance of banks can be improved by enhancing digital banking and customer experience. The authors of the literature [8] examine the importance of digital transformation and discuss how SMEs can address the challenges and opportunities in the process of digital transformation. The focus of the article is to analyze the impact and implications of digital transformation for SMEs, explore the process and strategies of digital transformation, and how to facilitate digital transformation of SMEs. The authors of the literature [9] examine the background and importance of the development of DeFi and discuss the applications and challenges of DeFi in the financial sector. The focus of the article is on analyzing the concepts and principles of DeFi, as well as the applications and advantages of DeFi in the financial sector. Also, the article explores the challenges and risks of DeFi, such as security issues and regulatory issues. The study aims to provide the financial community and regulators with a deeper understanding of DeFi and help them better understand and address the changes and challenges that DeFi brings.

## **2. STUDY SAMPLE AND INDEX SELECTION**

### **2.1. STUDY SAMPLE**

In this paper, the financial list of listed retail companies in the revised 2022 CSRC industry classification standard is selected as the basis and the financial list of companies listed in Shanghai and Shenzhen is screened according to the following principles:

(1) Companies should have complete annual financial data for the past three years (2019~2022).

(2) Considering the stability of the study and the reliability of the paper, companies with the \*ST symbol, i.e., with the risk of delisting, and companies with the ST symbol that are "specially treated" are removed.

(3) Excluding companies with missing important data.

From the data browser of Chioce Financial Terminal, there are 98 listed companies in the retail industry in Shanghai and Shenzhen exchanges, among which 88 listed companies in Shanghai and Shenzhen with complete financial data from 2019-2022. Screening according to the three principles described above, the remaining 72 listed retail companies among these 88 retail companies meet the requirements.

### **2.2. SELECTION OF INDICATORS**

The impact of the financial digital management model on corporate performance, which is the main study of this paper, is described in terms of the explanatory and explanatory variables as follows:

(1) Explanatory variables

In the study of this paper, the measures of retail firm performance are return on net assets (ROE) and Tobin's Q value. Among them, ROE reflects the efficiency of the company's use of its own capital, which can reflect the financial performance of the company in the short term.

(2) Explanatory variables

The explanatory variables in this paper mainly include the three dimensions of the financial digital management model and the degree of digitalization. Among them, the degree of digitization is measured by the data obtained from text analysis.

Among the above indicators, the indicators related to the degree of digitalization are calculated from the results of text analysis, and the rest of financial indicators are obtained

from Choice Financial Terminal and CSMAR database, and the summary of the above indicators is shown in Table 1.

**Table 1.** Summary of indicators

Dimensionality		Indicators	Symbols
Financial Digital Management Model	Value Creation Value Transfer Value Realization	Net sales margin	A1
		Cash Ratio	A2
		Cost Margin	A3
	Degree of Digitalization Long-term Performance	Current Asset Turnover Ratio	B1
		Total Assets Turnover Ratio	B2
	Short-term Performance Value Creation Value Transfer	Operating income growth rate	C1
		Operating profit growth rate	C2
		Operating Cost Growth Rate	C3
	Value Realization Degree of Digitalization Long-term Performance	Digitization of value creation	D1
		Digitization of value delivery	D2
		Enterprise Digital Foundation	D3
	Corporate Performance	Short-term Performance	Tobin's Q value
Value Creation		Return on Net Assets (ROE)	E2

### 3. EMPIRICAL ANALYSIS OF FINANCIAL DIGITAL MANAGEMENT MODEL ON CORPORATE PERFORMANCE

#### 3.1. DESCRIPTIVE STATISTICAL ANALYSIS

The next descriptive statistical analysis is performed on the indicators of financial digital management model and corporate performance of listed companies in the retail industry. Table 2 shows the descriptive statistical analysis of financial digital management model indicators and corporate performance after factor analysis. Since the factor analysis process of financial digital management model is standardized, the standard deviations in the descriptive statistics are all close to 1.0, which is not informative, and descriptive statistics are needed for the data before the standardization process.

**Table 2.** Descriptive statistical analysis after standardization

Variable Name	N	Min	Max	AVG	SD
Value Creation Factor	72	-1.171	7.555	.000000135	1
Value Realization Factor	72	-1.252	7.923	.000000822	1
Value Transfer Factor	72	-1.251	6.841	.000000683	1
Digitalization Factor	72	-1.056	4.952	.000000411	1
Net Asset Yield	72	-60.167	22.918	6.785	1
Tobin's Q	72	.726	6.085	1.7958	1

Table 3 shows the results of the unstandardized descriptive statistical analysis, from the table, we can see that the standard deviation of the three indicators of operating profit growth rate, operating cost growth rate and operating income growth rate is relatively large, which indicates that there is a great difference in the development ability of each retail enterprise, and these three indicators are all indicators of the value realization dimension of the financial digital management model, which also indicates that the value realization ability of these enterprises There is a big difference, and the value realization dimension of the financial digital management model of retail enterprises includes revenue sources and cost structure, and the

big difference in the value realization ability of each retail enterprise indicates that there is a difference in the revenue sources He cost structure chosen by the retail enterprises, which leads to a big standard deviation of the indicators of the value realization dimension among different retail enterprises. Among the three measures of the value creation dimension, the standard deviation of the cash ratio is relatively small at 0.93, which indicates that the solvency of retail enterprises is relatively close, and the standard deviation of the net sales margin and cost margin is large, which indicates that the profitability of retail enterprises varies greatly. The components of the value creation dimension include partnership, key business, and core resource capabilities. There is a gap in the value created by retail enterprises building partnership networks around value propositions and using the core resources and core capabilities owned by the enterprises to start this series of production and operation activities of the enterprises. The standard deviation of current asset turnover among the indicators of value transfer dimension is large, which indicates that there is a big gap in the fixed asset operation capability of retail enterprises. The standard deviation of both indicators of digitalization degree is small, around 0.01, because the process of data pre-processing is consistent, but this does not indicate that the digitalization degree of each enterprise is close, and further in-depth analysis is needed for the digitalization degree.

**Table 3.** Unstandardized descriptive statistical analysis

Variable Name	N	Min	Max	AVG	SD
Net sales margin	72	-22.534	133.344	5.597	16.411
Cost margin	72	-19.375	120.312	5.972	15.245
Cash Ratio	72	.077	6.887	.662	.931
Current Asset Turnover Ratio	72	.614	835.734	24.441	99.307
Total Assets Turnover Ratio	72	.053	2.562	1.086	.513
Operating cost growth rate	72	-66.586	366.237	8.352	46.413
Operating income growth rate	72	-66.232	390.943	8.502	49.167
Operating profit growth rate	72	-1281.572	3283.638	28.956	440.751
Digital Value Creation	72	.000992	.068	0.134	.011
Digital value transfer	72	.001638	.071	.0135	.0128
Return on Net Assets	72	-60.167	22.917	6.786	11.654
Tobin's Q	72	.72776	6.085	1.794	1.036

### 3.2. REGRESSION ANALYSIS

The purpose of regression analysis is to understand whether two or more variables are correlated and the direction and strength of this correlation, and to develop a mathematical model for looking at specific variables to predict the variables of interest to the researcher. Regression analysis can help one understand the amount of change in the dependent variable when a single variable changes. In this paper, we first establish the linear regression equation of financial digital management model indicators and performance indicators, and the regression parameter values and significance tests are shown in Table 4. VIF is the inverse of tolerance, which is mainly used to determine whether there is co-linearity, and the regression results in this paper have VIF=1, which indicates that there is no multiple co-linearity between variables. Both value realization factor and value creation factor passed the significance test. The t-test statistic of value realization factor was 2.056, and its probability p-value was 0.044, which was less than the significance level of 0.05, so the test was significant; the t-test statistic of value creation factor was 2.316, and its p-test value was 0.024, which was less than the significance level of 0.05, so the test was also significant. The coefficients of value creation



factor and value realization factor are 2.707 and 3.049 respectively, which are positive and further indicate that corporate performance is positively related to the value creation dimension and value realization dimension of the financial digital management model.

**Table 4.** Regression parameter values and significance tests

Models	Unstandardized factor		Standardization factor	t	Saliience	Covariance statistics	
	B	SD	Beta			tolerances	VIF
(Constant)	6.77	1.307		5.18	.000		
Value Creation Factor	2.71	1.316	.232	2.04	.043	1	1
Value Realization Factor	3.03	1.316	.262	2.32	.023	1	1
Value Transfer Factor	.975	1.316	.084	.73	.462	1	1
Digitalization factor	-.62	1.316	-.054	-.47	.633	1	1

a. Dependent variable: return on net assets ROE

#### 4. CONCLUSION

This paper defines the definition, components and basic structure of digital business model, establishes the evaluation index system of digital business model and retail enterprise performance, and investigates the impact of each dimension of digital business model on short-term performance and long-term performance, and the related findings can provide reference for retail enterprise finance to develop digital transformation measures in the rapidly developing digital environment.

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# ANALYSIS OF THE TECHNICAL APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN INTELLIGENT HOME APPLIANCES

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## ABSTRACT

The progress and breakthrough of artificial intelligence technology is of great significance to the improvement of the intelligence of home appliances. Firstly, we start from the connotation of intelligent home appliances, sort out the intelligent needs of home appliance development, and combine the characteristics and applicability of various artificial intelligence technologies. Then the role of artificial intelligence technology in intelligent appliance automation control is analyzed, and the key technologies in modern artificial intelligence technology and their application in intelligent appliance automation control are focused on to improve the judgment and troubleshooting efficiency of enterprise system for intelligent appliance equipment, so as to better assist in realizing high-speed, safe, fast and smooth operation of enterprise appliance equipment and further enhance company benefits, aiming to provide reference for researchers in related industries.

## KEYWORDS

Artificial intelligence technology; Smart home appliances; Equipment failure; Electrical equipment; Applicability analysis

## 1. INTRODUCTION

The mature application of artificial intelligence technology in intelligent home appliance systems and intelligent production management equipment can enhance the industrial production and intelligent manufacturing management of electrical systems [1]. With the emergence of a large number of artificial intelligence technology research results, its technical achievements have been widely developed and applied in China's intelligent appliance technology and production automation and other related appliance industries, which play a positive role and have a significant impact on further promoting the development of China's modern intelligent appliance industry [2-3]. The use of artificial intelligence technology to design intelligent control systems for home appliances can not only reasonably improve the intelligent capability of home appliances and enhance their efficiency in the process of complex use, but also the relevant research results can provide more scientific and reasonable, practical and innovative technology development directions and financial guarantees for the development of science and technology development planning and national economic medium and long-term planning in the field of intelligent automation and home appliance industry intelligence in China [4-5].

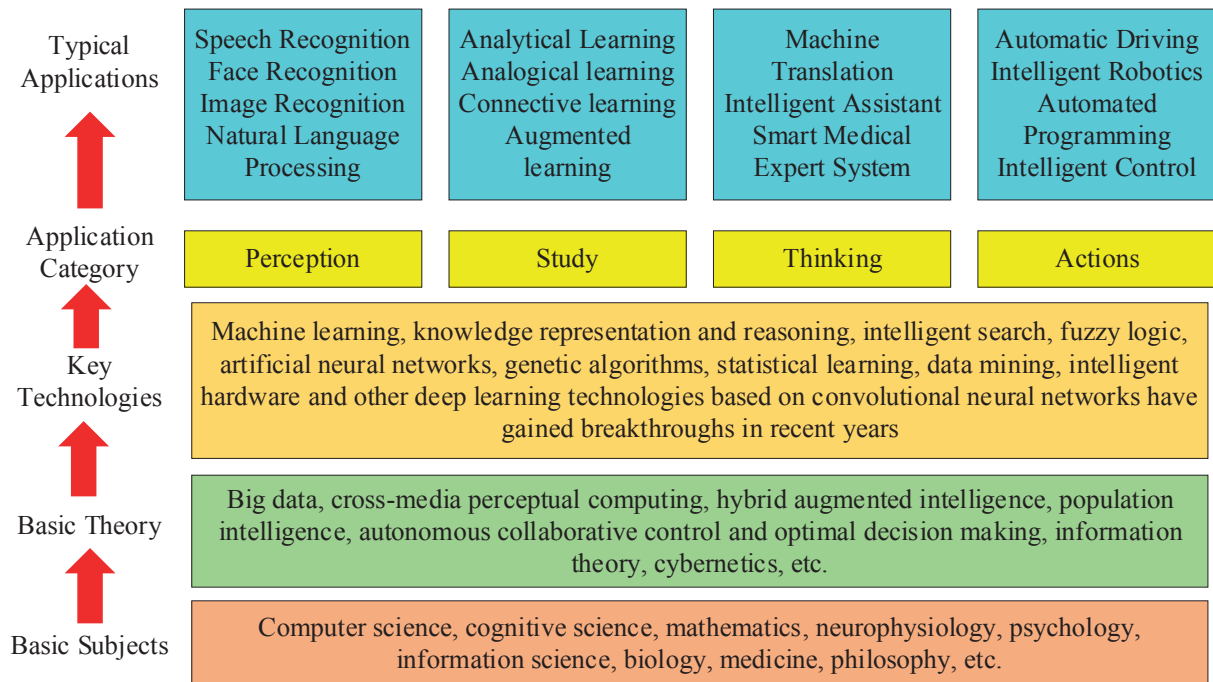
The literature [6] investigates the concept and development of smart homes and explores demand-side management techniques in smart homes and how they can be applied to improve

the efficiency of residential home appliances. The focus of the article is to analyze the demand-side management techniques in smart homes and how to achieve effective scheduling of appliances in smart homes to save energy and reduce energy costs. The study aims to provide guidance for research and practice in the field of smart homes, help people better understand the applications and advantages of demand-side management technologies, and improve the energy efficiency and user experience of smart homes. The literature [7] investigates the current development and importance of smart homes and explores the application of real-time pricing strategies based on multiple time periods in smart homes. The focus of the article is to analyze the power fluctuation problem caused by the continuity of smart home appliance operation and propose a real-time pricing strategy based on multiple time periods to achieve effective scheduling and energy saving for smart home appliances. The literature [8] investigates the design of an electrical energy scheduling system in smart homes, using multi-objective ant-lion optimization algorithms and evidence-based reasoning techniques to achieve electrical energy scheduling. The difficulties and challenges of electric power scheduling in smart home are analyzed, and a power scheduling system based on multi-objective antlion optimization algorithm and evidence inference technique is proposed to improve the energy utilization efficiency and user experience in smart home. The study aims to provide guidance for research and practice in the field of smart home, help people better understand the applications and advantages of multi-objective antlion optimization algorithm and evidence inference techniques, and promote the development and diffusion of smart home technologies.

## **2. ARTIFICIAL INTELLIGENCE TECHNOLOGY IN THE APPLICATION OF INTELLIGENT HOME APPLIANCES IDEAS**

### **2.1. ANALYSIS OF ARTIFICIAL INTELLIGENCE TECHNOLOGY AND ITS APPLICABILITY**

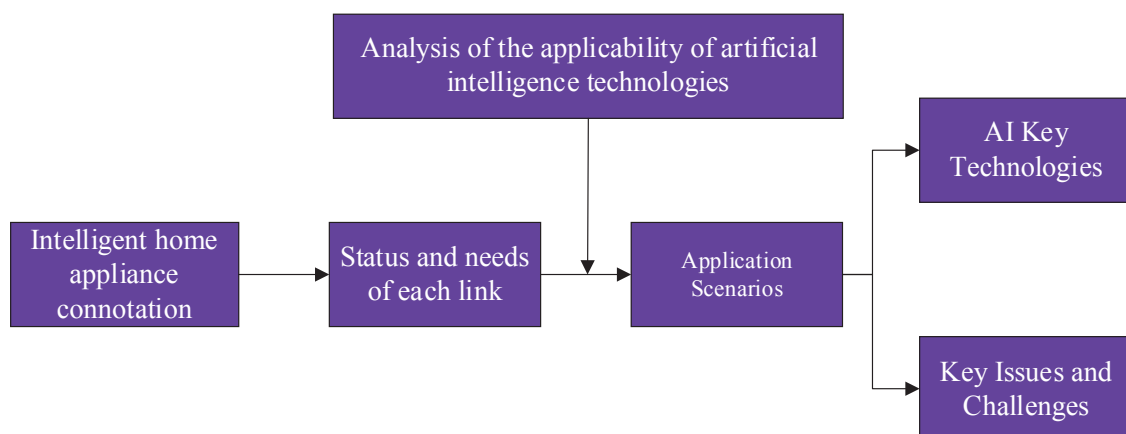
As a theoretical, methodological, technical and applied science to study the simulation, extension and expansion of human intelligence, AI has formed three mainstream research schools during its long-term development: (1) structural simulation approach (also known as connectionism), which is represented by “black box”-type technologies such as neural networks. (2) Functional simulation approach (also known as symbolism), which is represented by expert systems, intelligent search, machine games, etc. (3) Behavioral simulation methods, which are represented by intelligent robots, etc. Although the development of AI has encountered several downturns, the connectionist deep learning methods, represented by deep confidence networks and convolutional neural networks, have made breakthroughs in machine vision, speech recognition, natural language processing and other fields first since 2016, driving a new round of AI research worldwide. ai has become a multidisciplinary cross-technology field with its own complex intrinsic system and a wide range of application AI has become a multidisciplinary interdisciplinary technology field with its own complex inner system and wide range of applications. Figure 1 shows the overview of AI technology, which compares the main AI technologies from the perspective of basic disciplines, fundamental theories, key technologies, and classification applications.



**Figure 1.** Overview of Artificial Intelligence Technologies

## 2.2. INTELLIGENT HOME APPLIANCES BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGY

Early applications of AI technology in electric power mainly focus on fault diagnosis, load prediction and part of the intelligent control field has a fundamental role in the subsequent in-depth research. In the context of today’s extensive research and development of smart home appliances and even the global energy Internet construction on the agenda, the application of AI technology needs to start from the connotation of “strong and reliable, economic and efficient, clean and environmentally friendly, transparent and open and friendly interaction” of smart home appliances, sort out the current situation and needs of smart home appliances development, combine the characteristics and applicability of AI The overall application idea is shown in Figure 2. The general application idea is shown in Figure 2. It can be expected that not all smart home appliance applications need to add AI technology, but the application of AI technology may greatly improve the level of intelligence of home appliances. For this reason, an in-depth analysis of various suitable application scenarios, the characteristics and applicable environment of various AI technologies, and the possible problems and challenges faced is needed.



**Figure 2.** Intelligent home appliance ideas based on artificial intelligence technology

### **3. ANALYSIS OF THE SPECIFIC APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN INTELLIGENT HOME APPLIANCES**

#### **3.1. APPLICATION IN THE DESIGN OF SMART HOME APPLIANCES**

Electrical product design involves motor control technology, mechanical circuits, electronics technology and other electronic professional basic theoretical knowledge. In the traditional design of industrial electrical product development, in order to ensure design quality, it is necessary to increase the theoretical knowledge and experience reserves of relevant designers and improve their comprehensive technical capabilities.

Reasonable application of artificial intelligence technology can improve the comprehensive utilization of resources and reduce the probability of cost increase caused by human factors. The application of artificial intelligence technology, through scientific technical planning and design analysis and practical operation, can realize the design optimization of electrical products, avoiding the waste of large-scale research and development resources due to the lack of ability of designers or lack of practical experience, as well as the huge research costs and waste of investment.

#### **3.2. APPLICATION IN ELECTRICAL CONTROL**

Analysis of recent experience in the design and development of intelligent control systems for enterprise electrical automation reveals that the application of artificial intelligence technology to develop electrical automation control systems is an effective way to improve the efficiency of electrical equipment automation control systems can provide security for the overall safety and stability of the operation and use of various electrical appliances, and can also improve the overall production efficiency and quality of various electrical products and systems, thus promoting the intelligent development of electrical control.

#### **3.3. APPLICATION IN ELECTRICAL EQUIPMENT FAULT DIAGNOSIS**

Various minor faults may occur during the actual production, operation or maintenance of electrical equipment products. Generally, electrical equipment products will show some signs of failure a few days before the occurrence of minor faults. Therefore, in the process of management and maintenance, attention should be paid to regular monitoring of the whole system and the detailed conditions of each equipment to ensure that scientific and reasonable detection and control can be carried out when new fault phenomena occur suddenly in the process of maintenance and management, so as to improve the efficiency of the dynamic monitoring and control of the whole system and ensure that each electrical equipment can work reasonably and efficiently.

### **4. CONCLUSION**

In various electrical automation devices and their control, the application of artificial intelligence technology has always been an important reflection of today's scientific and technological development. The full promotion and application of AI technology in modern electrical equipment and its intelligent automation control system in China can help improve the intelligence and automation level of industrial electrical systems and enhance the energy efficiency level and the quality of automation operations. Therefore, it is necessary to comprehensively analyze and understand the various characteristics and various key application functions of artificial intelligence technology in electrical automation control. Through the application of electrical artificial intelligence technology and integrated platform system, it can truly achieve technological innovation, reduce the labor cost of manufacturing equipment, and promote the sustainable and coordinated stable development of the manufacturing informatization process in the domestic electrical industry.

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# RESEARCH ON THE APPLICATION OF DIGITAL-AIDED DESIGN METHODS FOR URBAN ECOLOGICAL GARDENS

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## ABSTRACT

This paper firstly studies the planning and design of modern ecological gardens and landscapes, the connotation of which has been gradually expanded, both in terms of spatial and temporal span, rich variety of items and environmental protection, as well as in pursuit of their large neutral richness, and traditional gardening techniques have been difficult to meet the needs of modern ecological garden development. Secondly, the use of modern digital-aided design methods in ecological garden planning and design is studied, bringing new aesthetic features to the planning and design of ecological gardens. Then it summarizes the splitting and reconfiguration, conjoint analysis, and two topologic ecological garden design methods, and designs the corresponding procedural flow to build a basic framework for topologic ecological garden design methods. This paper solves the long-standing problem of ecological design lacking a systematic and comprehensive analysis method, and promotes the development of digital-aided design methods for ecological gardens.

## KEYWORDS

Ecological garden; Digital-aided design; Conjoint analysis; Splitting; Reconfiguration

## 1. INTRODUCTION

Urban ecological gardening construction helps to make up for the shortcomings of environmental improvement, helps to build ecological civilization, and helps to enhance people's well-being [1]. China's supply-side structure has not been completely improved, the situation of environmental pollution is severe, and ecological degradation is still serious. Nowadays, people's living standards have obviously improved, and they pay more and more attention to the requirements of living environment quality, and the construction of new urbanization is still continuing, so it is very necessary to transform traditional gardens and strengthen the construction of ecological gardens in towns [2-4]. The construction of ecological gardens in towns and cities does not only stay on the surface of the landscape, but also takes into account the concept of ecological economy and environmental protection, which is an important initiative to build a beautiful China [5].

Literature [6] introduced a landscape design system based on 3D virtual reality and image processing technology. The system can simulate real scenes by using virtual reality technology and analyze and process the scenes by combining image processing technology to make the

landscape design more detailed and intuitive. The researchers proposed the design and implementation method of the system, and verified the feasibility and effectiveness of the system for landscape design through experiments. The literature [7] investigated the effects of campus landscape attributes on bird species richness and diversity and explored the implications of these results for eco-friendly urban planning. It was found that the diversity of campus landscapes was closely related to the richness and diversity of bird species. The article further suggests some suggestions for eco-friendly urban planning to promote diversity of campus landscapes and conservation of bird species. The authors of the literature [8] emphasized the importance of the need to consider the balance of ecosystems and how to reduce carbon emissions in the urban development process. The article suggests some practical approaches to help urban planners and designers to design urban landscapes with low carbon in mind.

## **2. DIGITAL-AIDED DESIGN METHODS FOR URBAN ECOLOGICAL GARDENS**

### **2.1. TOWN ECOLOGICAL GARDEN**

Urban gardens have both natural and cultural attributes that counteract urban environmental degradation and are an important means of solving environmental problems. However, with the development of ecology, scholars have found that not all landscaping is conducive to ecological construction. Effective ecological construction requires systematic and detailed consideration from macro to micro levels, which means that garden construction has new requirements, namely the construction of “ecological gardens”, which require reflecting the beauty of nature and society and following the laws of ecology. Based on ecology, ecological gardens integrate landscape science, landscape ecology, plant ecology and theories about urban ecosystems to study the relationship between ecosystems within the range that landscape gardens and urban green spaces may affect. Its purpose is to resolve the contradiction between the growing human demand and the limited supply capacity of nature, and to restore the virtuous cycle of the ecosystem.

### **2.2. DIGITAL-AIDED DESIGN CONCEPTS AND METHODS FOR ECOLOGICAL GARDENS**

Early ecological design focused only on natural factors, but as ecological design developed, it was found that the absence of human factors also failed to solve ecological problems. So ecological planning and design is now developing toward an overall humanistic ecosystem, i.e. a planning concept that considers both nature and humanity together. In addition, ecological gardening currently has the problem of limitations, and the expertise in various fields is not well integrated. Furthermore, theoretical research is dominated by principle results and lacks systematic theories and methodological systems. The development of computer software and remote sensing detection and other technologies, powerful data analysis capabilities and information graphical techniques bring designers a clear and explicit design basis, and gradually form ecological garden design methods based on various technologies. However, ecological issues are a huge system full of contradictions and connections, and it is difficult for any single discipline or technology to achieve ecological balance, and the problem of disciplinary integration still exists.

## **3. TOPOLOGICALLY BASED APPROACH TO ECOLOGICAL GARDEN DESIGN IN DIGITAL ASSISTANCE**

### **3.1. THE CONSTRUCTION OF TOPOLOGY ECOLOGICAL GARDEN DESIGN METHOD SYSTEM**

With primitives as the most basic logical cells, topologists perform logical transformations



by expanding the principles of conjugation, dynamics, conduction and transformation, and guide thinking through patterns such as rhombic thinking, inverse thinking, conjugate thinking and conduction thinking. The study of ecology requires systematic thinking, symbiotic thinking, and evolutionary thinking. We use the systematic, correlative, flexible, and changeable characteristics of topology, as well as the ability to break through contradictory problems, to build our own methodological system.

### 3.2. DIVERGENCE AND RECONSTRUCTION METHODS

This method is roughly divided into three steps: splitting (i.e., divergence), and transforming and reconstructing. The first step of splitting, according to the composition principle of primitives to split things according to different characteristics and properties: the second step of transformation, through replacement, increase, deletion, expansion, reduction, decomposition, replication, inverse thing element, non-thing element, inverse thing element, inverse transformation, inverse implication, conduction and other transformation methods. The third step of reconstruction, through the combination of chain, superiority evaluation and other methods to complete. In addition to establishing thinking paths to assist designers in thinking, the topologically formal model can be used as a programming language to establish artificial intelligence to allow computer-aided designers to generate design strategies. The process design is shown in Figure 1. In this way, as soon as a design vocabulary is input, the computer immediately presents the relevant connotation and the corresponding system, and then identifies the contradictory links through contradiction determination, and then transforms until the contradiction disappears, and the solutions to make the contradiction disappear are usually various, and the optimal solution needs to be screened by superiority evaluation.

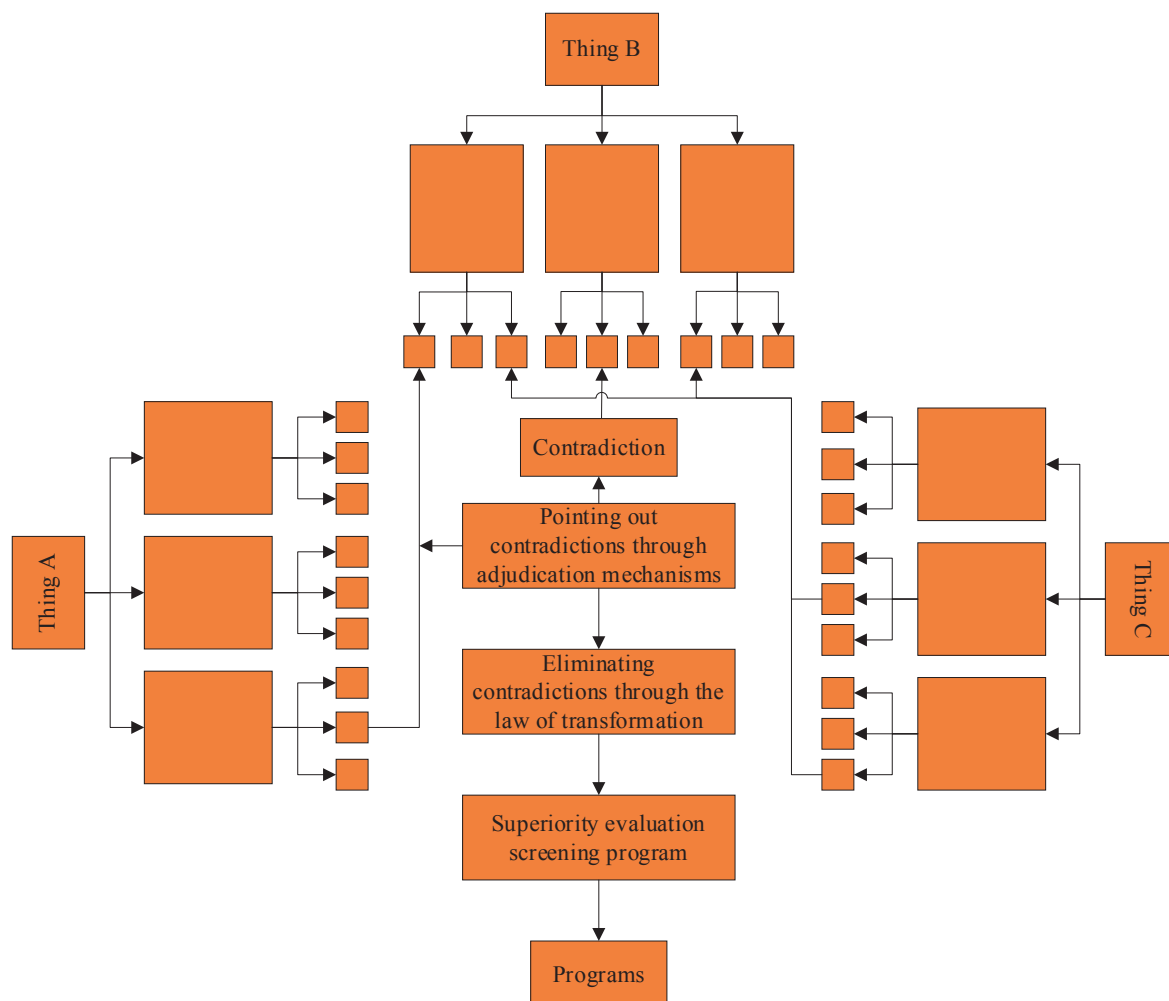
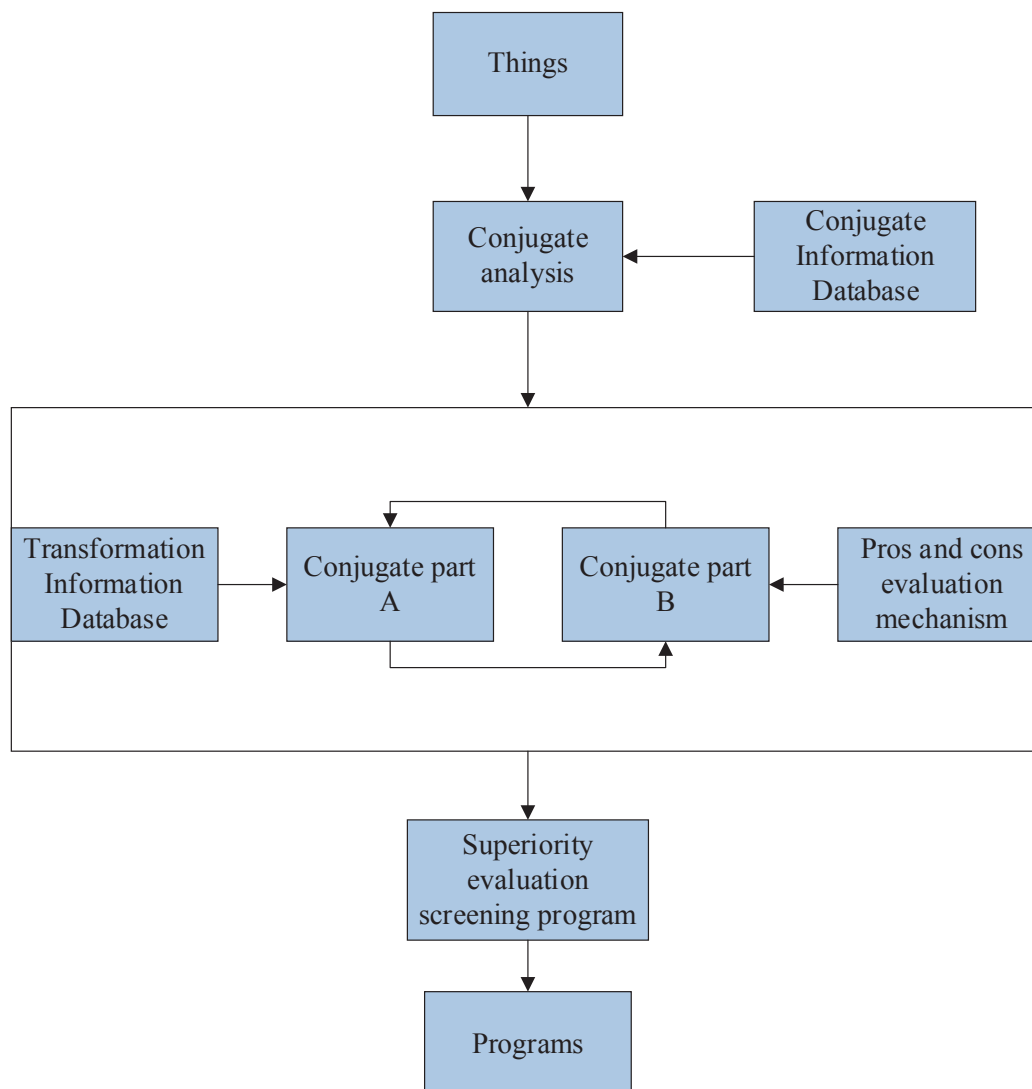


Figure 1. Sub-refactoring program flow

### 3.3. CONJUGATE ANALYSIS

Conjugate analysis is often used to describe the composition of things, which can reveal the nature of development and change, and under certain conditions, the corresponding conjugate parts can be transformed into each other, which can be used to explore the strategy to avoid harm. For example, a building consists of a real part “wall” and an imaginary part “space”, and the wall and space are interdependent. The design of the covariance analysis process is shown in Figure 2. Topology is a discipline that addresses contradictory problems by solving them in a variable and associative way. These features are very valuable to be utilized for ecological garden design.



**Figure 2.** Conjugate analysis process design

### 3.4. INTEGRATED USE

The dispersion and reconstruction method can systematically analyze the content of things and discover the potential for development and change. The most outstanding value of the total choke analysis method is to reflect the structure of things and to consider both sides of the problem. The fact of analysis method is a synthesis, which can include several levels of splitting and reorganization analysis and rich co-Choke pairs. A variety of analytical methods are combined with each other to finally conduct systematic and correlated analysis, solving the long-standing problem of ecological design lacking systematic and integrated analytical methods.

#### 4. CONCLUSION

In short, technological innovation plays an important role in modern ecological landscape planning and design, enabling us not only to reproduce natural beauty more freely, but even to create supernatural wonders on earth. Chinese gardens still have a strong vitality, in the construction of modern parks and scenic areas to get a new complement and development. We can believe that a new landscape design science rich in traditional Chinese cultural characteristics will be gradually enriched, perfected and matured in the development of modern socialist landscape construction.

#### FUNDING

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# STUDY ON THE APPLICATION OF FLIPPED CLASSROOM BASED ON E-BOOKBAG IN THE EARLY EDUCATION SMART CLASSROOM OF COLLEGES AND UNIVERSITIES

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## ABSTRACT

This paper firstly combines the electronic schoolbag with the flipped classroom teaching mode, which not only solves the problem that the flipped classroom teaching mode lacks the corresponding learning scaffold, thus also greatly exerts the application value of the electronic schoolbag in school education. Then the effectiveness and feasibility of the flipped classroom teaching mode in early education are verified through teaching experiments, which provides new ideas for the teaching reform of early education, improves the training quality of preschool education students, provides reference for the teaching reform of other similar courses, and promotes the application of the flipped classroom teaching mode in vocational education.

## KEYWORDS

E-book package; Flipped classroom; Teaching model; early education; Application research

## 1. INTRODUCTION

With the continuous integration of information technology, network technology and education, the traditional teaching model can no longer meet the learning needs of learners [1]. As a result, educational experts at home and abroad have devoted themselves to studying an efficient and innovative teaching model that can meet the learning needs of learners and the progress of social development [2]. Until the emergence of the flipped classroom teaching model, which innovates through the reverse order of the teaching process, people who are currently in the anxious state of curriculum and teaching reform have seen a new prospect and a “flipped classroom fever” has rapidly started in China [3-4]. The electronic schoolbag as a teaching aid undoubtedly adds wings to the flipped classroom teaching mode, and the proper combination of the two can provide learners with rich learning resources and help learners' independent inquiry, while teachers can also give learners timely answers and inspiration to achieve better learning results [5-6].

The literature [7] describes a web-based information technology application for English education in the flipped classroom. The researchers proposed the design and implementation method of the application and verified the feasibility and effectiveness of the method for English education through experiments. The method reverses the traditional classroom teaching model, i.e., students first learn relevant course content in a home environment, and then discuss and communicate in the classroom in order to improve students' learning and participation. The literature [8] investigated the practice of applying the flipped classroom to computer-assisted landscape design teaching. The researcher proposed a flipped classroom design method

based on the “Rain Classroom” platform and verified the effectiveness of the method in landscape design teaching through experiments. The method can stimulate students’ learning interest and motivation, and improve their learning effectiveness and participation. At the same time, the method can provide more learning resources and interactive opportunities for students, promote communication and cooperation between teachers and students, and thus improve teaching quality and students’ overall quality.

## **2. FLIPPED CLASSROOM BASED ON E-BOOK PACKAGE**

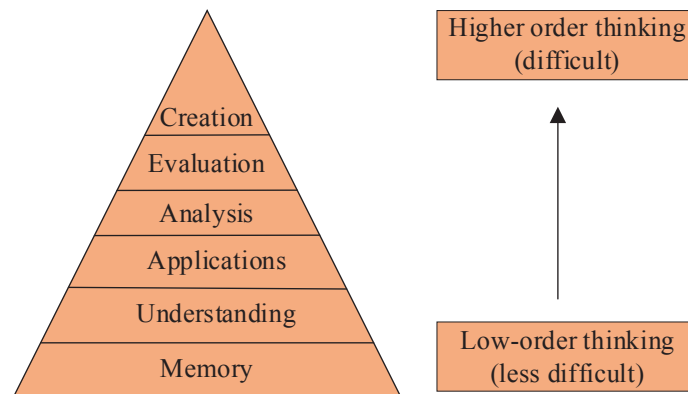
The e-book package plays the role of a learning scaffold in the flipped classroom teaching model. A learning scaffold is a temporary scaffolding framework provided to learners according to their learning needs, with the aim of helping students to traverse the nearest developmental zone and gain further development and independent learning ability. The learning scaffolds currently used in the flipped classroom teaching model implemented in schools are guided learning plans prepared by teachers before class. Such learning scaffolds are task-based learning scaffolds with clear purposes, which are relatively simple for learners to operate and understand. However, it often restricts learners’ thinking space and is not conducive to learners’ deep learning. Thus, the organic combination of e-bookbag and flipped classroom model has a strong practical significance.

### **2.1. E-BOOK PACKAGE**

Electronic schoolbag is a portable terminal that uses information technology equipment for teaching and learning. From its name, it is easy to understand that the electronic schoolbag is a network-based, mobile educational support product that can accommodate a large amount of resources. In China, the electronic schoolbag system is a learning environment that integrates education cloud services and personal terminal application platform to provide teaching support services for learners in the way of “cloud + end”. This “cloud + end” form of e-schoolbag learning system mainly includes two parts: the user side and the education cloud platform. The user side mainly provides some resources for learners, including teaching videos, error books, homework system, examination system and classroom interactive system and other functional modules. The education cloud platform mainly includes four parts: basic teaching functions, learning management system, teaching dashboard system and electronic file system. The electronic schoolbag terminal based on Education Cloud can better support the development of flipped classroom teaching mode, and learners can customize the learning mode, which is more conducive to the development of personalized learning.

### **2.2. UNDERLYING LOGIC OF FLIPPED CLASSROOM**

The first stage of the traditional teaching model is in the classroom and the second stage is in the classroom, as shown in Figure 1. In the flipped classroom model, the first stage is brought forward to before class, and knowledge is presented and delivered through various vehicles, so that students’ confusion in the second stage can be solved more efficiently during and after class, changing from “knowledge-based” to “behavior-based”.



**Figure 1.** A modified model of Bloom's cognitive domain goal model

### 2.3. DIFFERENCES BETWEEN FLIPPED CLASSROOM AND TRADITIONAL CLASSROOM

At a conference on flipped classrooms held at a university in 2021, participants identified the flipped classroom as a teaching model that promotes student-teacher interaction and transforms teachers into student facilitators. Unlike traditional teaching models, flipped classroom teaching resources can be kept for a long time, making it easy for students to preview, study or review. According to domestic scholars, Zhang Jinlei and others, flipped classroom can also be called “inverted classroom”, which is a new teaching model that changes the roles of teachers and students in traditional teaching by reversing the arrangement of knowledge transfer and knowledge internalization, and re-planning the use of classroom time. The flipped classroom integrates constructivist learning theory, mastery learning theory, learning style theory and cooperative learning theory, and has a relatively deep theoretical foundation and important practical value purpose. The differences between the flipped classroom and the traditional classroom are shown in Table 1.

**Table 1.** Differences between flipped classroom and traditional classroom

Type	Traditional Classroom	Flipped Classroom
Teacher Roles	Indoctrinators and Dominators	Leaders and facilitators
Student Role	Passive recipient	Active inquirer
Teaching Model	Lecture in class, homework in class	Learning before class, exploring during class, summarizing after class
Classroom Assignment	Teacher lecture-based	Teacher-student inquiry-based
Teaching Tools	Visual presentation	Self-directed learning Collaborative exploration, question and answer
Teaching Evaluation	Offline paper tests	Multi-dimensional assessment

### 3. THE APPLICATION OF THE FLIPPED CLASSROOM TEACHING MODEL BASED ON E-BOOKBAG IN EARLY EDUCATION

In order to understand the achievement of the learning objectives of the flipped classroom teaching mode of “before, during and after” in the teaching of early education, the experimental class and the control class of this experiment were selected among 22 classes (51 students), 22 classes (54 students) and 22 classes (49 students) by combining the results of the final examination and the pre-test questionnaire of the last semester. The experimental class and the control class were selected. The experimental study was conducted for 6 weeks with the experimental content of “Early Children’s Thinking” in the early psychology course, to test the effectiveness of the e-schoolbag-based flipped classroom teaching model in the early classroom from the perspectives of cognitive goals, ability goals and emotional goals.

### 3.1. ANALYSIS OF THE FRONT-SIDE QUESTIONNAIRE

After collecting the pretest questionnaires, a one-way ANOVA was conducted on them using SPSS tools: the mean scores of the students in the three classes, Class 22, School 1 and Class 22, School 3, were 78.13 and 77.46, respectively, which were much higher than the mean score of Class 22, School 2, which was 65.36, and the standard deviations of these two classes were much lower than those of Class 22, School 2, indicating that the students in Class 22, School 1 and Class 22, School 3 had basically the same level of awareness. Thus, the experimental class of this experiment was determined to be Class 22 School 1 and the control class was Class 22 School 3, and the return of the pre-test questionnaire is shown in Table 2.

Table 2. Pre-test questionnaire return

Classes	Quantity	Issuance	Recycling volume	Recovery rate (%)
Class 1 of 22	51	51	47	92.16
Class 2 of 22	54	54	54	100
Class 3 of 22	49	49	48	97.95

### 3.2. POST-TEST PAPER ANALYSIS

At the later stage of the experiment, the unit test of the experimental content was administered to the experimental class and the control class respectively, and both classes participated fully. The recovery rate of the test papers was 100%, and the recovery of the post-test questionnaire is shown in Table 3, from which it can be seen that the experimental class had an excellent rate of 54%, and no one failed. In contrast, the excellent rate of the control class reached 43%, and the number of failures reached 8%. Looking at the average scores of the two classes, the average score of the experimental class was 83, while the average score of the control class was only 74, the effect was obvious.

Table 3. Post-test questionnaire return

Classes	Score	Quantity	Percentage (%)	AVG
Class 1 of 22	90-100	9	17.65	83
	80-89	18	35.29	
	70-79	12	23.53	
	60-69	9	17.65	
	Less than 60	3	5.88	
Class 3 of 22	90-100	5	10.20	74
	80-89	16	32.65	
	70-79	13	26.53	
	60-69	11	22.45	
	Less than 60	3	8.16	

### 3.3. ANALYSIS OF STUDENTS' RECOGNITION OF FLIPPED CLASSROOM

The survey results of the experimental class showed that 41% of the students liked the flipped classroom teaching mode very much, 53% of the students liked the flipped classroom teaching mode, 6% of the students had indifferent attitude, and 3% did not like it, which indicated that most of the students liked the flipped classroom teaching mode. In contrast, the results of the control class showed that more than 59% of the students expressed less satisfaction with the traditional classroom.

### 3.4. ANALYSIS OF STUDENTS' INDEPENDENT LEARNING

Statistical analysis of the experimental class on completing homework before class and participating in group discussion and teacher-student communication in class showed that 37% of the students could easily complete the homework assigned by the teacher before class, 44% could basically complete the homework, and 14% felt that it was difficult to complete the homework. 50% of the students had been participating in classroom interaction and behaved actively. 31% of the students often participated in group cooperation and were more active, which showed that more than 81% of the students were able to complete the tasks given by the teacher and actively participate in classroom interactions. In contrast, less than 11% of the students in the control class interacted actively on a regular basis, and nearly 72% of the students were in a passive waiting mode. In today's rapidly changing online learning platform, the flipped classroom teaching model will be better applied in the field of early education, helping to strengthen the learning quality cultivation and professionalism of kindergarten teacher students.

### 4. CONCLUSION

The e-schoolbag-based flipped classroom teaching model is in the stage of practical verification, and further research is still needed for the emergence of problems and shortcomings. The effectiveness and feasibility of the e-schoolbag-based flipped classroom teaching model in early education are verified through practical data and students' feedback. It has both cultivated students' habits of independent learning and improved their learning performance. The flipped classroom based on e-schoolbag effectively frees teachers from the podium and makes students really become the main subject of the classroom, which provides new ideas for the teaching reform of early education majors and has certain reference significance for other courses, and promotes the application of the new concept of flipped classroom based on e-schoolbag in vocational education.

### FUNDING

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# EXPLORING THE CONSTRUCTION OF INTELLIGENT TOURISM MANAGEMENT MODEL IN THE CONTEXT OF BIG DATA

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## ABSTRACT

In this paper, the overall framework of wisdom tourism management and the construction of wisdom tourism management platform are proposed in the scenic area wisdom tourism management scheme design. The construction of wisdom tourism management platform includes the integration of network resources and hardware facilities, the establishment of Internet of Things and video monitoring system and the construction of big data platform to unify standards. An evolutionary game analysis of the regional wisdom tourism cooperative management model is also conducted. The results show that the long-term evolutionary equilibrium of the wisdom tourism management model, at this time the expected return of inland and coastal wisdom tourism cooperative management is 2.5. This paper analyzes the construction strategy of the wisdom tourism management model in the context of big data, which has certain reference significance for tourism enterprises.

## KEYWORDS

Intelligent tourism management; Internet of things; Video monitoring system; Big data platform; Evolutionary game

## 1. INTRODUCTION

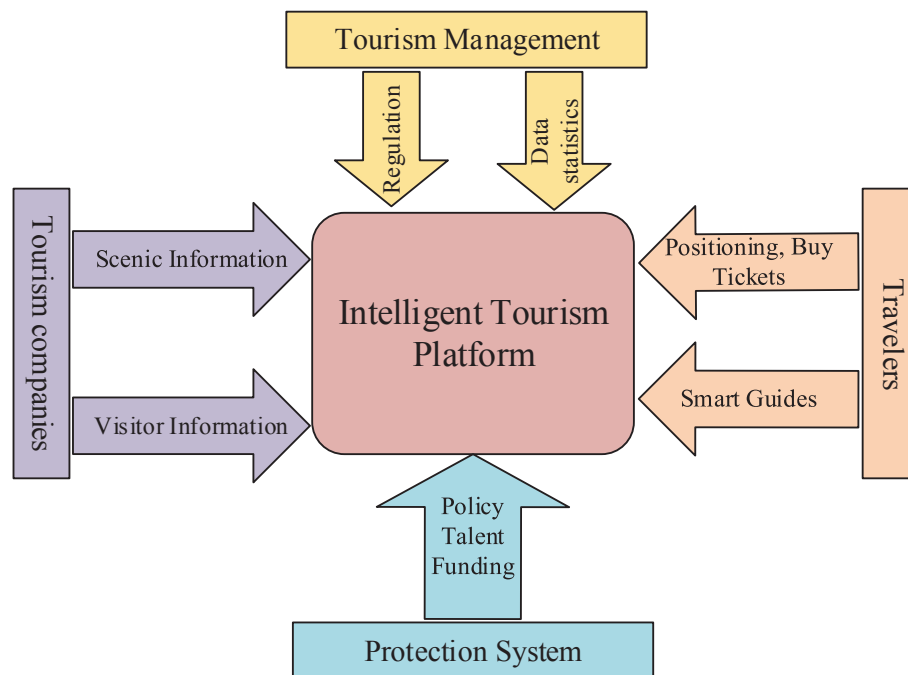
With the development of information technology, the application of big data has gradually become a hot topic in various industries [1-2]. Smart tourism, as an emerging industry in tourism, also needs to be intelligently managed with the help of big data technology [3]. The construction of smart tourism management mode not only helps to improve the operational efficiency and service quality of tourism enterprises, but also provides tourists with more convenient and personalized tourism experience [4-5]. Therefore, it is of great theoretical and practical significance to explore the construction of smart tourism management model in the context of big data [6]. Existing studies have concluded that big data technology plays an important role in promoting the construction of smart tourism management model [7]. Big data technology can collect, integrate and analyze various types of data in the tourism industry, thus providing tourism enterprises with more accurate market forecasts and customer demand analysis [8].

## 2. SCENIC INTELLIGENT TOURISM MANAGEMENT MODEL PROGRAM DESIGN

### 2.1. GENERAL FRAMEWORK OF INTELLIGENT TOURISM MANAGEMENT

The overall management framework of wisdom tourism is shown in Figure 1, in which the whole ecological system of wisdom tourism is built with the wisdom tourism platform as the

center, including the five parts of wisdom tourism platform, tourism management department, tourism enterprises, tourists and protection system. The parts form an organic whole with each other. The tourism management department, as the regulator of the tourism industry, supervises the smart tourism platform while relying on the information related to tourism enterprises collected by the platform. Tourism enterprises, as market players, obtain all kinds of effective information through the smart tourism platform, so as to provide tourists with personalized tourism services and commodity recommendations. Travelers as consumers, through the smart tourism platform, so as to easily access the information and services provided by tourism enterprises. The protection system is to ensure the establishment and subsequent safe and stable operation of the intelligent tourism system in terms of policies, funds, talents and mechanisms.



**Figure 1.** General framework of intelligent tourism

## 2.2. INTELLIGENT TOURISM MANAGEMENT PLATFORM CONSTRUCTION

### 2.2.1. INTEGRATION OF NETWORK RESOURCES AND HARDWARE FACILITIES

Intelligent tourism platform construction needs to open up the network between the scenic spots and systems to achieve data interoperability and provide a channel for the data center to collect data. On the other hand, tourism enterprises, which have always been asset-light operation mode, re-invest a lot of money to build basic networks and hardware facilities is not very realistic for tourism companies. Therefore, it is necessary to transform and integrate the existing resources to make full use of them, avoid duplication of investment and save capital expenditure.

#### (1) Integration of existing network resources

For the Internet of each scenic spot, the available ones are maintained and reused, and new business nodes should be added to the unconnected ends. At the same time, according to the peak number of tourists and peak business volume of scenic spots, the network bandwidth should be expanded to ensure timely and smooth data transmission.

#### (2) Rational use of server room resources

Each scenic area in the process of information technology is bound to establish their own server room, the construction of intelligent tourism platform more need for standardized server

room support.

### (3) Hardware equipment reuse

Intelligent tourism big data platform and the construction of each application system is bound to take up a lot of computing and storage resources. Although the old server resources computing capacity, storage space can not be compared with the new server, but the use of idle resources bearing relatively small subsystems or feasible.

## **2.2.2. ESTABLISHMENT OF INTERNET OF THINGS AND VIDEO SURVEILLANCE SYSTEM**

The popularity of mobile Internet, Wi-Fi networks and smart mobile terminals has made it possible to collect tourist search information, location information and consumption information, which can be docked with third parties through the smart tourism platform to achieve user information sharing. However, these data alone are not enough to support the application, and need to enrich their own data collection channels to provide more information to the data center. IOT and video surveillance system can just help the company to complete the collection of more information of scenic spots.

### (1) Internet of things system construction

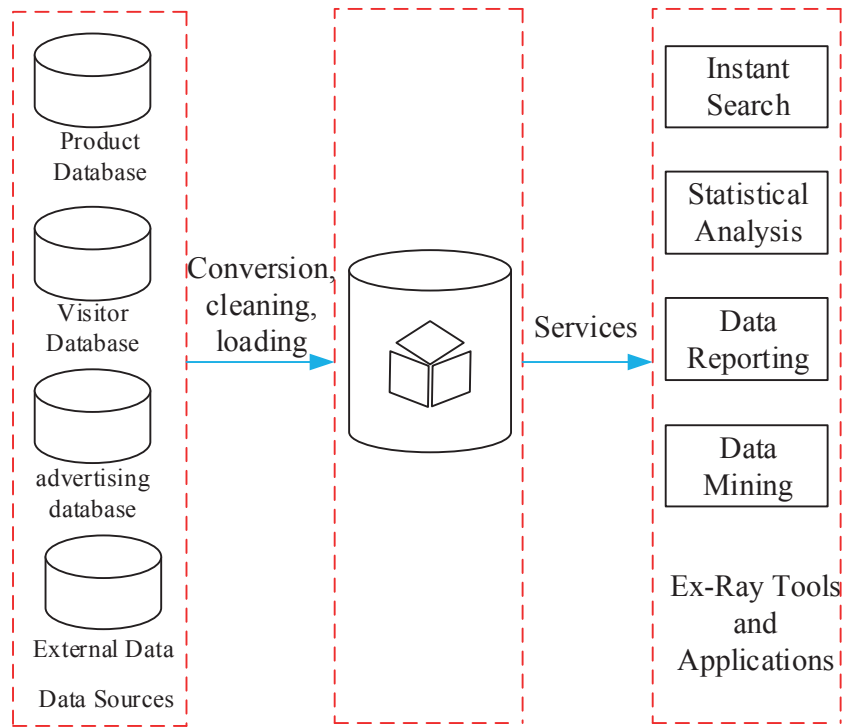
Internet of things is the nerve endings of the wisdom tourism system, is the perception organ of wisdom tourism, it is through the application of two-dimensional code, radio frequency identification (RFID), wireless sensors and other technologies to connect all kinds of items and the Internet, real-time collection of tourism activities in the basic information of each tourism activity object, and upload to the wisdom tourism platform.

### (2) Video monitoring system

Video information is the most intuitive data information. The video monitoring system is built in the tourist distribution center of the scenic spot, major traffic routes, entrances and exits of the scenic spot, key protection areas, accident-prone areas, parking lots, etc.

## **2.2.3. BUILDING A UNIFIED STANDARD FOR BIG DATA PLATFORM**

The data center layer with the big data platform as the core is the most important part of the smart tourism platform. The big data platform uses various technologies such as cloud computing and fuzzy identification to classify and store massive data and information through data collection layer and data information provided by third parties. By establishing a data warehouse, integrating all kinds of information resources, serving all kinds of intelligent applications and providing the basis for intelligent decision-making of enterprises, the framework of the big data management platform of intelligent tourism is shown in Figure 2. By integrating information data to build data sources, the existing data scattered in various scenic spots, systems and industries are integrated according to the object-centered principle to form business databases such as products, tourists and advertisements. The original scattered data of each database is extracted and cleaned up on the basis of system processing, aggregation and collation, unification and synthesis after entering the data warehouse. The virtual data view can extract subsets of information from different dimensions such as time and space, so as to build a richer application.



**Figure 2.** Wisdom tourism big data platform framework

### 3. GAME ANALYSIS OF THE EVOLUTION OF REGIONAL INTELLIGENT TOURISM COOPERATION MANAGEMENT MODEL

The main criteria for the division of regional wisdom tourism cooperation management mode are the way of cooperation of regional subjects and the degree of cooperation. From the cooperation mode of the cooperation subject, the regional cooperation can be divided into point an axis development mode, single core radiation mode, core edge mode, core edge mode and network mode. However, in terms of the degree of cooperation, these modes are shown as deep cooperation.

Through the analysis, we get the stable state and evolution law of regional smart tourism cooperative management system, which provides a theoretical basis for guiding regional smart tourism cooperative management. In this paper, we use MATLAB simulation to simulate the evolution process of regional wisdom tourism cooperative management system and verify the conclusion of regional wisdom cooperative management evolution game model. The set of ordinary differential equations describing the state of regional intelligent tourism cooperative management system is

$$F_{(X)} = \frac{dX}{dt} = X \left[ X(\Delta U_L Y + U_L + G - C_L - W_L) - (1 - X)(H_L Y + U_L) \right] \quad (1)$$

$$G_{(Y)} = \frac{dY}{dt} = Y \left[ Y(\Delta U_S X + U_S + G - C_S - W_S) - (1 - Y)(H_S X + U_S) \right] \quad (2)$$

Regional wisdom tourism cooperation subject is divided into inland and coastal regions, there are 2 regional wisdom tourism cooperation strategies to choose from, the initial strategy ratio is 0.5 respectively. Various cases, according to the needs of the actual situation, the benefit matrix uses different values.

According to the results of the theoretical analysis given for the above different cases, the number of various regional smart tourism cooperation strategies accounted for under different gains is simulated. Since coastal regions get excess returns through cooperation than inland

regions, it may be assumed here that  $U_L < U_S$  for simple cooperation its returns  $U_L = 3$ ,  $U_S = 5$ .

If  $\Delta U_L - H_L < W_L + C_L - G$ ,  $\Delta U_S - H_S > W_S + C_S - G$ .

Then the gain parameters are:

$$\begin{cases} \Delta U_L = 10, & H_L = 2, & W_L = 7, & C_L = 5, & G = 2 \\ \Delta U_S = 8, & H_S = 4, & W_S = 1, & C_S = 5, & G = 2 \end{cases} \quad (3)$$

When  $\Delta U_L - H_L < W_L + C_L - G$ ,  $\Delta U_S - H_S > W_S + C_S - G$ , (0,0) is the evolutionary stable equilibrium strategy, which means that both inland regional tourism and coastal regional tourism in the cluster adopt the simple cooperative strategy to get the stable solution. After long-term game learning, both inland region and coastal region take simple cooperation strategy and get long-term evolutionary equilibrium, at this time, the expected return of inland and coastal wisdom tourism cooperation management is 2.5.

#### 4. CONCLUSION

Big data background through the intelligent tourism management mode can improve the efficiency and competitiveness of the tourism industry, and to provide tourists with a more efficient, convenient and personalized travel experience. Scenic wisdom tourism management model program design, wisdom tourism management platform construction its important components, the construction of wisdom tourism management platform needs to integrate network resources and hardware facilities, the establishment of the Internet of things and video monitoring system and the construction of big data platform unified standards. In addition, this paper also analyzes the evolutionary game of regional wisdom tourism cooperation management mode, which can provide reference and reference for the cooperation between different scenic spots and improve the overall competitive strength of regional tourism.

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# A STUDY ON THE INNOVATION OF KINDERGARTEN AND PRIMARY SCHOOL CURRICULUM FOR THE DEVELOPMENT OF YOUNG CHILDREN'S SELF-REGULATION ABILITY IN THE CONTEXT OF THE INTERNET

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## ABSTRACT

This paper proposes a specific approach to the development of young children's self-regulation ability by innovating in the target curriculum for the development of self-regulation ability in young children, based on the theory of learning self-regulation. The weights of indicators for the evaluation of young children's self-regulation ability are determined through hierarchical analysis, and the EYFS curriculum is designed to promote the development of young children's self-regulation ability. Finally, after determining the weights of the indicators, the requirements of the rating levels used for actual measurement were also calculated and determined in order to obtain the final evaluation criteria for the self-regulation ability of young children in learning. Through this study, the path of connecting kindergarten and primary school curriculum is innovated, and new ideas and methods are provided for the development of children's self-regulation ability.

## KEYWORDS

Self-regulatory skills; Learning self-regulation theory; Hierarchical analysis; EYFS program ; Rating levels

## 1. INTRODUCTION

In the Internet era, young children are faced with an unprecedented multimedia information and network environment [1]. Although the Internet has brought many conveniences and opportunities for young children, it has also brought a series of challenges, one of which is the issue of developing self-regulatory skills in young children [2-3]. Self-regulation is a key element of young children's development and is important for their learning, life, and future growth [4]. However, the infinite lure of the Internet and young children's own cognitive characteristics make them more susceptible to interruptions and distractions and lack the ability to self-control and plan [5]. Therefore, it is imperative to explore a feasible EYFS curriculum innovation to develop young children's self-regulation skills [6]. There have been many studies on young children's self-regulatory skills in early education research, mainly focusing on self-control and planning behaviors in traditional educational settings [7-8]. Therefore, it is very necessary to study children's self-regulation ability under the background of Internet.



## 2. CURRICULUM INNOVATION FOR EARLY CHILDHOOD CAPACITY BUILDING GOALS

Training objectives, that is, the expected training standards and requirements for the educated at all levels and in all types of schools. In terms of stages, preschool childhood and primary school belong to the most basic education, and its training objectives reflect the essence of basic education and the functions it should perform.

Although there are some differences in the performance of early children's self-discipline ability in kindergarten and primary school, it is essentially the reflection of children's inner psychological ability in different environments. Educational policies in different countries have different impacts on children's learning environment and learning tasks, but children, as subjects of learning, have the ability to identify and self-regulate the environment. Educators should help children identify their environment and strengthen self-regulation and control in different environments. Especially in the Internet environment, children's cognition and decision-making on the Internet will largely determine the development of their self-control ability on the Internet.

### 2.1. LEARNING SELF-REGULATION THEORY

Learning is divided into four stages: planning, behavioral, volitional control, and self-reflection, in which self-regulated learners have to continuously monitor and regulate their cognition and emotions, as well as create or use material or resources in the environment that are conducive to learning and regulate their learning behavior with the help of learning strategies.

The process is divided into four stages such as planning-self-monitoring-control-response, and the four major domains of cognition, motivation, behavior, and environment are included in each of the four stages. The theoretical model of learning self-regulation is shown in Figure 1, in which the self-regulated learner is in a cycle of interaction between the individual, behavior, and environment, containing four stages. To accurately assess learners' level of self-regulation, one can look at the elements that influence the learning process, and in conjunction with the reality of this study using kindergarten students as research subjects and the aforementioned basis, the cognitive, motivational, behavioral, and environmental dimensions can be included in the initial proposed index system.

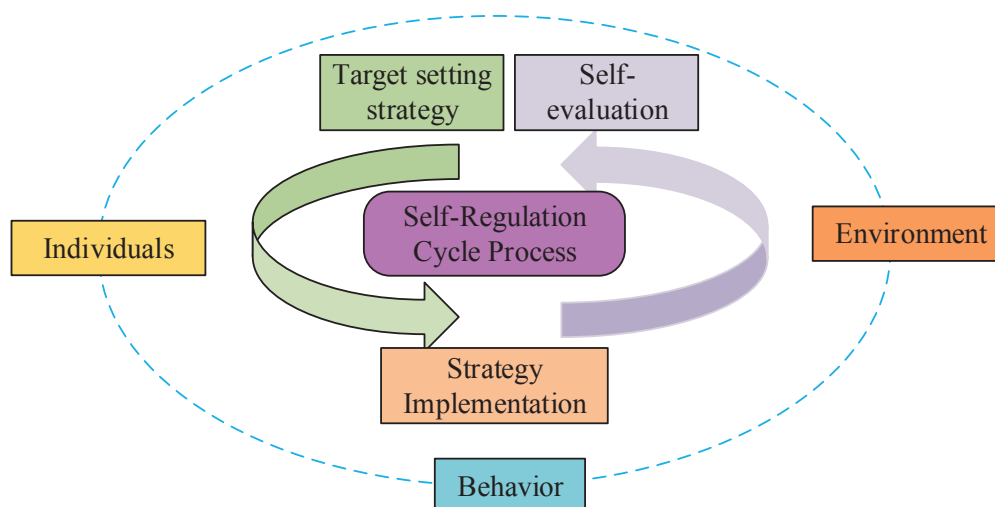


Figure 1. Theoretical model of learning self-regulation

### 2.2. DEVELOPMENT OF SELF-DISCIPLINE IN YOUNG CHILDREN

The development of self-discipline is an important skill for young children entering

elementary school. Self-regulation comes first from children's perceptions of their environment. From an ecological point of view, in today's Internet context, self-regulation is influenced by the child's own and environmental factors. From the child's point of view, the main factor is the child's perception of the environment and self-control. From kindergarten to elementary school, the environment changes and so does the way of learning. The transition from playful learning to text-based learning requires strong self-discipline in learning.

The characteristics of young children's self-discipline are mainly manifested in the following areas:

(1) Self-awareness

Children are aware of their behaviors and emotions and are able to self-evaluate and self-regulate them.

(2) Self-control

Children are able to control their own behavior and emotions, follow rules and conventions, and are not easily disturbed by the outside world.

(3) Self-management

Children are able to manage their time and behavior, make plans and goals, and act according to them.

(4) Self-regulation

Children are able to adjust their behavior and emotions to new situations and requirements in response to changes in their environment and situations.

### 3. ASSESSMENT OF YOUNG CHILDREN'S SELF-REGULATORY SKILLS AND DESIGN OF EARLY CHILDHOOD AND PRIMARY SCHOOL CURRICULUM

#### 3.1. DETERMINATION OF INDICATOR WEIGHTS

This paper uses hierarchical analysis applied to the problem of determining weights in the field of education evaluation to calculate the weights of first-level indicators, which first compares each first-level indicator between two, and then constructs a judgment matrix accordingly, and finally calculates the weights of the indicators using relevant formulas. The specific process is as follows:

(1) The first-level indicators resource management, self-regulation strategy and motivation to learn self-regulation are compared two by two, and the judgment matrix is built accordingly as shown in Table 1.

**Table 1.** Judgment matrix of self-regulation evaluation indicators for young children

	Resource Management C1	Learning Strategies C2	Learning Motivation C3
Resource Management C1	1	3	1/3
Learning Strategies C2	5	1	1/5
Learning Motivation C3	3	1/3	1

(2) Each column element in the judgment matrix is normalized, and the general term of each element is

$$a'_{ij} = \frac{a_{ij}}{\sum_{i=1}^n a_{ij}}, (i, j = 1, 2, \dots, n) \tag{1}$$

where  $a_{ij}$  is the original data.

(3) Normalize the vector  $\bar{W} = (\bar{w}_1, \bar{w}_2, \dots, \bar{w}_n)^T$ :

$$W_i = \frac{\bar{w}_i}{\sum_{j=1}^n \bar{w}_j}, (i = 1, 2, \dots, n) \quad (2)$$

The requested feature vector  $W_i$  is obtained.

(4) In order to make the judgments of relative importance of each index compatible and satisfy the characteristics of consistency, the weights of the evaluation indexes of learning self-regulation of children can be tested by calculating the following steps:

$$\lambda_{\max} = \sum_{i=1}^n \frac{(AW)_i}{nw_i} \quad (3)$$

### 3.2. DESIGN OF THE CURRICULUM BASED ON EYFS PROGRAM

After determining the weights of each index, the rating level requirements for actual measurement also need to be determined to obtain the final evaluation criteria for young children's learning self-regulation ability. In this paper, the design of the EYFS program refers to a program that is offered between kindergarten and elementary school to help children better adapt to elementary school learning life. The EYFS aims to provide children with a holistic system of continuous development and learning, so that they can have more and better opportunities in life, so that every child can become a healthy, secure, successful and happy person in the future. It has Four principles: A unique child, Positive Relationships, Enabling Environments, enabling environments, Learning and development. The EYFS program needs to help children recognize the change in their environment and the change in their learning style from their perspective, so that they can improve their self-regulation skills. The program aims to help young children gradually adapt to the learning environment and learning style of elementary school, develop their independent learning and self-management skills, and improve their interest in learning and learning effectiveness. The EYFS program has the following characteristics:

(1) Comprehensive in that the EYFS program covers several subject areas, such as language, mathematics, and science, and is designed to provide children with comprehensive subject knowledge and skills. Therefore, in terms of curriculum design, under the background of the Internet, kindergartens and primary schools need to integrate their curriculum objectives and curriculum content based on the network environment and network technology, Achieve incremental rather than leapfrog changes in your learning style, help children adapt to the learning environment.

(2) Progressiveness is the gradual increase in content and difficulty of the EYFS program to accommodate children's cognitive and developmental levels and to help children make a smooth transition to elementary school. In the context of the Internet, kindergartens and primary schools should gradually use network technology to help children perceive and learn relevant content, so as to form an interest in learning itself rather than an interest in irrelevant network stimulation, and gradually increase the learning of network knowledge, so that children have more network identification ability.

(3) Guidance is the ability of the EYFS program to develop children's self-discipline in

learning and life by guiding them to learn and manage themselves, and to improve their ability to adapt to elementary school life. Help children identify the learning environment under the background of the Internet, understand the instrumental significance of the Internet in learning, and enhance children's self-monitoring and self-management in the network environment.

(4) Transformation is the focus of the EYFS program on developing children's overall quality and creative ability, transforming their knowledge and skills into practical application skills, and laying a solid foundation for their future learning and life. Help children's online environment to take action, make corresponding self-disciplined behavior and self-evaluation.

To sum up, based on the EYFS project concept, the design of preschool and primary school bridging curriculum should focus on the characteristics of the transitional stage of learning between kindergarten and primary school. Attention should be paid to the characteristics of the transitional phase of learning between kindergarten and primary school. Based on the changes of the Internet environment, the course starts from the internal formation mechanism of children's self-regulation ability, adjusts from the aspects of environment, self and behavior, stimulate children's learning motivation, enhance their own learning strategies, and strengthen children's management of learning resources., helps children to Self-awareness, Self-control, self-manage and Self-regulation, so as to enhance their self-discipline ability, help young children better adapt to elementary school learning life.

#### **4. CONCLUSION**

This study explores the innovation of the design of preschool and primary school bridging curriculum based on the EYFS program concept for young children's self-discipline ability in the context of the Internet, aiming to provide new ideas and methods for the cultivation of young children's self-discipline ability. In the study, by studying the theory of self-regulation and the development of young children's self-regulatory ability, the index weights of the evaluation of young children's self-regulatory ability were determined, and the curriculum was designed to effectively promote the development of young children's self-regulatory ability. Specifically, the results of the study showed that by strengthening the development of self-control, normative behavior and self-evaluation, the level of children's self-regulation ability can be effectively improved. Also, in the design of the curriculum, we emphasized the cooperation between families and educational institutions to better promote the development of young children's self-regulatory skills. Therefore, it is believed that curriculum innovation for young children's self-discipline is necessary and effective, and can provide important references and lessons for the development of young children's self-discipline.

#### **FUNDING**

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# THE REFORM OF ENGLISH TEACHING IN HIGHER EDUCATION IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This study firstly discusses the composition of higher vocational English teaching evaluation and the design of teaching activities in the part of the construction of a blended teaching model of higher vocational English speaking. Secondly, the process of data set acquisition and feature processing, including data extraction and pre-processing, is elaborated through the application of data mining in higher vocational English teaching. Finally, the training method of the college English assessment model is constructed based on the logistic regression model. The results show that the model is very suitable for the teaching characteristics of spoken English in higher education and the teaching effect is good. This study provides a preliminary exploration for the reform of English teaching in higher education based on big data technology and provides a reference basis for future teaching reform and practice.

## KEYWORDS

Higher-level English; Blended teaching; Data mining; Logistic regression; Big data technology

## 1. INTRODUCTION

With the rapid development of information technology, the application of big data is becoming more and more extensive. In the field of education, big data has also become an important support for teaching reform [1]. English teaching in higher education has been widely concerned, and how to promote the reform of higher education English teaching and improve the teaching effect through big data technology has become a hot issue of related research [2-3]. In recent years, many scholars have conducted research on the application of big data in higher vocational English teaching [4]. Some scholars believe that the teaching mode of higher vocational English courses based on big data technology can improve the teaching effect and enhance students' learning interest [5-6]. In addition, the current situation and problems of English teaching in higher education point out that there are some difficulties and shortcomings in technical support, teaching methods and teaching resources [7]. In order to overcome these difficulties, the researcher suggested that teachers should strengthen the application of big data technology, change the traditional teaching mode, and promote the renewal of teaching contents and forms [8].

## 2. THE CONSTRUCTION OF BLENDED TEACHING MODE OF ENGLISH IN HIGHER EDUCATION

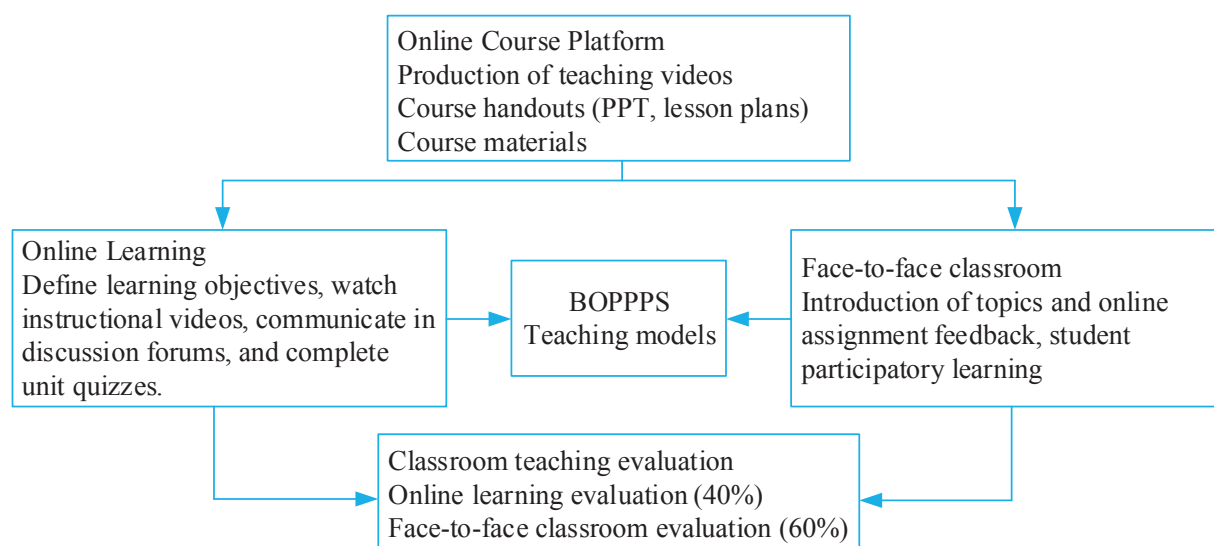
### 2.1. COMPOSITION OF ENGLISH TEACHING EVALUATION IN HIGHER EDUCATION

Under the blended teaching model based on the BOPPPS model, the teacher's learning evaluation of students includes formative and summative evaluations throughout the learning process, fully reflecting the students' input and classroom performance in the online learning process. Among them, 40% comes from students' participation in the online learning session and 60% comes from their performance in the face-to-face classroom, and the specific proportion of each component is shown in Table 1.

**Table 1.** Evaluation components of English teaching in higher education

Composition of classroom teaching evaluation						
Online learning (40%)				Face to Face Classroom (60%)		
Video viewing duration and notes	task	Unit quizzes	Discussion forum posting	Group activity performance	Classroom outcomes	Final oral exam
15%	10%	5%	10%	20%	30%	10%

After the overall planning and design of each part of the blended teaching process, the blended teaching model based on the BOPPPS model was finally constructed as shown in Figure 1.



**Figure 1.** English blended teaching model based on the BOPPPS model

### 2.2. DESIGN OF TEACHING ACTIVITIES

In the design of teaching activities, the six links of BOPPPS are used to effectively connect the learning content of the online course with the classroom teaching activities. The specific process is as follows:

(1) Let students personalize their time outside of class to study the online instructional videos and complete the corresponding learning task objectives.

(2) Through online assignments and student-teacher communication in the discussion forum, students can test the effectiveness of the online learning pre-test and prepare for the oral presentation activities in the face-to-face classroom.

(3) In the face-to-face classroom, the instructor provides feedback on students' online learning to introduce the topic. The focus is on participatory learning through group discussions, role plays, debates and other speaking activities. Students are given more opportunities to

communicate and demonstrate their speaking skills, and the teacher is able to get a true picture of how well students are learning online.

(4) The teacher summarizes the important and difficult sentence patterns taught in class and asks students to complete the unit quizzes of the online course after class to further consolidate the learning effect. Although the online learning and the face-to-face classroom are separated in terms of learning time, the activities are closely linked and organically integrated.

### **3. APPLICATION OF DATA MINING IN HIGHER EDUCATION ENGLISH TEACHING**

#### **3.1. DATASET AND FEATURE PROCESSING**

##### **3.1.1. DATA EXTRACTION**

Students use the University English Teaching and Assessment System to carry out training to predict whether or not to pass the exam, in which the data for the study are obtained from the teaching data within the system and involve the following information about the big drop.

###### **(1) Student user profile**

Student user profile refers to the basic information data of each student, such as basic personal information, answering behavior, etc.

###### **(2) English training questions data**

English training questions data refers to the basic information of all questions and the data when students do the questions. The specific data mainly includes the question type, difficulty and question weight of the test paper.

###### **(3) Students' environment during English training**

The data on the environment in which the students are working during the English training includes the total answer time of the students, the information on the equipment used to answer the questions, and the form of Internet access.

##### **3.1.2. DATA PRE-PROCESSING**

There are many problems in the data obtained in data extraction, such as inconsistent data in the same latitude, and some noise may exist in the data, which is also called dirty data. In performing model prediction, if the quality of the data cannot be guaranteed, it will have some influence on the prediction results. Therefore, corresponding measures need to be taken to eliminate the dirty data.

###### **(1) Data cleaning**

In the collected data, there may be some fields missing. For this situation, we can start from the following three ways: filling in manually, filling in by using feature average and predicting the missing values by machine learning model algorithm.

###### **(2) Data integration**

In the process of exporting raw data, several tables are generated, and data integration is the process of combining the data from these tables into a total data store.

###### **(3) Feature processing**

In feature processing, data mining is performed by using machine learning models, and feature processing is completed, and the main methods include normalization, discretization, feature dimensionality reduction, and feature selection.



## 3.2. DATA MINING BASED ASSESSMENT MODEL FOR COLLEGE ENGLISH

### 3.2.1. LOGISTIC REGRESSION MODEL

The logistic regression model is an evolution of optimization based on the linear regression concept, in which a linear regression is fitted to a given data point by using 1 straight line, and the process of fitting is linear regression. In linear regression, all sample characteristics in the combined training sample set are multiplied with the parameters separately, and then the resulting results are summed and the model takes the form of

$$h(x) = w_0x_0 + w_1x_1 + w_2x_2 + \dots + w_nx_n \quad (1)$$

The vector equation, as

$$h(x) = W^T X \quad (2)$$

### 3.2.2. COLLEGE ENGLISH ASSESSMENT MODEL TRAINING

The posterior probability of each sample as:

$$p(y | x, w) = p(y_i = 1 | x_i) y^i (1 - p(y_i = 1 | x_i))^{1-y_i} \quad (3)$$

The maximum likelihood function in the sample is the result of multiplying the posterior probabilities of each sample as:

$$L(W) = \prod_{i=1}^m p(y_i = 1 | x_i) y^i (1 - p(y_i = 1 | x_i))^{1-y_i} \quad (4)$$

For the contingent likelihood function, as:

$$L(W) = \sum_{i=1}^m \log p(y_i = 1 | x_i) y^i (1 - p(y_i = 1 | x_i))^{1-y_i} \quad (5)$$

Solving for it and deriving it for w yields:

$$w' = \frac{\partial L(w)}{\partial w} \sum_{i=1}^m (y_i - g(z)) x_i \quad (6)$$

When the derivative is 0, it is not possible to derive w. Therefore, it is necessary to find w by means of algorithmic optimization. During the training process, a penalty term about w can be added to the loss function (W).

## 4. CONCLUSION

This study makes a preliminary exploration on the reform of higher vocational English teaching in the context of big data, and proposes the construction of a blended teaching model of higher vocational English speaking and the application of data mining in higher vocational English teaching. Through the practice and analysis of this study, the following conclusions are drawn:

(1) We clarified the components of the evaluation of higher vocational English teaching and designed teaching activities suitable for blended teaching. The construction of this model enables students to complement each other in traditional classroom teaching and online learning, and improves their oral expression ability and comprehensive language use ability.

(2) We built a data mining-based assessment model for college English to assess and improve students' language skills. This data mining-based assessment model can more accurately identify students' language proficiency and provide targeted instructional coaching.

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# THE DEVELOPMENT STATUS AND PROSPECT OF BEHIND-THE-SCENES DOCUMENTARY FILM IN CHINA IN THE CONTEXT OF BIG DATA

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## ABSTRACT

This paper firstly analyzes the production mode and function of behind-the-scenes documentaries, and discusses the specific values carried by behind-the-scenes documentaries. Secondly, the K-means cluster analysis algorithm in big data technology is used to analyze the development constraints of behind-the-scenes documentaries with the existing evaluation of the Internet. The results show that the user evaluations of single value pursuit, rough production, lack of artistry, lack of industry, and lack of platform account for 40.75%, 30.06%, 33.46%, 20.26%, and 30.98%, respectively. Finally, some feasible strategies for the development of behind-the-scenes film documentaries are proposed, i.e., starting from the theme of the story to trigger the emotional resonance of the audience. And a professional team needs to be utilized to further balance business and art to promote the innovative development of behind-the-scenes film documentaries.

## KEYWORDS

Film; Big data technology; K-means algorithm; Cluster analysis; Behind-the-scenes documentary; Development strategy

## 1. INTRODUCTION

From the birth of documentary films at the beginning of the century to the present, the content of documentary films tends to be diversified and the subjects are all-embracing, forming different documentary genres such as humanities and social documentaries, natural science and technology documentaries, and documentary films, which have greatly enriched people's cognitive world [1-2]. Since the beginning of the new century, under the influence of the creative thinking of other countries in the world, Chinese documentaries have undergone significant changes in the concept of creation, and the areas of concern have gradually expanded, resulting in a number of new documentary genres. Among them, the emergence of documentaries that focus on the filmmaking process as the main recording content has created a brand new kind of documentary - behind-the-scenes film documentaries [3-4].

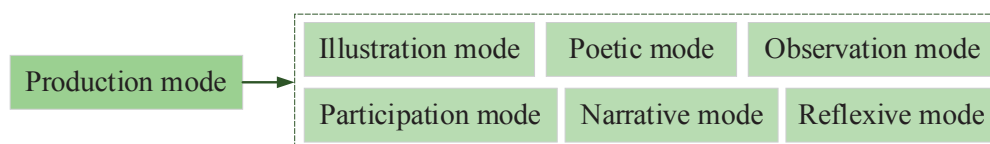
A behind-the-scenes documentary is both a faithful record of the film-making process and a new creative act done by the writer-director. Unlike the fictional creation of feature films, behind-the-scenes documentaries can be regarded as the documentary creation of the writer-director, which generally consists of two steps. The first step is to selectively collect the original material in the process of film creation, and then creatively refine the material to form an audiovisual text with an artistic form, which conveys the emotional experience and value judgment of the creative subject to the audience and realizes the emotional communication

and spiritual communication with the audience [5-6]. Therefore, in behind-the-scenes documentary creation, the camera is not only a machine to record behind-the-scenes facts, but also an ideographic tool controlled by the creator. In addition, the commercial orientation and utilitarian demands of behind-the-scenes documentaries have led to the development of their documentary from aesthetic principles to instrumental styles, placing more emphasis on discovering stories from behind-the-scenes material, enhancing the episodic nature of the documentary, and promoting the marketing and dissemination of the film through storytelling expressions [7-8].

## 2. THE PRODUCTION MODE AND FUNCTION OF BEHIND-THE-SCENES DOCUMENTARY FILM

### 2.1. THE PRODUCTION MODEL OF BEHIND-THE-SCENES FILM DOCUMENTARIES

A behind-the-scenes film documentary is a filming of a specific film production process that involves both films in terms of content. Therefore, in this paper, the feature films that are the focus of behind-the-scenes documentaries are referred to as original films, and behind-the-scenes documentaries are referred to as film documentaries or behind-the-scenes documentaries. The creation of behind-the-scenes film documentaries absorbs the traditional modes of documentary filmmaking, and Nichols classifies documentaries into six modes, as shown in Figure 1.

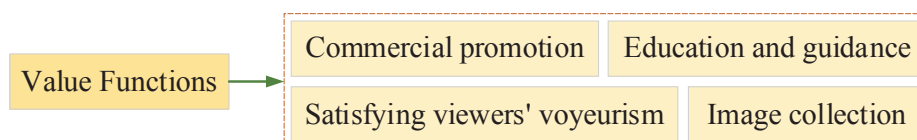


**Figure 1.** Behind the scenes of a film documentary production model

Narrative mode is an approach that combines clips of past occurrences to form a structure that better suits the needs of the filmmaker. The poetic mode is a way to correlate temporal rhythm and spatial arrangement, often manifested in behind-the-scenes documentaries as montage clips with background music to show the passage of real time. Narrative mode focuses on highlighting experiences and memories, showing a social subjectivity from the universal to the particular, from the individual to the collective, etc.

### 2.2. THE VALUE FUNCTION OF BEHIND-THE-SCENES FILM DOCUMENTARIES

Although the behind-the-scenes documentary has only been around for a decade, it has gradually revealed its own value and function as the number of works increases. The behind-the-scenes documentary is originally from the film body and therefore has the function of serving the film, while the behind-the-scenes documentary as an independent film and television text has its own theme, which all constitute the unique mark of the behind-the-scenes documentary. The value and function of behind-the-scenes documentaries are shown in Figure 2.



**Figure 2.** The value function of behind-the-scenes film documentaries

The reason for the rapid development of behind-the-scenes documentary film at this stage is that it serves the propaganda function of the film body. The film is a figurative expression of the art of video, which originates from life but is higher than life, and people peep into the lives of all kinds of people through the images shown on the screen. The behind-the-scenes

documentary is a record of the director's filmmaking process, and it is full of the director's control of the main body of the film and in-depth thinking, which has great educational value and also has a guiding meaning in the same industry. The behind-the-scenes documentary is a documentary film, and compared with the timeliness of its own publicity function, its documentary effect is more long-lasting and more meaningful. At the same time, in order to ensure the objectivity and integrity of the material, the scene usually uses "direct" filming, synchronization of material, and from the details of the plot and story, so that the audience can see the real story of the film behind the scenes.

### 3. K-MEANS-BASED ANALYSIS OF CONSTRAINTS ON THE DEVELOPMENT OF BEHIND-THE-SCENES FILM DOCUMENTARIES

The K-means algorithm is an iterative cluster analysis algorithm that divides the data into  $k$  group in advance and randomly selects  $k$  objects as the initial clustering centers. By calculating the distance between each object and each cluster center, the data object is divided into the nearest cluster centers, and the cluster centers are recalculated after each sample is assigned, repeating until the termination condition is satisfied. The algorithm can gather samples with higher similarity in the same class. Considering the requirement of algorithm complexity for the analysis of the constraints of the development type of behind-the-scenes film documentaries, the Euclidean distance with less algorithm complexity is usually used in calculating the distance between samples.

Assuming that dataset  $D$  has  $n$  sample objects and the feature dimension of each data sample is  $m$ -dimensional, the  $i$ th data object can be represented as  $X_i = (x_{1i}, x_{2i}, \dots, x_{mi})$ , where  $x_{mi}$  is the  $m$ th dimensional feature of data object  $X_i$ . If  $k$  data are randomly selected as the initial clustering center, the  $j$ th clustering center can be expressed as  $C_j = (c_{1j}, c_{2j}, \dots, c_{mj})$ , where  $c_{mj}$  is the  $m$ th dimensional feature of the clustering center  $C_j$ . Then the Euclidean distance  $d(i,j)$  between two data objects  $X_i$  and  $C_j$  is specifically calculated by the expression

$$d(i,j) = \sqrt{(x_{1i} - c_{1j})^2 + (x_{2i} - c_{2j})^2 + \dots + (x_{mi} - c_{mj})^2} \quad (1)$$

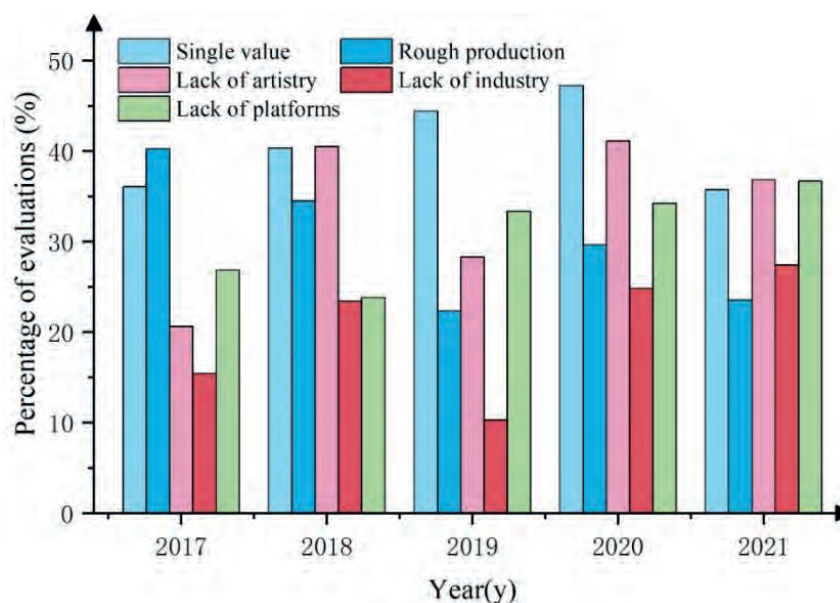
The criterion function of the K-means algorithm usually uses the error sum-of-squares function, and let  $C_i$  be the clustering cluster,  $Y$  be the data object in the clustering space, and  $m_i$  be the center of  $C_i$ . The mean square error  $E$  is expressed as

$$E = \sum_{j=1}^k \sum_{Y \in C_j} |Y - m_j|^2 \quad (2)$$

This allowed for the collection of user ratings of behind-the-scenes documentaries of films that existed on the Internet from 2017-2021 and the quantitative analysis of the data using the K-means algorithm, and yielded the results shown in Figure 3.

From the results of the Internet cluster analysis on the development constraints of behind-the-scenes film documentaries, from 2017 to 2020, single value pursuit, rough production, lack of artistry, lack of industry and lack of platform become the main factors hindering the development of behind-the-scenes film documentaries, with user ratings of 40.75%, 30.06%, 33.46%, 20.26%, and 30.98%. This shows that the current competition in the Chinese film market has made behind-the-scenes documentaries a commercial propaganda tool, which has gradually lost its other functions such as education. And the production of behind-the-scenes

documentaries in an eye-catching way makes them untechnical and unpopular with users. It is necessary to propose effective development strategies to avoid the misunderstanding of Chinese behind-the-scenes documentaries, so that Chinese behind-the-scenes documentaries can better perform their functions and gain the recognition of audiences.



**Figure 3.** Constraints to the development of behind-the-scenes film documentaries

#### 4. THE DEVELOPMENT STRATEGY OF BEHIND-THE-SCENES DOCUMENTARY FILM IN THE CONTEXT OF BIG DATA

In the context of big data, film as a kind of image text has both contemporary and historical communication value. The explosive development of Chinese cinema in recent years is the brilliant result of the continuous construction of China's film industry chain, the continuous improvement of the film industry system, and the continuous gathering of film viewers' desire to watch movies, among other factors. As a behind-the-scenes documentary that visually records the process of film production and related thematic events, it is of great significance to the industry in terms of innovation and promotion of industry development. In the face of the behind-the-scenes documentary at this stage of the emergence of quick success and near profit reduced to the pursuit of a single value of film and television publicity film asked the uneven quality of the lack of a professional team and so on. There is an urgent need for corresponding measures to make the behind-the-scenes documentary industry really get attention to achieve a healthy long-term development.

(1) Balancing commerce and art, behind-the-scenes film documentaries should accomplish the purpose of propaganda while also adhering to the artistic principles of documentaries. Through objective observation and recording, creative processing of the material, and proper handling of the relationship between propaganda and artistry, in order to play the role of film set documentaries to strengthen the theme of the film and stimulate the audience's interest in watching the film.

(2) Focusing on storytelling to dig deeper into the theme, behind-the-scenes film documentaries are documentaries that instill humanistic care by looking at people in film production or related background themes. It is an artistic medium used by humans to communicate, exchange and understand, and needs to further focus on emotional expression and character portrayal to win the audience's empathy.

(3) Team specialization to achieve industrialization, no market-oriented mode of operation can not form a relatively complete industrial pattern will seriously limit the development of the

film behind the scenes documentary. It is necessary to further cultivate professional talents, establish multiple distribution channels and innovative marketing to create an industrialized platform for behind-the-scenes documentaries and promote the innovative development of Chinese behind-the-scenes documentaries.

## 5. CONCLUSION

This paper takes the production mode and functional value of behind-the-scenes documentaries as the starting point, and analyzes the types and values of behind-the-scenes documentaries in detail. The analysis of the constraints on the development of behind-the-scenes documentaries by using K-means cluster analysis algorithm with big data technology shows that: the single pursuit of value, rough production, lack of artistry, lack of industry and lack of platform are the main factors that hinder the development of behind-the-scenes documentaries, and the percentage of user ratings are 40.75%, 30.06%, 33.46%, 20.26% The percentages of user ratings are 40.75%, 30.06%, 33.46%, 20.26%, and 30.98% respectively. This gives the development strategy of Chinese behind-the-scenes documentaries in the context of big data, i.e. the need to further dig deeper into the story theme, focus on the balance of commercialization and artistry and build a professional team to promote the development of behind-the-scenes documentaries.

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# THE CONSTRUCTION OF EARLY WARNING MECHANISM OF COLLEGE STUDENTS' PSYCHOLOGICAL CRISIS UNDER THE BACKGROUND OF BIG DATA

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## ABSTRACT

Under the background of big data, the article analyzes that the main stressors faced by college students are learning pressure, independent and independent pressure, family and economic pressure and future pressure, and the stressors of college students have certain differences in gender, grade, major, self-assessed academic performance, family origin, whether they are only children, family structure, parents' marital status and family income level. Combining the relevant knowledge of psychology and the actual management of college students, we combine qualitative and quantitative analysis to construct an early warning mechanism for college students' psychological crisis, so as to provide reference for the prevention of college students' psychological crisis and thus promote the free and comprehensive development of college students.

## KEYWORDS

College students; Stressors; Psychological crisis; Early warning mechanism

## 1. INTRODUCTION

Along with the development of big data and media convergence, China has entered the all-media era. In the era of full media, information is everywhere, everywhere, and no one uses it, which leads to profound changes in the ecology, media pattern and communication mode [1-2]. As a result, contemporary college students have a new identity "Internet generation", and the changes in their growth environment naturally cause changes in their psychological conditions, and the psychological problems of contemporary college students are mostly reflected in the reshaping of interpersonal communication ability, the reconstruction of self-cognition, the guidance of values and the relief of media dependency symptoms, etc., which are accompanied by interpersonal communication disorders, the prevalence of Internet violence, virtual personalities and the lack of communication, The changes of these psychological factors are all related to the "media ecological environment" [3-5]. Therefore, it is particularly important to construct an early warning mechanism for college students' psychological crisis in the era of full media. In the face of the profound changes that are taking place in the ecology, media pattern, and communication mode of the Austrian debate, the psychological situation of college students is waiting for the opportunity to move, which means that the early warning mechanism for college students' psychological crisis needs to be adjusted urgently [6-7].



## 2. STUDENT PSYCHOLOGICAL STRESS SURVEY STATISTICS

### 2.1. RESEARCH SUBJECTS

The population of this study was college students nationwide, but due to the limited time and the resources available, this survey used an overall stratified sampling method, and a total of 800 undergraduates from freshman to senior years were selected from four universities in Guangzhou as respondents, and 791 were collected, including 171 freshmen, 229 sophomores, 197 juniors, and 194 seniors. There were 327 male students and 464 female students. There were 361 people in arts, 311 people in science and technology, and 119 people in arts and sports. The questionnaires were distributed and collected by mail, and the statistical tool of the questionnaire was SPSS17.0.

### 2.2. GENERAL CHARACTERISTICS OF COLLEGE STUDENTS' STRESSORS

The mean values and standard deviations of the scores of each factor of college students' stressors are shown in Table 1, and it can be seen that the mean scores of each factor of college students' stressors are, in descending order, study stress, autonomy and independence stress, family and economic stress, future stress, social and interpersonal stress, opposite-sex relationship stress, and major and sudden stress.

**Table 1.** Means and standard deviations of college students' stressor scores for each factor

Stressors	Average value	Standard deviation
Learning Stress	14.94	7.72
Autonomy and independence stress	13.64	8.85
Family and financial pressures	9.29	9.43
Career stress	8.92	5.38
Social and interpersonal stress	8.39	8.13
Heterosexual Stress	8.21	8.56
Critical and sudden stress	4.52	4.98

### 2.3. COMPARISON OF THE DIFFERENCES OF COLLEGE STUDENTS' STRESSORS ON THE ONLY CHILD

The results of the independent sample t-test on each factor and total stress score of stressors for college students with only child and non-only child are shown in Table 2. It can be seen that only-child college students have higher scores than non-only-child college students on the five stressors: major and sudden stress, academic stress, social and interpersonal stress, opposite-sex stress, and autonomy and independence stress, as well as on the total stress score. The scores of the two stressors, major and sudden stress and heterosexual stress, were significantly higher than those of the non-one-child college students, while the scores of the five stressors, family and financial stress, future stress, study stress, social and interpersonal stress, and autonomy and independence stress, did not differ significantly between the one-child college students and the non-one-child college students.

**Table 2.** Comparative results of differences in college students' stressors on only child

Pressure source	one child	Quantity	AVG	SD	Significance
Major and sudden stress	Yes	328	5.136	5.48724	P=0.04
	No	463	4.068	4.54061	
Family and Economic Stress	Yes	328	9.2085	9.75417	P=0.823

	No	463	8.8527	9.19469	
Mileage pressure	Yes	328	7.9266	5.03311	P=0.716
	No	463	8.9913	7.92205	
Study Stress	Yes	328	14.9815	5.63312	P=0.924
	No	463	9.0185	8.26146	
Social and interpersonal stress	Yes	328	9.3925	7.34751	P=0.065
	No	463	7.3492	8.37025	
Opposite sex relationship stress	Yes	328	9.3925	9.30272	P=0.001
	No	463	7.3492	7.92205	
Autonomy and Independence Stress	Yes	328	13.1723	8.50894	P=0.066
	No	463	71.1226	47.3302	
Total stress score	Yes	328	14.3191	8.87984	P=0.104
	No	463	65.8232	41.8742	

## 2.4. COMPARISON OF COLLEGE STUDENTS' STRESSORS IN TERMS OF GENDER DIFFERENCES

The results of the independent sample test on the mean scores of the factors and the mean scores of the total stress scores of the stressors of college students of different genders are shown in Table 3. It can be seen that the mean scores of each factor and total stress scores of female college students are higher than those of male college students. In addition, the differences between male and female college students in the scores of four stressors, namely, major and sudden stress, family and economic stress, heterosexual relationship stress, and social and interpersonal stress, as well as the total stress scores, were significant, and the scores of female college students were significantly higher than those of male college students. There was no significant difference in the scores of male and female college students on the three stressors: career stress, study stress, and autonomy and independence stress.

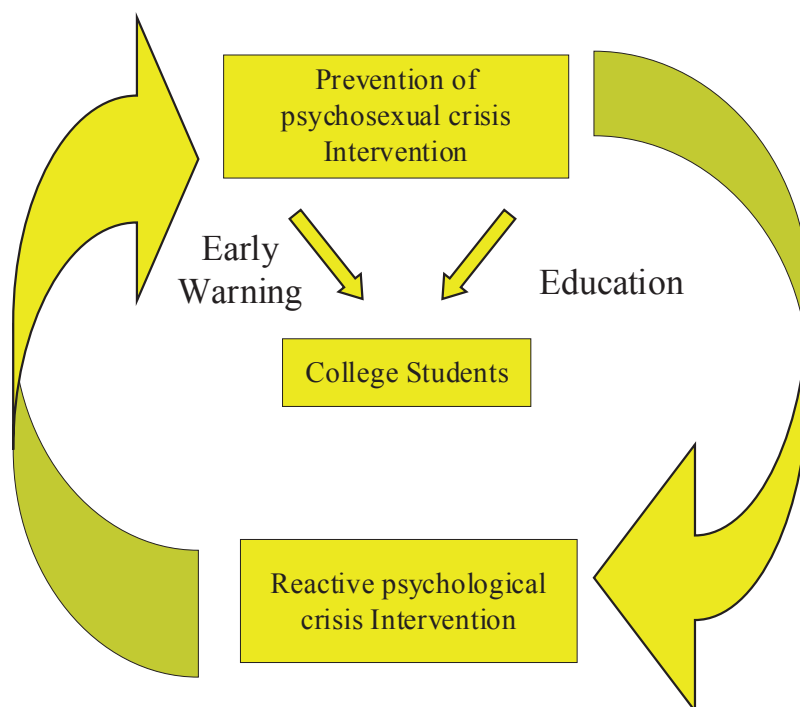
**Table 3.** Comparison of gender differences in stressors among college students

Pressure source	one child	Quantity	AVG	SD	Significance
Major and sudden stress	Male	330	5.0487	4.60793	P=0.01
	Female	461	4.1256	5.19525	
Family and Economic Stress	Male	330	10.3842	9.43828	P=0.006
	Female	461	8.9047	5.30212	
Mileage pressure	Male	330	8.5282	9.34736	P=0.855
	Female	461	8.9755	5.52111	
Study Stress	Male	330	15.4452	8.52787	P=0.142
	Female	461	14.5973	7.10306	
Social and interpersonal stress	Male	330	9.0914	8.22304	P=0.037
	Female	461	7.8702	8.04492	
Opposite sex relationship stress	Male	330	9.7072	8.73601	P=0.000
	Female	461	64.5802	43.5261	
Autonomy and Independence Stress	Male	330	7.1168	8.29756	P=0.188
	Female	461	14.1279	8.72841	
Total stress score	Male	330	13.3031	8.63297	P=0.01
	Female	461	72.5802	44.8658	

### 3. THE CONSTRUCTION OF EARLY WARNING MECHANISM OF COLLEGE STUDENTS' PSYCHOLOGICAL CRISIS BASED ON BIG DATA

#### 3.1. PREVENTIVE PSYCHOLOGICAL CRISIS INTERVENTION FOR COLLEGE STUDENTS

In the practice of psychological crisis intervention, reactive crisis intervention is indispensable, but it has limitations such as passivity and lagging. Therefore, in the practice of psychological crisis among college students, we should follow the "big intervention concept of combining preventive psychological crisis intervention and reactive psychological crisis intervention" and establish the concept of preventive psychological crisis intervention for college students as shown in Figure 1. Preventive psychological crisis intervention for college students means that colleges and universities aim to prevent the occurrence of college students' psychological crisis by planning certain programs and activities in advance, or try to prevent the development of more serious problems by designing certain strategies to intervene in college psychological crisis at an early stage, so as to control the development of college students' psychological crisis. Preventive psychological crisis intervention for college students attaches importance to prior prevention and focuses on education and early warning. Its short-term goal is to contain the possible psychological crises of college students in the bud and prevent them from occurring in the first place, and its long-term goal is to promote the comprehensive and free development of college students' body and mind. The current psychological crisis intervention work for college students should adopt the intervention mode of mainly preventive psychological crisis intervention, supplemented by reactive psychological crisis intervention, so that the pre-prevention and post-intervention can be coordinated, echoed and unified.

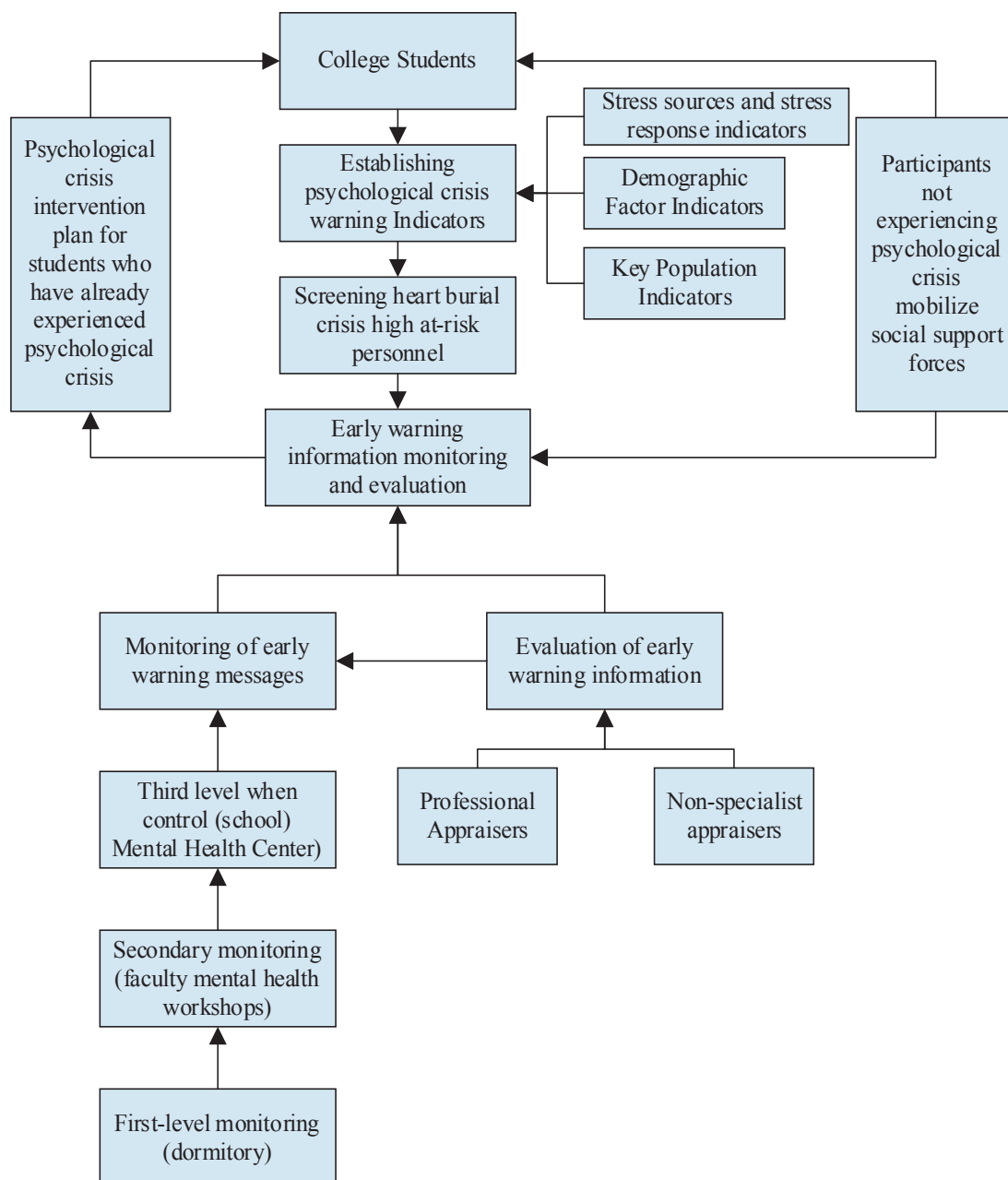


**Figure 1.** Concept of preventive psychological crisis intervention for college students

#### 3.2. EARLY WARNING MECHANISM FOR COLLEGE STUDENTS' PSYCHOLOGICAL CRISIS

The construction of the psychological crisis early warning mechanism for college students is a systematic project. It is important to analyze the main links of the psychological crisis early warning mechanism for college students and grasp the relationship between each link and

each link and the whole, so as to ensure that the constructed mechanism can run effectively. The construction of early warning mechanism for psychological crisis of college students. According to the main stress sources encountered by public security college students and their stress reaction status, combined with the demographic factors of college students and the actual police management, establish the psychological crisis early warning index, and accordingly screen the high-risk personnel (faculty psychological professionals), monitor and evaluate the high-risk personnel (faculty psychological professionals) with daily performance (district team and dormitory collection), and if it is found that they may be suspected of psychological crisis, then Need to quickly mobilize their social support forces (faculty) to prevent the occurrence of psychological crisis. The department will upload the appropriate information to the school's mental health center. If the person is in psychological crisis, the school mental health center will start the psychological crisis intervention plan to help the person get rid of the psychological crisis as soon as possible, the specific early warning mechanism is shown in Figure 2.



**Figure 2.** Early warning mechanism for college students' psychological crisis

#### 4. CONCLUSION

Under the background of big data, it is necessary to establish a three-level psychological crisis early warning and monitoring network in school, college and dormitory in order to timely and accurately record the abnormal psychological and behavioral performance of early warning subjects and update the changes of their psychological status into the early warning information database through the early warning network. On the basis of improving the three-level early warning and monitoring network, we use network technology to establish a “flat” psychological crisis early warning and monitoring network to realize direct communication between students and school mental health education center, students and college, college and school mental health education center and other channels, which can greatly improve the timeliness and effectiveness of handling psychological crisis emergencies. and effectiveness.

#### FUNDING

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# A STUDY ON THE IMPACT OF ETHNIC MUSIC INDUSTRIALIZATION ON MUSIC EDUCATION MAJORS IN UNIVERSITIES IN THE CONTEXT OF BIG DATA

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## **ABSTRACT**

This paper firstly discusses the cultural essence of folk music and gives measures for the development of folk music industrialization. Secondly, in order to screen out better folk music, the calculation of folk music feature thresholds and feature weights is carried out using big data technology to achieve feature selection. Finally, quantitative data analysis was conducted using Internet data as an example. The results showed that 82.17% thought that the industrialization of folk music could make the music appreciation ability of college music education students improved, and 73.26% thought that the industrialization of folk music could promote the reform and innovation of college music education mode.

## **KEYWORDS**

Folk music; Industrialization; Feature selection; Music education; Big data technology; Feature weights

## **1. INTRODUCTION**

The 5,000-year history and civilization of the Chinese nation has nurtured countless cultural essences, of which ethnic music culture is one of the most colorful. Ethnic music culture is a source of progress and development of human society, as it is the cultural essence of all ethnic groups, shoulders a strong cultural mission, and carries profound national spirituality, ideals and beliefs, and cultural heritage [1-3]. China has a long history and many ethnic groups, and one side of the land nurtures one side of the people, and one side of the land nurtures one side of the culture, and each ethnic group has formed a music culture with strong characteristics.

Ethnic music, as an important branch of the music industry, has an important significance both in terms of economic effects and in the inheritance and preservation of traditional Chinese culture, and ethnic music has injected fresh blood and new forms of expression into the development of modern music [4-5]. Many scholars and experts have conducted in-depth analysis and research on folk music, but due to the subjectivity and focus of research, a complete system has not yet been formed for the study of the heritage of folk music and some of its effects on modern music, and there is a lack of a systematic and integrated industrial

development concept.

In the context of global multicultural development, we should not only absorb the excellent foreign culture and use it for the Chinese, but also inherit and innovate our national culture, carry forward the excellent national spirit of the Chinese nation, and use the ancient for the present [6-7]. Music education in colleges and universities is an important way to realize the inheritance and dissemination of Chinese traditional culture, and national music culture must be deeply integrated into college music education to continuously improve the real influence of national music culture and enhance college students' awareness of national music culture [8-9].

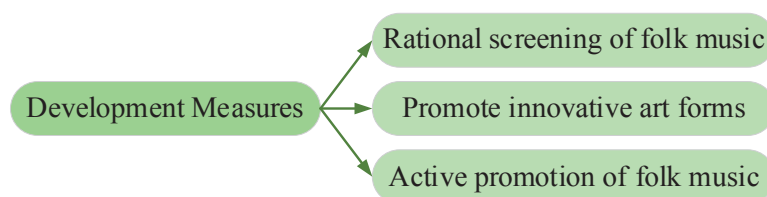
## 2. CULTURAL ESSENCE OF FOLK MUSIC AND INDUSTRIALIZATION DEVELOPMENT MEASURES

### 2.1. THE CULTURAL ESSENCE OF FOLK MUSIC

Ethnic music culture is a musical style gradually formed by ethnic minority people in their life, production and activities, and is the main embodiment of traditional history and culture. Analyzed from the perspective of the essence of ethnic music, the music of ethnic minorities is also the embodiment of the character and aesthetics of ethnic minorities, showing the cognitive understanding of life, life and nature of ethnic minority people. Personal thoughts and emotional consciousness are expressed through the rhythm of the tunes and are sung according to the differences in the actual meaning conveyed by the words and songs to match different occasions. The life and development of ethnic minorities are closely related to music culture, for example, there are many prayer songs for social activities such as ritual meetings and festival celebrations, which also show the social performance of ethnic minority music culture.

### 2.2. DEVELOPMENT MEASURES FOR THE INDUSTRIALIZATION OF FOLK MUSIC

Folk music has a very prominent position in China's bright culture, and has unique cultural connotation and artistic value in terms of expression, national culture and national spirit it conveys. Folk music is a kind of art precipitated by the baptism of time and the rendering of regional culture in the long history with strong national colors and unique expressions. After hundreds of years of development and precipitation, folk music has its own industry chain, and it has greatly influenced the development of music education in colleges and universities. The specific development measures of ethnic music specialization are shown in Figure 1.



**Figure 1.** Development measures for the industrialisation of folk music

## 3. DATA CLASSIFICATION FOR FEATURE SELECTION OF ETHNIC MUSIC IN THE CONTEXT OF BIG DATA

At present, China has countless folk music works, and among these huge number of music works, there are great differences in their artistic level, expressive content and quality. For this reason, we should select folk works with specific conditions, reasonably screen folk music, and choose the best part of it. We should fully purify and screen the folk music with rich humanistic sentiment and artistic characteristics, so as to promote the long-term development of folk music. This chapter uses big data to selectively screen the characteristics of folk music, so that the

best folk music can be discovered.

Big data is characterized by speed, immediacy, and the sum of personalization and socialization. The speed is manifested in three aspects, which are fast data generation, large scale of massive data expansion, and fast data disappearance. Digitization brings the mobility of life, therefore, it is necessary to enhance the immediacy of information processing. Compared with traditional methods of screening for ethnic music, big data usually has a special relationship with users' immediate actions. Big data has a strong connection with people and social activities, and data can no longer be distributed according to physical structures, but needs to be reorganized in combination with personal and social relationships. The same is true for the industrial development of folk music, which can only be sustainable if structured content is added.

Usually the data are classified and the metadata are directly treated as features, but for a sample, different data represent different weights, i.e., for different metadata to distinguish the degree of inconsistency. In this paper, based on the above big data characteristics, certain improvements are made to feature selection, and the improved expressions are:

$$tf_{ik} = f_{ik} / \sum_{j=1}^t f_{ij} \quad (1)$$

Where,  $tf_{ik}$  denotes the  $k$  rd metadata frequency of sample  $X_i$ ,  $f_{ik}$  denotes the number of metadata occurrences, and  $j$  denotes the sample capacity. Then the threshold value of sample feature selection is:

$$f_k = \lg(N / n_k) \quad (2)$$

Where,  $N$  denotes the number of sample points and  $n_k$  is the number of samples in which the metadata has appeared, the final sample feature weight expression is

$$w_{ik} = ((\lg(f_{ik}) + 1) \cdot f_k) / \sqrt{\sum_{k=1}^t [(\lg(f_{ik}) + 1) \cdot \lg(N / n_k)]} \quad (3)$$

In the equation, the addition of 1 to the metadata is to ensure the presence of non-zero weights for metadata whose frequency is 1. The sample features are selected according to the weight size. Based on the feature selection of the ethnomusicology data samples, the classification of the ethnomusicology data is performed.

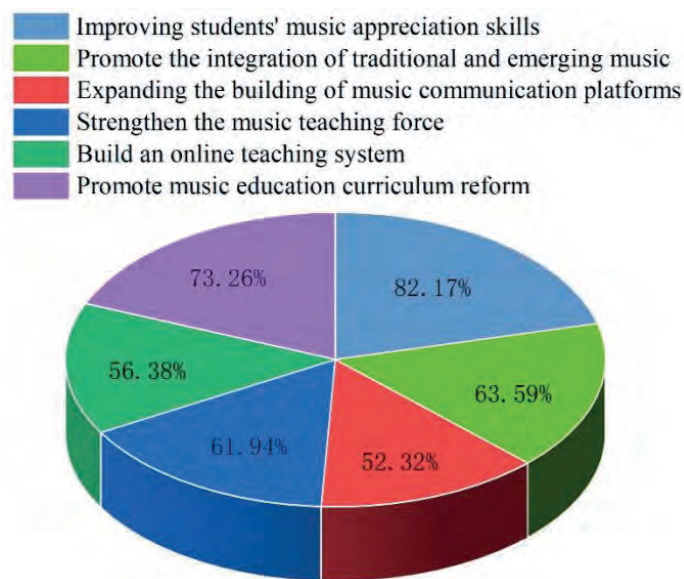
#### 4. THE IMPACT OF INDUSTRIALIZATION OF FOLK MUSIC ON MUSIC EDUCATION MAJORS IN COLLEGES AND UNIVERSITIES

Based on the previous discussion on the industrialization of ethnic music and the data classification of ethnic music feature selection through big data technology, this chapter focuses on the quantitative analysis of data based on the currently available data on the trend of ethnic music industrialization on college music education majors on the Internet, as a way to explore the specific impact of ethnic music industrialization on college music education majors. The impact of ethnic music industrialization on college music education majors within the period of 2017 to 2021 the results of the impact of industrialization on music education majors in colleges and universities are shown in Figure 2.

From the evaluation results on the Internet about the influence of the industrialization of ethnic music on music education in colleges and universities, 82.17% of people think that the industrialization of ethnic music can make the music appreciation ability of students majoring in music education in colleges and universities improved. This indicates that the development



of music industrialization can have a positive impact on the education and teaching of music majors in higher education institutions, and students can use modern music production software to experience the charm of music in a deeper level. In addition, students' job search and employment are no longer limited to their professional ability, and they can use their hobbies as the basis for development to enhance their music appreciation and composition ability. 73.26% believe that the industrialization of folk music can promote the reform and innovation of music education mode in colleges and universities, which indicates that the development of music industrialization can transform the traditional education concept within institutions and has a profound impact on promoting the reform of music curriculum in higher education institutions. It further increases the practical teaching of students, who can personally participate in art performance-type activities and summarize their music learning experience and improve their music skills in practice. The percentage of those who think that the industrialization of ethnic music can help music education majors achieve the integration and development of traditional and emerging music is 63.59%, which indicates that the development of music industrialization has stimulated the development of music e-commerce, music peripheral products, and high-end music equipment. Colleges and universities can use multimedia and other advanced technologies to use music images and acoustic materials as the main teaching content of music classes, so that traditional music expressions can be fully integrated with modern technical means. This optimizes the audiovisual experience of students and maximizes their ability to perceive the beauty of music.



**Figure 2.** The impact of the industrialisation of folk music

The educational philosophy of today's higher education institutions is gradually changing from one based on professional education to one based on aesthetic education, where students can truly achieve all-round development. Despite this shift in educational philosophy, aesthetic education has always been a more superficial development, and the failure of both students and teachers to raise the importance of music education has become a key issue limiting the development of music in higher education. As the key to talent training in higher education institutions, the real implementation of the concept of music professional education is crucial. Only by raising the importance of music education among students in institutions can we improve the environment for the development of the music industry and thus enhance the economic benefits of China.

## 5. CONCLUSION

This paper analyzes the development measures of folk music industrialization from the

cultural essence of folk music. In order to better screen out representative folk music culture for industrialization, the feature threshold and feature weights of folk music are selected using big data technology. A data analysis was conducted on the impact of the industrialization of folk music on the existing Internet on the music education majors in colleges and universities. The results showed that the percentages of helping students improve their music appreciation ability, promoting music curriculum reform, and prompting the integration of traditional and emerging music were 82.17%, 73.26%, and 63.59%, respectively. This indicates that the industrialization of ethnic music in the context of big data can effectively realize the improvement of learning ability and music appreciation ability of college music education students, and also further innovate the development of music education curriculum.

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# EXPLORING THE MODE OF ENGLISH TEACHING IN COLLEGES AND UNIVERSITIES IN THE CONTEXT OF INFORMATIZATION

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## ABSTRACT

In the context of information technology, all higher education institutions are actively exploring online and offline hybrid English teaching models suitable for students' learning characteristics. The hybrid teaching model was explored, and the effectiveness in English writing skills training was evaluated in terms of performance and analyzed quantitatively and qualitatively by SPSS data statistical method on the English writing scores of 80 college students, and 40 hybrid writing learning test questions were designed. The results showed that the participants' mean scores in English writing showed significant differences in the pre-test and post-test experiments. In the English writing proficiency assessment, students' English writing scores showed significant differences ( $\alpha \leq 0.05$ ), which verified the advantages of implementing a blended English teaching model in English writing instruction.

## KEYWORDS

Information background; College English; Online and offline hybrid; Teaching mode

## 1. INTRODUCTION

At this stage, China's economy is running smoothly, and the development of information technology in China has entered a brand new stage, and intelligent technology has been applied in various fields in China, and the external education in schools is naturally no exception [1-3]. English is the common language in the world nowadays, and with the accelerating globalization, the importance of English is becoming more and more significant [4-5]. In addition, since English is more practical, students need not only to master some theoretical knowledge in the process of learning English, but also to be able to apply the knowledge learned in practical life [6-7]. Thus, in the current context of information technology, it is very necessary to innovate English teaching in colleges and universities [8-9].

## **2. RESEARCH ON THE ONLINE AND OFFLINE HYBRID ENGLISH TEACHING MODE IN THE CONTEXT OF INFORMATION TECHNOLOGY**

### **2.1. “ONLINE” AND “OFFLINE” HYBRID TEACHING MODE**

In the era of rapid development of information, the full use of various network information to contemporary English teaching, so that students can use the network platform for learning and communication to achieve “online” and “offline” mixed learning. This not only greatly enriches teaching resources, but also expands students’ learning horizons and makes their learning more convenient and faster.

The “online” and “offline” blended teaching makes good use of information technology as a platform for students to learn online anytime and anywhere, and also highlights the “student-centered” learning mode. It facilitates the communication between students and teachers, and improves students’ interest in English learning and their ability to learn English independently. Therefore, the “online and offline” blended teaching mode is very much in line with the current requirements of China’s teaching reform, and it is also very important for the research and exploration of education and teaching.

### **2.2 Build “online and offline” hybrid English teaching mode**

Classroom learning and off-class learning are integrated with each other. In the process of English teaching, to improve classroom efficiency and enhance communication and exchange between teachers and students, teachers should pay attention to students’ learning characteristics and establish a relaxed and pleasant classroom atmosphere to achieve the best English learning effect by making learning plans and learning goals according to students’ situations in a targeted way. In the context of information technology, try to create a good online learning environment for students, which can improve students’ interest in learning English by showing pictures, playing music and other effects. After class, teachers can use online platforms or establish online second classes such as WeChat and QQ groups, where teachers can share their elaborate English courseware, some good learning materials, etc. to these groups. Teachers can also assign English learning tasks or interesting English learning activities to students in online platforms or groups, encourage students to participate, and give them appropriate rewards through various ways. This strengthens the online communication between students and teachers and also effectively expands students’ learning styles and learning spaces. Thus, it can be seen that classroom teaching and off-class learning can be better combined through information network technology, so that the quality of English teaching can be effectively improved. The continuous updating and change of English teaching mode not only improves the quality of English teaching well, but also promotes the improvement of English teachers’ teaching and research level. With online teaching, teachers can make the teaching process visual and vivid through easy-to-use course modules. Students can also learn anytime and anywhere, and teaching managers can grasp the teaching dynamics and provide support for teaching reform through the analysis of big data.

## **3. ANALYSIS OF THE APPLICATION OF ONLINE AND OFFLINE HYBRID ENGLISH TEACHING MODE**

### **3.1. RESEARCH QUESTIONS**

This paper investigates the practice of online and offline blending in college English writing in the context of college English and composition question types and writing teaching, with a view to evaluating the performance of implementing a blended intelligent learning model in English writing teaching through an empirical study. In response to the current teaching situation, the study poses the following two questions:

1. Is there any difference in the level of writing skill performance between the students in the experimental group (blended mode learning) and the students in the control group (traditional way learning) in the post-test?

2. Is there a difference in writing skill achievement levels between students in the experimental group on the pre and post tests?

### 3.2. STUDY DESIGN

An experimental research method was used for the study. A total of 100 students located in two equal level classes in the sophomore year were randomly selected and divided into two groups; the experimental group consisted of 50 students, while the control group was also 50 students. Two variables were designed: The first variable was mixed-mode learning and the second variable was writing skills. Therefore, the study focused on assessing the independent variable “mixed mode” and the dependent variable “writing skills”, with the experimental group learning to write through a mixed mode and the control group using traditional teaching methods.

### 3.3. RESEARCH TOOLS

The study used writing achievement test questions, including pre-test, post-test, and mixed mode instruction. The test questions were used to measure students’ writing performance as a pre-test and post-test of the experimental study, aiming to measure the effects of the blended model on the subjects’ English writing skills, mainly the accurate use of English language forms, the effective expansion of paragraph writing, and the rational application of coherence and articulation techniques. The content of writing instruction was analyzed based on Bloom’s cognitive taxonomy and normative scale. The objectives of each level and the percentage weights of each observed dimension were designed. To check the reliability and validity of the test questions, the time required for the test subjects, and the difficulty and discrimination coefficients of the test questions the test was first administered to 15 students at random. The following formula was applied in the pilot study to calculate the test time spent by students/number of students. The duration of the test was (60) minutes. The clarity of the test questions was checked by pretesting and modified for misleading related questions, and the correlation between the test questions and the total score is shown in Figure 1.

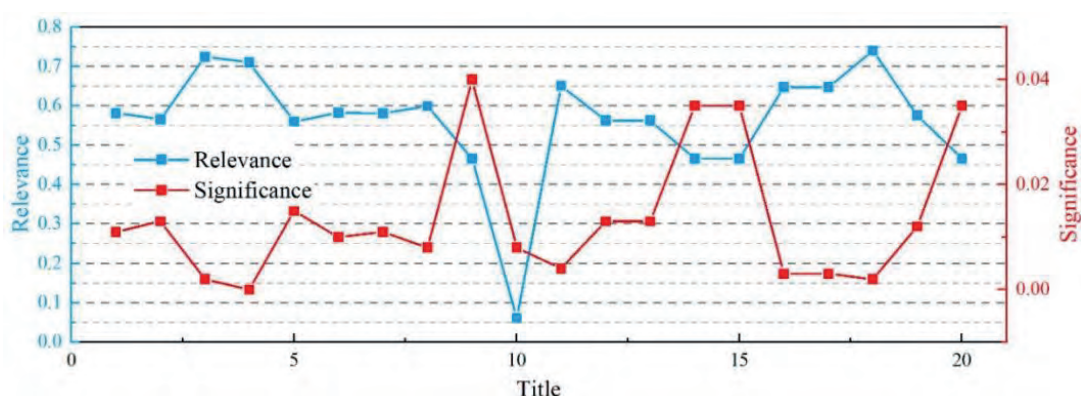


Figure 1. Correlation between test questions and total score

### 3.4. ANALYSIS OF STUDY RESULTS

The purpose of this study was to investigate the effectiveness of a blended model in developing English writing skills among college students. The first research question, “Is there a difference between the experimental and control groups in the level of writing skill performance on the post-test?” was analyzed and explained by using the statistical data software SPSS to collect data from the online and offline blended instruction. In order to answer

this research question, the null hypothesis was formulated: the experimental and control groups did not show statistically significant differences in writing performance levels on the posttest ( $\alpha \leq 0.05$ ). To test this hypothesis, the study counted the means and standard deviations of the two groups in the post-test and applied independent samples t-test to measure their significant differences as shown in Table 1. There was a significant difference in the overall mean scores of the experimental and control groups in the post-test ( $\alpha \leq 0.01$ ). The mean of the experimental group reached 29.9 while the mean of the control group was 23.60. This result indicates that the hybrid teaching model is more advantageous than the traditional teaching method in improving students' writing skills.

**Table 1.** Independent samples t-test in post-test for experimental and control groups

Sample	quorum	AVG	SD	T Check	Significance
Experimental group	50	29.89	4.398	3.82	0.01
Control group	50	23.61	5.923	7.9	

In order to observe whether there were differences in writing skill performance levels between students in the experimental group in the pre- and post-tests, this paper tested the second research question and formulated the null hypothesis: in the pre- and post-tests, students in the experimental group did not show statistically significant differences in their writing skill levels ( $\alpha \leq 0.05$ ), and a paired-samples t-test was statistically investigated as shown in Table 2. In the total mean score of the post-test, students in the experimental group showed significant variability, with the mean of the post-test reaching 29.89, while the mean of the pre-test was 13.36. This implies a statistically significant difference in the pre- and post-tests, proving that the rational application of the hybrid teaching model is very effective in improving college students' writing skills and is important for creating an efficient classroom.

**Table 2.** Test results for differences in mean scores in pre-test and post-test

Sample	quorum	AVG	SD	T Check	Significance
Post-test	50	29.89	4.398	11.2	0.01
Pre-test	50	13.36	5.868	5.7	

#### 4. CONCLUSION

With the development of modern information technology, the "online" and "offline" hybrid English teaching mode combines traditional teaching with students' online learning. This mode of teaching not only brings students freedom in time and space, but also brings a positive effect of mutual attention among students, which reflects the "student-centered" teaching mode, making students the main object of teaching and maximizing their individual learning needs. Teachers should vigorously implement the "online and offline" hybrid teaching model, strive to update their own teaching philosophy and teaching methods, make their own teaching model to keep up with the development of the new era, and constantly improve students' English learning level to do their part to cultivate more high-quality talents to adapt to the development of society.

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# EXPLORING THE MECHANISM OF CONSTRUCTING INTELLIGENT SYSTEM OF MENTAL HEALTH EDUCATION FOR COLLEGE STUDENTS BY APPLYING DATA FUSION MODEL

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## ABSTRACT

This paper firstly studied the data fusion model, explored its automatic merit seeking and the way to obtain the best fusion. Then the intelligent system of mental health education for college students was constructed based on the data fusion model, the framework of the system was established, the way of evaluating the effect of psychological education was established, and the operation process of the intelligent system was analyzed. Finally, the effect of mental health education was evaluated using indicators such as education satisfaction, self-efficacy and life satisfaction. The results showed that the self-efficacy of students increased by 3.53 and the life satisfaction of students increased by 3.08 after the mental health education in school, indicating that the education system constructed in this paper is effective. This study lays a theoretical foundation for the reform of psychological education in colleges and universities, which is important for the development of mental health education in universities.

## KEYWORDS

Data fusion model; Automatic merit seeking; Mental health education; Intelligent system; Self-efficacy; Life satisfaction

## 1. INTRODUCTION

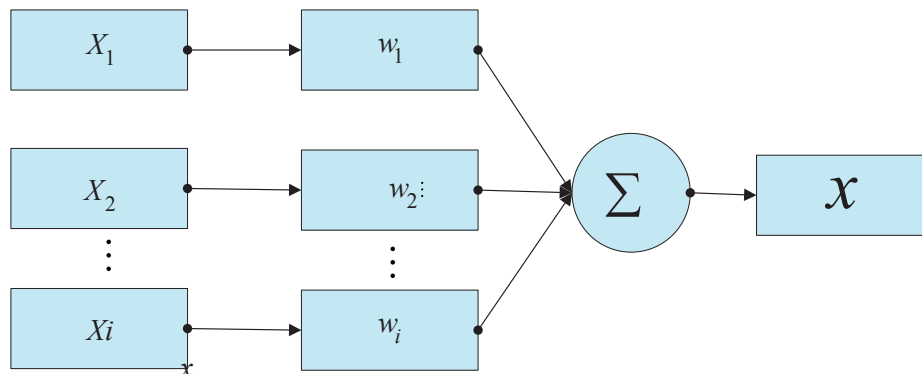
Mental health education in higher education has always been in a crucial position in the development of modern education, especially today, when the traditional education model has developed into quality education [1]. Mental health education in higher education is not education for the treatment of mental diseases in a narrow sense, but education for psychological quality, which is precisely a fundamental component of social and cultural quality [2-3]. Mental health education in higher education occupies a leading role in the development of human potential [4]. Developing human potential is one of the important goals of quality education, and reaching this goal requires mental health education to assist in promoting the formation of a sound personality in students [5]. The role of mental health education is to promote the development of students' potential and thus their overall development [6]. Leporatti, L. et al. used hospital treatment records to investigate the effect of psychoeducation



on symptoms of depression and anxiety and its impact on physical health, and the results showed that mental health education was able to reduce the likelihood of mental disorders in patients [7]. Liu, X. explored the changes and effects of the level of mental health of students with negative psychological symptoms and applied machine learning methods to model and analyze the susceptibility factors [8].

## 2. DATA FUSION MODEL

The data fusion model finds the corresponding optimal weighting values for each sensor with the help of adaptive finding and satisfies the minimum total mean square error in order to obtain the optimal fusion results. Figure 1 shows the adaptive data fusion algorithm model.



**Figure 1.** Adaptive data fusion algorithm model

Let the monitored values of  $n$  sensors be  $X_1, X_2, \dots, X_n, X$  for the true value to be estimated, variance in order  $\sigma_1^2, \sigma_2^2, \dots, \sigma_n^2$ . Independent of each other and  $x$  is estimated unbiasedly. The fused  $x$  and the weighting factor satisfy the following equation:

$$\hat{X} = \sum_{i=1}^n \omega_i X_j \quad \sum_{i=1}^n \omega_i = 1 \quad (1)$$

where the total mean square error is:

$$\Delta^2 = E \left[ \sum_{j=l}^n \omega_i^2 (X - X_i)^2 + \sum_{i=l, j=l, i \neq j}^n \omega_i \omega_j (X - X_i)(X - X_j) \right] \quad (2)$$

By treating the estimated true value  $X$  as a constant, the estimation is based on the mean value of the historical data of each sensor. Then the mean value of the  $k$  measurements is

$$x_i(k) = \frac{1}{k} \sum_{j=1}^k x_i(j) \quad (3)$$

The estimated value is:

$$\bar{X} = \sum_{i=1}^n \omega_i x_i(k) \quad (4)$$

The total mean square error is:

$$\Delta^2 = E \left[ \sum_{i=l}^n \omega_i^2 (X - x_i(k))^2 + 2 \sum_{i=l, j=l}^n (X - \bar{x}_j(k))(X - \bar{x}_j(k)) \right] \quad (5)$$

## 3. CONSTRUCTION OF INTELLIGENT SYSTEM OF MENTAL HEALTH EDUCATION FOR COLLEGE STUDENTS

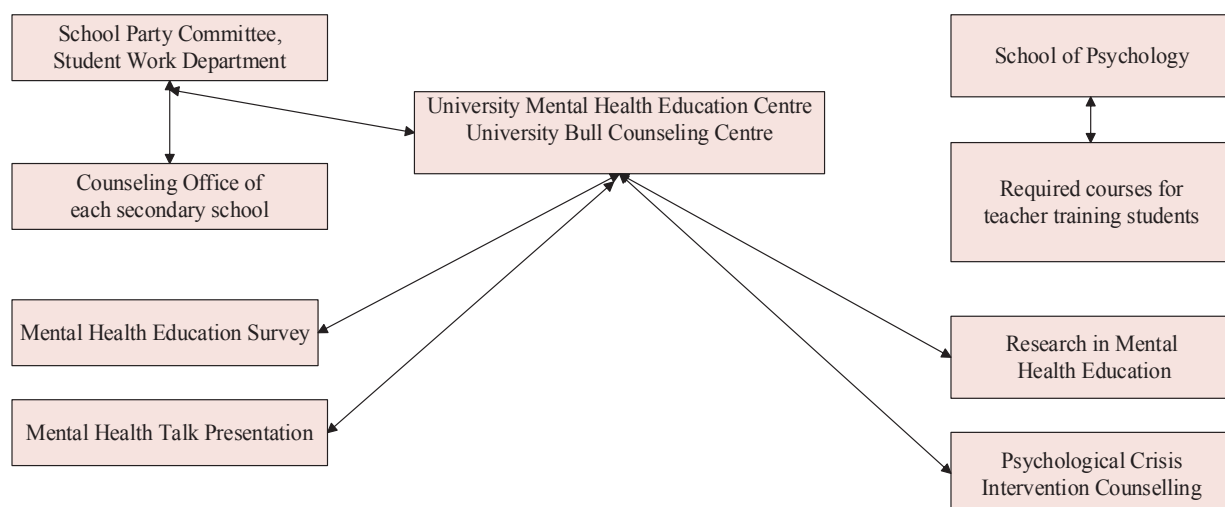
The data fusion model achieves more accurate and personalized educational support by integrating data from multiple sources, mining laws and patterns, and optimizing decision making and evaluation to support the construction of an intelligent system for mental health education of college students. This paper uses data fusion model to build an intelligent system for college students' mental health education, and the following is the main content.

### 3.1. FRAMEWORK COMPOSITION OF MENTAL HEALTH EDUCATION INTELLIGENT SYSTEM

Mental health education management system is two operating institutions, the Mental Health Education Center for college students under the leadership of the Party Committee of the university with the Department of Student Work as the guide, and the Counseling Center for college students with the School of Psychology of the second-level colleges as the leader. The Ministry of Student Work carries out mental health education activities for all students through the Mental Health Education Center and the student work departments of the second-level colleges. In accordance with the curriculum requirements arranged by the academic affairs department of the university, the School of Psychology offers compulsory courses on mental health education for all teacher-training students, as well as some elective courses on mental health education for all students.

The Mental Health Education Center, as a college student mental health education department established in accordance with national, provincial and municipal documents, is responsible for carrying out the school's mental health work and accepting inspection and supervision from higher authorities. Meanwhile, with the help of a team of peer counselors, it conducts general mental health tests and carries out special activities of mental health education for the entering freshmen every year.

The Counseling Center exists as an educational and teaching practice base for applied psychology in the School of Psychology, providing educational services to students and faculty. It is mainly responsible for, for students who are willing to seek help to use psychological expertise or skills to provide effective counseling and intervention: Familiar with the school's emergency plan for handling crisis events, and guide the docking secondary colleges to develop relevant plans. In response to the special needs of different colleges, they are guided to conduct thematic salons, psychological lectures and psychological workshops that meet the requirements of the colleges. Figure 2 shows the university mental health intelligence system.



**Figure 2.** University mental health education system

### 3.2. THE OPERATION PROCESS OF MENTAL HEALTH EDUCATION INTELLIGENT SYSTEM

The operation mode of the mental health education management system is that the two centers co-exist, and their work has independence and overlap. For the development of on-campus mental health activities and mental health survey, the Mental Health Education Center is responsible for them in cooperation with the counseling office of each second-level college and the graduate students of applied psychology. For individual psychological crisis intervention of college students on campus, the teachers of the School of Psychology in the Counseling Center are responsible. The creation of mental health education curriculum is designed by the Academic Affairs Office of the university and implemented by the School of Psychology. Figure 3 shows the operation model of mental health education.

Mental health general test, the establishment of all students' personality psychological profile, is the university for mastering the psychological situation of students, through standardized scales and annual analysis of the calculated norm, the basic screening of each year's entry of new students, targeted intervention to prevent the guarantee.

Psychological education activities refer to a series of psychological health education activities carried out by the Center for College Student Mental Health Education under the direct leadership of the Department of Student Work, in cooperation with graduate counselors, among all students in school. It includes a series of activities of the Student Mental Health Festival, special psychological salons, psychological reports for specific groups, OB group training with novel design, leaderless group discussion, box court sand tray game, relaxation training and other mental health knowledge and self-adjustment skills. We also make use of the Internet, WeChat platform, school and college radio, student magazines and other media to widely publicize and create an atmosphere.

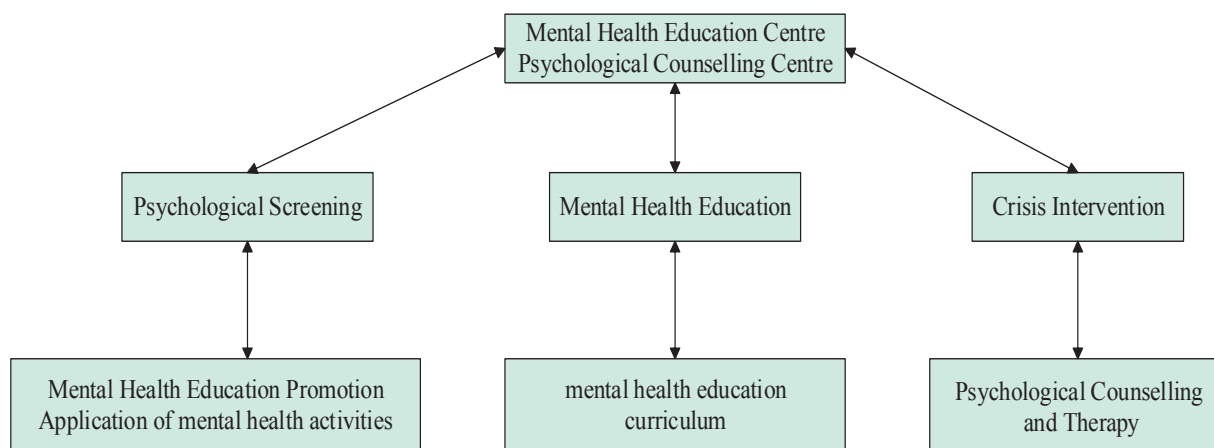


Figure 3. Mental health education operational model

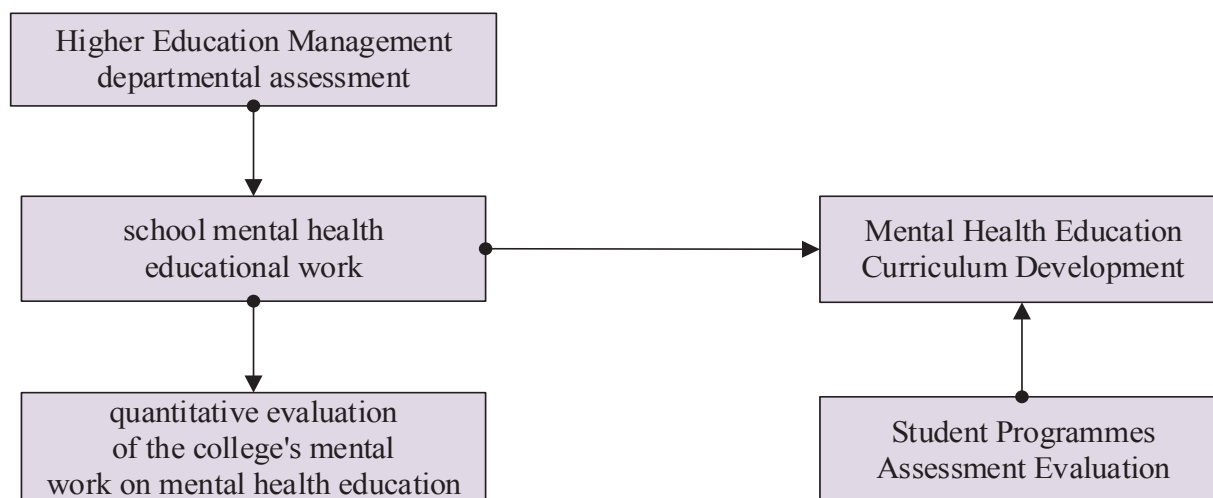
### 3.3. EVALUATION OF MENTAL HEALTH EDUCATION MANAGEMENT SYSTEM FOR COLLEGE STUDENTS

Figure 4 shows the university mental health education assessment and evaluation system. The assessment and evaluation system mainly includes the following aspects. One is the assessment of the university's hardware and supporting facilities, activity design and function creation required by the provincial and municipal higher authorities. Second, the university's target management assessment and evaluation of the development of mental health education work at each level, with emphasis on the assessment of the development of mental health work at each basic unit. Third, the students' evaluative assessment of course delivery within the academic affairs system.

The assessment points of the provincial and municipal higher authorities require sound institutional mechanisms at the school level to guarantee the basic conditions for the development of mental health work in schools. A well-developed curriculum and teaching system with a systematic knowledge structure. Content-rich activities to carry out, multi-channel expansion of educational support forms.

The school's target management assessment and evaluation observation points, including the sound organization of the second-level colleges, with dedicated personnel to regularly organize and carry out mental health education activities actively participate in the school's mental health education activities for college students.

Student evaluation observation points, student evaluation refers to course teaching evaluation and practical application effect evaluation, course teaching evaluation includes classroom knowledge teaching, case teaching, experiential activities and other content.



**Figure 4.** University mental health education assessment and evaluation system

#### 4. EVALUATION OF THE EFFECT OF MENTAL HEALTH EDUCATION FOR COLLEGE STUDENTS

In order to have a clearer picture of the impact of mental health education on students' mental health and the degree of improvement, we distributed questionnaires to 150 people in University D. 122 valid questionnaires were returned. A pre- and post-experimental group measurement design was used, and the study adopted a combination of objective measurements and subjective ratings.

Table 1 shows the difference tests before and after the members' experiment. The pre-test of students' self-efficacy was 32.66, and after the school's mental health education self-efficacy was 36.09, an increase of 3.53. The pre-test of students' life satisfaction was 15.39, and after the school's mental health education life satisfaction was 19.46, an increase of 3.08. The significant differences between the pre-test and post-test measures of self-efficacy and life satisfaction indicate that the school's mental health The difference between the pre and post measures of self-efficacy and life satisfaction was significant, indicating that the school's mental health education program had a positive effect on students' self-efficacy and life satisfaction.

**Table 1.** Tests for differences before and after member trials

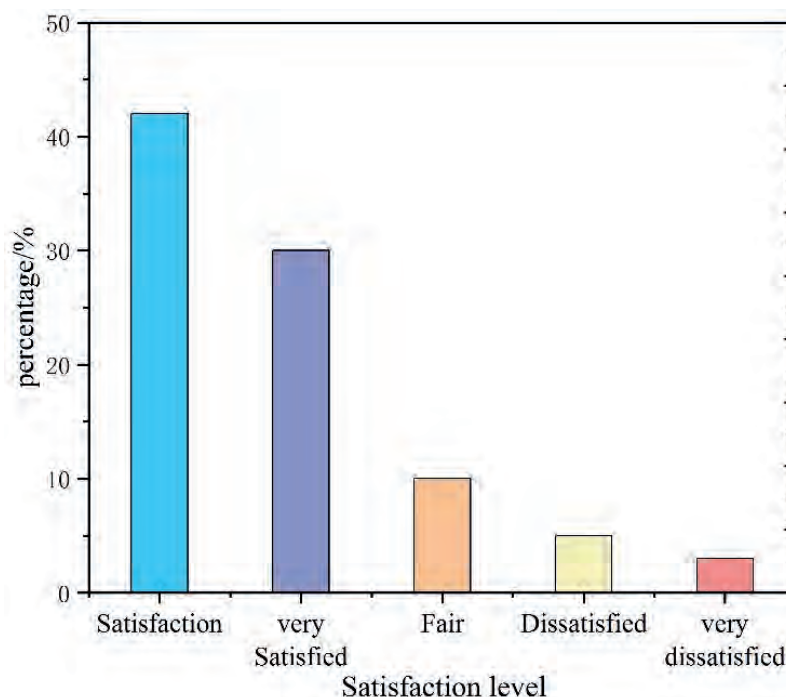
	Pre-test	Post-test	t
Self-efficacy	32.66±6.56	36.09±8.98	-4.135*
Life satisfaction	15.39±4.45	19.46±9.46	-4.635**

Note: \*P<0.05, \*\*P<0.01

In the survey on “the part of mental health education that you benefit most”, 65% said that mental health education helps me a lot in terms of the number of new friends and my psychological state. 80% said that mental health education classroom teaching helps a lot and they learn a lot of psychological knowledge. 60% said that classroom group activities help a lot and they experience a sense of cohesion and belonging. Seventy percent thought that the practical assignments and reading exercises after the psychological classroom were very helpful. 65% thought that participating in various psychological education clubs was very rewarding in line with their personal interests. 68% thought that the social practice of mental health education was very helpful to them. Table 2 shows the positive feedback of psychological education. All in all, basically 70% of them think that the school’s mental health education is very helpful to their psychological construction. In terms of satisfaction with teaching, more than 70% of them said they were more satisfied. Figure 5 shows the satisfaction of teaching.

**Table 2.** Positive feedback on psychoeducation

Meet new friends	65%
Classroom group activities	60%
Mental Health Education Classroom Teaching	80%
Practical assignments and reading exercises after psychology classes	70%
Participation in various psycho-educational clubs in line with personal interests	65%
Mental health education social practice	68%



**Figure 5.** Teaching satisfaction

## 5. CONCLUSION

This paper constructs an intelligent system of mental health education for college students based on data fusion model, and analyzes the effect of mental health education in terms of teaching satisfaction, self-efficacy and life satisfaction. It is concluded that students’ self-efficacy increased by 3.53 and students’ life satisfaction increased by 3.08 after the school’s mental health education, and 70% of them thought that the school’s mental health education was helpful to their psychological construction. In terms of teaching satisfaction, more than 70% of them said they were more satisfied. It indicates that the mental health education of college

students based on the data fusion model is effective.

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# RESEARCH ON INFORMATION-BASED TEACHING MODEL OF MENTAL HEALTH EDUCATION IN COLLEGES AND UNIVERSITIES APPLYING INTELLIGENT ALGORITHMS

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## ABSTRACT

This paper first analyzes the main problems of mental health education in colleges and universities, and discusses the specific significance of information-based teaching to mental health education teaching. Secondly, the four-dimensional integrated mental health education teaching model is constructed by using the idea of new discipline construction and informatization teaching theory, and the teaching design is carried out by group intelligence algorithm. Finally, a case study was conducted to verify the effectiveness of the four-dimensional integrated mental health education informatization teaching model. The results showed that more than 55% of the students agreed that the model could improve attention, learning resources utilization and sharing, and other effects. This shows that the four-dimensional integrated information-based teaching model can promote the development of information-based mental health education.

## KEYWORDS

Swarm intelligence algorithm; Information technology; Four-dimensional integration; Teaching model; Mental health education; Instructional design

## 1. INTRODUCTION

With the development of educational philosophy, we have a deep understanding of education and teaching, based on the background of social development, it is crucial to promote the development of teaching to keep up with the times. Mental health education is a very broad concept, simply speaking, it is based on the ideological, psychological and behavioral characteristics of college students in different grades. Through different ways and methods of targeted phased education, in order to promote the improvement of college students' mental health and thus reduce the occurrence of psychological crisis events [1-2]. Mental health education in colleges and universities is carried out to promote the development of students' mental health, which has a very significant role in the improvement of students' competence and literacy awareness, so it is crucial to continuously strengthen the quality level of mental health education [3-5].

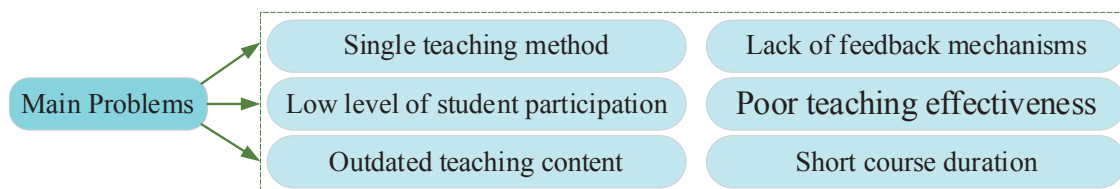
Students live and study in an information-based environment, with a strong sense of self and a large space for personality development and creative thinking. Students are more information conscious, their understanding of the Internet is gradually rationalized, they are better at using network software for information exchange, and they are more familiar with using the Internet to find resources, and most of them have a very strong sense of network participation [6-7].

In the context of the information era, a large number of information technologies have been introduced in production and life, which have a great impact on our production and life patterns. Therefore, based on the background of the information era, analyzing the development mode of mental health education can significantly promote the development and optimization of the current development mode, so that the future development mode of mental health education can be targeted and focused, and the positive significance is very far-reaching [8-9].

## 2. THE SIGNIFICANCE OF INFORMATION-BASED TEACHING OF MENTAL HEALTH EDUCATION IN COLLEGES AND UNIVERSITIES

### 2.1. THE MAIN PROBLEMS OF MENTAL HEALTH EDUCATION IN COLLEGES AND UNIVERSITIES

College students are important human resources, builders and successors of socialist modernization, which are related to the development of the country and the prosperity of the nation. Cultivating qualified builders and successors with good health quality for the country is an important function of all higher education institutions and an unshirkable responsibility of higher education providers. With the development of the times and the increasing prominence of mental health problems of college students, health education as an important part of school education has received more and more attention and focus. Through the research on the current situation of mental health education courses carried out in many colleges and universities, it is found that the main problems still exist in mental health education in colleges and universities are shown in Figure 1.



**Figure 1.** Problems of mental health education in higher education

Mental health education course for college students is a public course that integrates knowledge transfer, psychological experience and behavioral training. The uniqueness of this course determines that its teaching methods and organization should be different from other general disciplines, i.e., it requires both flexible and diverse teaching methods and forms, as well as behavioral training and interactive experience in order to achieve its teaching objectives. Due to the limitations of class time, teaching content and teachers' level, the teaching process of mental health education courses in colleges and universities. The teaching method is still mainly traditional lecture method, which is single and the students' participation is low, and it is difficult to penetrate the learned knowledge and methods into the students' actual study and life, which leads to superficial teaching effect.

### 2.2. THE SIGNIFICANCE OF INFORMATION-BASED TEACHING FOR TEACHING MENTAL HEALTH EDUCATION

Information-based teaching makes full use of the advantages of modern teaching media such as computers and Internet, bringing advantages that traditional teaching media cannot



match, mobilizing more teaching media and information resources, thus building an informative and knowledge-rich learning environment. In addition, the characteristics of computer interactivity, multimedia features, and hypertext features make it easier to create a situational teaching environment, which improves students' learning enthusiasm and allows them to actively explore knowledge instead of passively receiving knowledge and information.

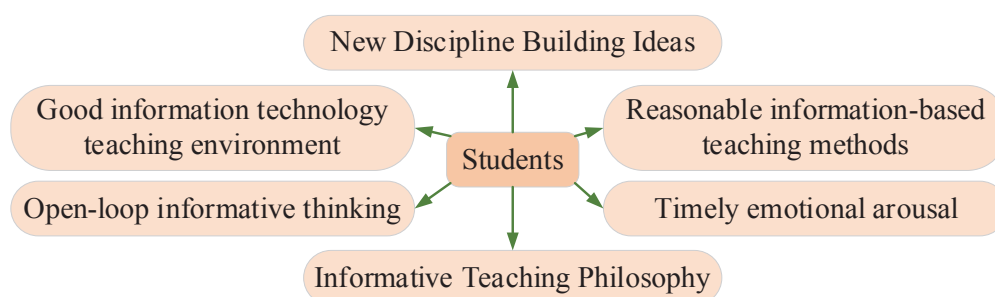
Mental health education activity course is a course guided by teachers, using activities as a carrier, allowing students to feel, experience, think and feel in the activities and gain psychological growth, forming a sound personality and good psychological quality. The traditional college mental health classroom is usually the teacher's lecture, abstract teaching, boring and empty theory is difficult to stimulate learning enthusiasm, and even the classroom teaching content and the actual life of students are disconnected, students have a lot of confusion is difficult to get answers, emotional experience blank, it is difficult to achieve the purpose and effect of teaching.

Therefore, it is especially important to let "information technology" into the mental health class. The main purpose of information-based teaching is to make use of the technical conditions provided by the network environment, abandon the teaching mode of "filling the classroom", and fully arouse students' interest in learning. In order to optimize the teaching content, improve teaching efficiency and stimulate students' creative thinking.

### 3. DESIGN OF FOUR-DIMENSIONAL TEACHING MODEL OF MENTAL HEALTH BASED ON GROUP INTELLIGENCE ALGORITHM

#### 3.1. CONSTRUCTION OF FOUR-DIMENSIONAL INTEGRATED MENTAL HEALTH EDUCATION TEACHING MODEL

Led by the idea of new discipline construction and informatization teaching concept, through constructing a good education and teaching ecological informatization environment, adopting reasonable and effective informatization teaching methods, and building a complete open-loop informatization mind map. Covering the emotional arousal of the teaching process, a new student-centered, four-dimensional integrated mental health education classroom informatization teaching method that cultivates students' comprehensive ability is proposed, and the structure of this model is shown in Figure 2.



**Figure 2.** A four-dimensional model for teaching mental health

In this method, the first three are external factors and the latter are internal factors. In the process of cultivating people, stimulating the subjective initiative of the trained person through emotional arousal is the guarantee for the realization of the cultivation goal. The information environment of education and teaching, the reasonable and effective information teaching method and the open-loop information thinking map as the external factors provide the external conditions for the realization of the goal of cultivating people.

### 3.2. FOUR-DIMENSIONAL INTEGRATED TEACHING DESIGN BASED ON SWARM INTELLIGENCE ALGORITHM SOLVING

Swarm intelligence is a general term for the collective intelligent behavior of a class of decentralized self-organized systems, which mainly simulates the phenomenon of collaboration or competition among individuals in the process of foraging or survival of natural groups of low-energy organisms, or the existence of interaction between individuals and the environment, and finally characterizes the intelligent behavior. The swarm intelligence optimization algorithm formed by scientists according to this has special advantages in solving engineering problems, such as the advantages of not requiring the continuity of the problem to be solved, derivability and not relying on gradient information, which has become a favorable tool for solving optimization problems nowadays.

In this example, although the objective function is relatively simple, there are more constraints, and it belongs to the optimization problem solving with nonlinear constraints, so the construction method of the penalty function in the course textbook is used to design. In this example, the outer point method is used, and the penalty function is constructed together with the constraints. With  $\max(\cdot, \cdot)$  denoting the larger of the 2 elements in parentheses selected, the penalty function can be written as

$$P(X) = \sum_{j=1}^n (\max(0, g_j(X)))^2 \quad (1)$$

where  $g_j(X)$  is an inequality constraint.

The fitness function that incorporates the penalty function and the objective function can be written as

$$F(X, \gamma) = f(X) + \gamma \cdot P(X) = f(X) + \gamma \cdot \sum_{j=1}^n (\max(0, g_j(X)))^2 \quad (2)$$

Where  $\gamma$  is the penalty factor, and if it is chosen large enough, the solution of the unconstrained problem  $F(X, \gamma F(x, \gamma))$  will be close to the solution of the original problem  $f(X)$ , and the complex nonlinear constrained optimization problem is transformed into a relatively simple unconstrained problem.

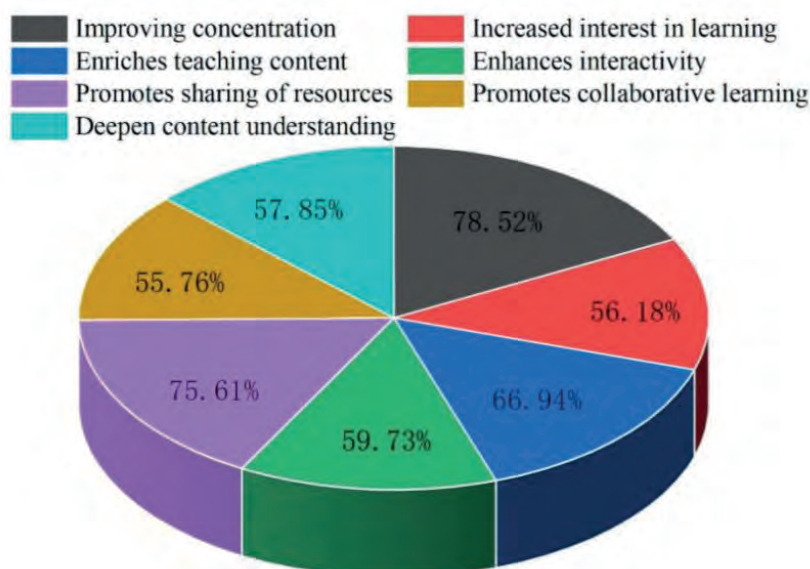
As a result, the design of the four-dimensional teaching model can be realized through mathematical quantification, and then the information-based teaching of efficient mental health education can be realized, and the information-based development of mental health teaching in colleges and universities can be promoted.

### 4. EMPIRICAL ANALYSIS OF THE FOUR-DIMENSIONAL INFORMATION TEACHING MODEL OF MENTAL HEALTH IN COLLEGES AND UNIVERSITIES

In order to verify the effectiveness of the four-dimensional all-in-one informative teaching model of mental health education in colleges and universities designed based on the swarm intelligence algorithm in this paper, this chapter takes the mental health education course of a university in S city as an example and carries out a semester of teaching with the four-dimensional all-in-one informative teaching model. At the end of the semester, the role of the four-dimensional integrated informatization teaching mode in improving the teaching effect of the mental health education course was investigated, and the specific results are shown in Figure 3.

In terms of the role of the four-dimensional integrated information-based teaching mode in

improving the teaching effect of mental health education courses, the highest percentage of agreement was 78.52%, which believed that the information-based teaching mode could effectively improve students' attention, and the second highest percentage of agreement was 75.61%, and indicated that the mode could effectively promote the use and sharing of learning resources. The remaining roles all have an approval rate of more than 55%, and the larger the percentage chosen, the higher the recognition and deeper the students' knowledge of the role.



**Figure 3.** Teaching effectiveness of the four-dimensional teaching model

According to the proportion of students' choices, the effects of the information-based teaching mode on improving the teaching effectiveness of mental health education courses are, in order, enhancing students' attention, promoting the use and sharing of learning resources, enriching teaching contents, enhancing teacher-student interaction, deepening the understanding of teaching contents, improving students' interest in learning, and promoting cooperative learning among students. This shows that the four-dimensional integrated information-based teaching mode constructed in this paper can effectively promote the characteristics of innovative teaching methods, diversified information presentation, sharing of teaching resources and flexible teaching strategies, which can effectively enhance students' learning interests in mental health teaching courses and promote the development of information-based mental health education in colleges and universities.

## 5. CONCLUSION

This paper starts from the main problems of mental health education in colleges and universities, and analyzes the specific significance of information-based teaching to mental health education teaching. Based on the idea of new discipline construction and informatization teaching theory, the four-dimensional one mental health education teaching model was constructed and given a group intelligence algorithm for teaching design. The teaching effect of the four-dimensional one information-based teaching model was analyzed with examples, and the results showed that 78.52% of the students thought that the information-based teaching model could effectively improve students' attention. This shows that the four-dimensional integrated informatization teaching mode given in this paper can promote the informatization development of mental health education in colleges and universities.

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# EXPLORING THE DIVERSIFICATION OF UNIVERSITY FUNDRAISING AND FINANCING CHANNELS BASED ON BIG DATA ANALYSIS

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## ABSTRACT

This paper firstly discusses the classification of diversified financing channels in universities and analyzes the specific significance of diversified financing channels. Secondly, in order to better avoid the risks arising in the process of financing, the risk control of financing is based on differential game theory to achieve the optimal control of financing channels in colleges and universities. Finally, taking College A as an example, the empirical analysis was conducted and rationalized suggestions were given. The results show that the current financing channels of colleges and universities are mainly financial allocation and tuition fee income, which account for more than 90% of the total. This indicates that colleges and universities need to further optimize the financing channels and use BOT mode and donation to achieve financing from multiple perspectives to improve the efficiency of college operation.

## KEYWORDS

Universities; Financing channels; Risk control; Differential game; Diversification; BOT model

## 1. INTRODUCTION

With the continuous reform of higher education system, the expansion of colleges and universities and the accelerated pace of massization of higher education, the scale of higher education has been growing. The expansion and development of higher education cater to the demand of social and economic development for high-quality workers and meet the strong desire of people to receive higher education [1-2]. However, many problems that cannot be ignored have emerged in the process of expansion and vigorous development of colleges and universities, such as inadequate running conditions, structural shortage of faculty, and difficulty in guaranteeing teaching quality [3-4].

Although the central and local governments have been increasing financial allocations, their growth has not been able to keep pace with the development of higher education. The traditional financing mode of relying solely on government appropriation has become more and more difficult to meet the funding needs of universities, and the shortage of funds has become a major development obstacle to the expansion of university scale and quality improvement [5-6]. Therefore, actively expanding diversified fundraising and financing channels to enrich school running funds has become an important concern for universities.

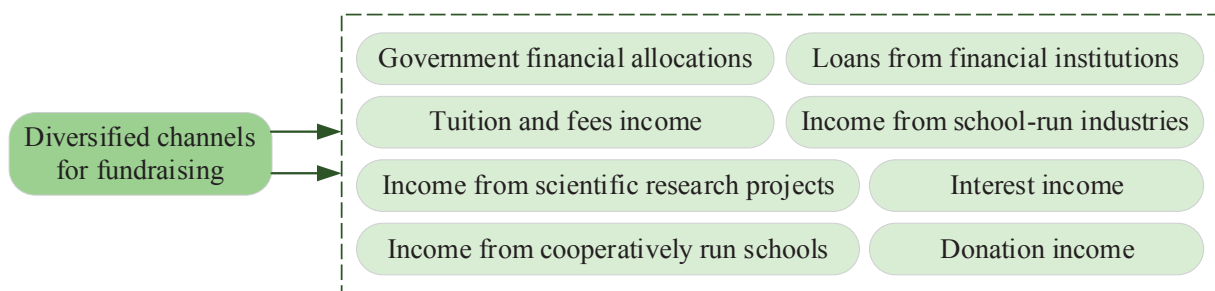
In order to solve the above problems, colleges and universities generally adopt such means as expanding campus area, building new buildings, introducing talents, purchasing books and materials, acquiring instruments and equipment, and improving teaching facilities to improve the school conditions, all of which require sufficient financial support [7-8]. Therefore, universities must rely on their own "management" ability, expand diversified financing channels,

break the bottleneck of capital shortage, and at the same time, avoid various risks brought by financing, so as to truly achieve sustainable development [9-10].

## 2. DIVERSIFICATION OF FINANCING CHANNELS AND SIGNIFICANCE OF UNIVERSITY FUNDRAISING

### 2.1. CLASSIFICATION OF DIVERSIFIED CHANNELS OF FUNDRAISING IN HIGHER EDUCATION

With the introduction of the national policy of encouraging colleges and universities to raise funds through multiple channels, colleges and universities have started to actively explore diversified financing modes and make efforts to broaden financing channels to meet their growing fund demands. At present, the diversified financing mode of colleges and universities has taken shape, and a diversified education financing structure mainly based on financial allocation and tuition fees, supplemented by other financing channels has been formed initially. The classification of diversified financing channels for colleges and universities is shown in Figure 1.

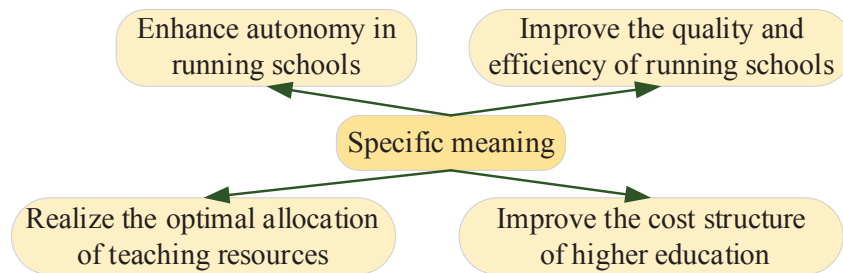


**Figure 1.** Diversified channels for raising financing for colleges and universities

The financial allocation refers to the educational expenses arranged and allocated to the University by the central or local governments, including the allocation for educational expenses, research expenses, infrastructure expenses and other expenses. The income from tuition and fees mainly refers to tuition and accommodation fees collected from students. Loans from financial institutions mainly refer to the reimbursable funds for teaching, scientific research and infrastructures obtained by universities through various financial institutions, which are mainly loans from commercial banks at present.

### 2.2. SIGNIFICANCE OF DIVERSIFYING FINANCING CHANNELS IN HIGHER EDUCATION

As colleges and universities are the positions of spreading knowledge, developing science and technology and transforming science and technology, colleges and universities must analyze their own advantages and disadvantages by combining international and domestic forms of education to carry out the sustainable development of colleges and universities. The diversification of financing channels of colleges and universities can effectively enhance the autonomy of colleges and universities, further improve the cost structure of colleges and universities, realize the optimal allocation of resources, and improve the quality and efficiency of colleges and universities. The significance of diversified financing channels of colleges and universities is shown in Figure 2.



**Figure 2.** The significance of diversifying financing channels

At present, the unbalanced development of running conditions and running environment of colleges and universities has caused the low utilization rate of running resources and high management cost of colleges and universities which seriously affect the quality and efficiency of running colleges and universities. Therefore, enhancing the internal construction of colleges and universities and optimizing resource allocation have become the outstanding for colleges and universities to improve the quality and efficiency of running schools at present.

### 3. RISK CONTROL OF UNIVERSITY FUNDRAISING BASED ON DIFFERENTIAL GAME

College financing is the way to improve the quality of college operation and optimize the optimal allocation of educational resources. However, the diversification of financing channels also makes the financing of colleges and universities have certain risks. Based on the big data analysis technology, this chapter proposes the differential game to realize the risk control of college financing, so that colleges and universities can better realize financing and ensure the safety of college financing even if the financing channels are diversified.

The idea of differential games can be applied to rational human decision making, so differential games have been intensively studied and widely used in various decision making scenarios in management and economics. If the time interval is  $[t_0, T]$ ,  $t_0$  is the initial time,  $T$  is the end time, and the game participant is written as  $i \in \{1, 2, \dots, n\}$ , there exists a control variable strategy  $u_i(t)$  for the game player and a state variable strategy  $x(t)$  satisfying:

$$x(t) = f(t, x(t), u_1(t), \dots, u_n(t), x(t_0)) = x_0 \quad (1)$$

where,  $x_0$  is the initial condition of the state equation.

At this point the objective function is:

$$\max \int_{t_0}^T g_i(t, x(t), u_1(t), \dots, u_n(t)) dt + Q_i(x(T)) \quad (2)$$

$i, t, f, g$  above are differentiable, and it is clear from the presentation that the differential game is essentially an optimal control problem on a continuous time interval.

### 4. EMPIRICAL ANALYSIS OF DIVERSIFIED FINANCING CHANNELS FOR UNIVERSITIES

#### 4.1. DATA ANALYSIS OF FUNDRAISING MODELS IN HIGHER EDUCATION

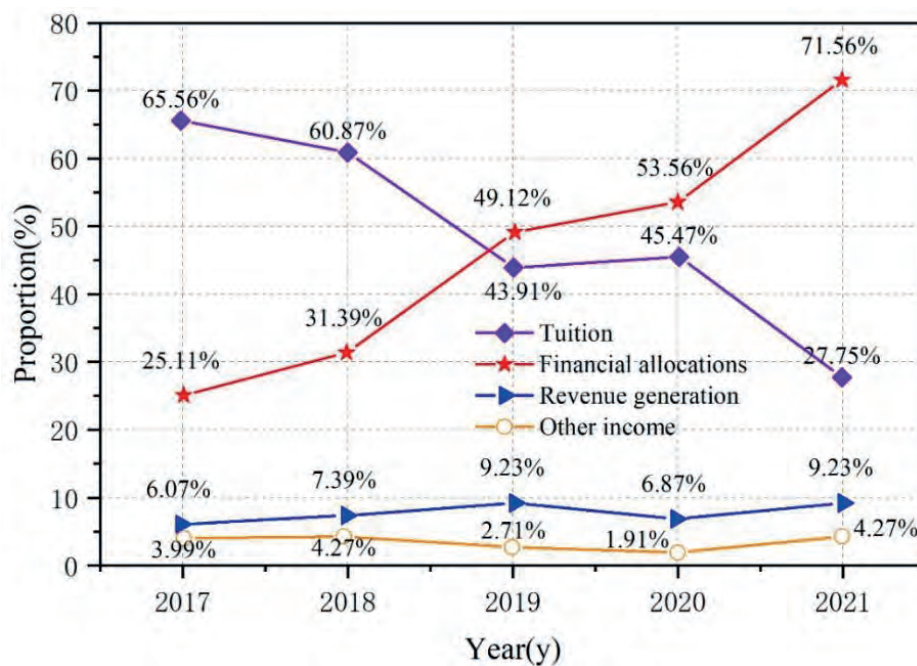
In recent years, the internal structure of education funds of colleges and universities has been changing, and the proportion of financial education funds in the total income is decreasing year by year. The business income, such as tuition and miscellaneous fees and revenue-generating income, shows a rising trend year by year, which indicates that colleges and universities have gradually established a diversified financing mode mainly based on financial

appropriation, supplemented by tuition fees, income from school-run industries and social donations. In this section, we take the fundraising and financing channel data of College A in the past five years as an example, analyze the problems arising from the diversification of fundraising and financing channels of College A, and then give certain suggestions for the construction of diversified fundraising and financing channels.

Figure 3 shows the composition structure of College A's revenue sources from 2017-2021.

From the composition structure of College A's revenue sources from 2017-2021, College A's financial allocation and tuition and fees can account for more than 90% of the total revenue in all years. Especially after the successful restructuring and promotion of College A in 2019, the proportion of financial appropriation increases significantly, reaching 71.56% in 2021, and financial appropriation and tuition and fees reach more than 98% of the total revenue. Other financing channels only account for a very small portion, and even show a decreasing trend year by year. This shows that the overall financing structure of College A is relatively single, with financial allocation and tuition and fees accounting for the majority of revenue sources, while other financing channels, such as revenue-generating income and social donations, are negligible. Under the constraints of the traditional system, College A lacks the enthusiasm and innovative thinking of multi-channel fundraising, and only focuses on finance and students, which ultimately cannot provide a broad source of funds for its long-term development.

In addition, a survey was conducted for the changes of College A's debt from 2017-2021. Due to unclear property rights, poor operation and management, and debt disputes, College A's school-run industries have deteriorated in recent years and have been closed or disposed of one after another. As a result, College A lacks an important source of funds, which is the income from school-run industries. In addition, due to the low visibility of College A and the lack of a well-developed local social donation organization system, the school's other income such as donations is extremely limited, accounting for less than 5% of the total income since 2017.



**Figure 3.** College A's revenue streams from 2017 to 2021



## 4.2. SUGGESTIONS FOR DIVERSIFYING FUNDRAISING CHANNELS IN HIGHER EDUCATION

Universities should take the initiative and actively seek donations from all walks of life. Set up a special fund-raising agency with dedicated staff responsible for raising funds, and establish a practical endowment fund management system and a long-term effective fund operation and development mechanism. Give full play to the role of the alumni liaison office, establish long-term contact mechanisms with graduates, and take the initiative to return to their alma mater when they have the ability to do so, and donate funds to run and develop their alma mater. Universities should improve their own scientific research, establish a perfect cooperation mechanism, actively seek projects that can bring into play the school's professional expertise, and actively seek cooperation. Joint education with enterprises can solve a series of problems such as lack of facilities and financial constraints, provide students with internship sites and increase their practical experience. Colleges and universities should make full use of the BOT mode for financing construction projects, by signing construction contracts, during the validity of the agreement, the project company will finance the construction of college infrastructure and be responsible for the operation and maintenance, and regularly collect usage fees. Colleges and universities can also apply for special funds for national bonds and issue education bonds for financing mainly with negotiable long-term type and ultra-long-term type bonds.

## 5. CONCLUSION

This paper analyzes the risk control strategy of college fundraising and financing by using differential game, starting from the classification and specific meaning of diversification of college fundraising and financing channels. In order to seek the diversification of college financing channels, an empirical analysis was conducted using College A and rationalized suggestions were put forward. The results show that the financing channels of colleges and universities are mainly financial appropriation and tuition and fees, which can account for more than 90% of the total income in all the years. This shows that the current financing channels of colleges and universities are relatively single, and it is necessary to use BOT mode, donation investment and other aspects to diversify financing channels, further improve the efficiency of college financing and realize the effective improvement of college operation efficiency.

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# THE CURRENT SITUATION, HOT SPOTS AND TRENDS ANALYSIS OF STEM EDUCATION RESEARCH IN CHINA BASED ON INTERNET AND ARTIFICIAL INTELLIGENCE

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## ABSTRACT

The rapid development of technologies such as the Internet, 5G technology, and artificial intelligence has not only changed the form of education, but also made the advantages of STEM education, which aims to cultivate innovation and problem-solving abilities, increasingly apparent. Through the literature published in core journals in the field of STEM education in China, we can glimpse the current research status, research issues, and development trends in the field of STEM education in China. This not only has great significance for the development of STEM education research in China, but also provides some supplementary research data for international STEM education. The bibliometric method was used to analyze the overall trend, high-frequency word distribution, and clustering of the literature from 2012 to 2023 in the CNKI database of Peking University core and CSSCI journals as data sources, and to construct a knowledge map with the visualization advantage of CiteSpace tool to examine the current situation, hot topics and development trend of STEM education research in China. The results show that, based on the Internet and artificial intelligence, the number of STEM education research in China has been steadily increasing in general, and the hot topics cover three aspects: STEM education philosophy and education policy, STEM curriculum design and STEM literacy, and the emerging research frontiers cover curriculum design, but the cooperation network of research scholars and research institutions is scattered and the depth of research needs to be strengthened.

## KEYWORDS

STEM Education; Interdisciplinary Literacy; Innovation Awareness; STEM Curriculum; CiteSpace

## **1. INTRODUCTION**

As an internationally recognised form of interdisciplinary education, STEM education is becoming increasingly evident for its interdisciplinary problem-solving capabilities. With the rapid development of technologies such as the Internet, 5G technology and artificial intelligence, STEM education is also an opportunity for collaborative human-machine teaching [1]. STEM education originated in the United States and has been developed over the past 30 years. It has gradually become a strategic choice for countries around the world to implement new changes in education in the 21st century [2-3]. With the global spread of STEM education, China has also made use of the opportunity of innovation and entrepreneurship to make STEM education flourish, and has made great progress in terms of theoretical research, educational application practices and related science and technology policies [4-5], although there are also problems and challenges. This study takes advantage of the bibliometric method to visualise and measure the literature in a specific field. The aim is to track and analyse the research trends and directions of STEM education in China, explore and find the frontiers of research, in order to provide some reference for further research and localised practical application of STEM education in China. In addition, it reveals the current research status and research hotspots of STEM education in China, as well as forward-looking recommendations, with a view to providing data references for international STEM education.

## **2. DATA SOURCES AND STUDY DESIGN**

### **2.1. DATA SOURCES**

In order to ensure the authority of the literature and the reliability of the data sources, the Peking University core journals and CSSCI journals in China Knowledge Network (CNKI) were used as the data sources for this study. In addition, in order to ensure the comprehensiveness of the literature, we searched the literature with “STEM education” or “STEAM education” as the theme, title and keywords, and searched the literature collected from January 1, 2012 to June 13, 2023 (because the research on STEM education in China started to develop after 2012(China Academy of Educational Sciences, 2017), so the search The study was based on these 820 Chinese literatures. This study uses these 820 Chinese literature as the research sample to conduct bibliometric statistics and visual analysis of STEM education research in China based on the Internet and artificial intelligence.

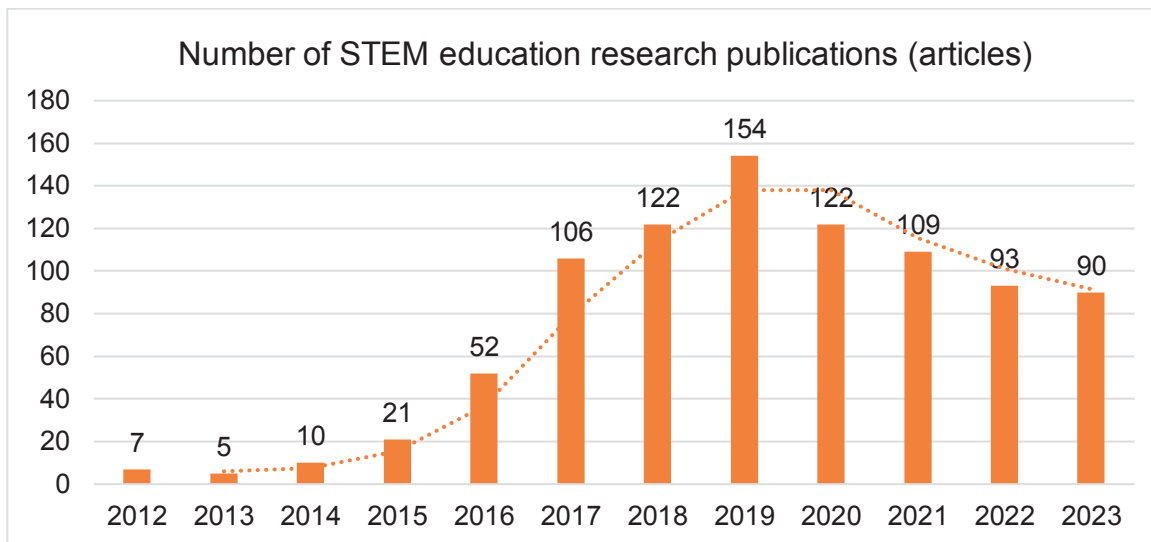
### **2.2. RESEARCH METHODOLOGY AND TOOLS**

CiteSpace is a visual analysis tool developed by Professor Chao-Mei Chen, a Chinese-American scholar at Drexel University in the USA, which combines the principles of co-citation analysis and pathfinding network algorithms [6-7] to present the evolution of knowledge domains in a It is designed to represent the evolution of the knowledge domain on a network map, and to characterise the research hotspots and frontiers in a co-occurrence knowledge map [8]. In view of this, this study uses CiteSpace (version 6.2.R2) to create a visual knowledge map to collate and analyse research results on STEM education in China, with a view to revealing the current status, hot spots and development trends of STEM education research in China in a more objective manner.

## **3. THE GENERAL STATE OF STEM EDUCATION RESEARCH**

### **3.1. DISTRIBUTION OF THE NUMBER OF STEM EDUCATION RESEARCH PAPERS**

The number of research papers published can present the evolution and development of research results in the research field, revealing the trends and hotness of the field.



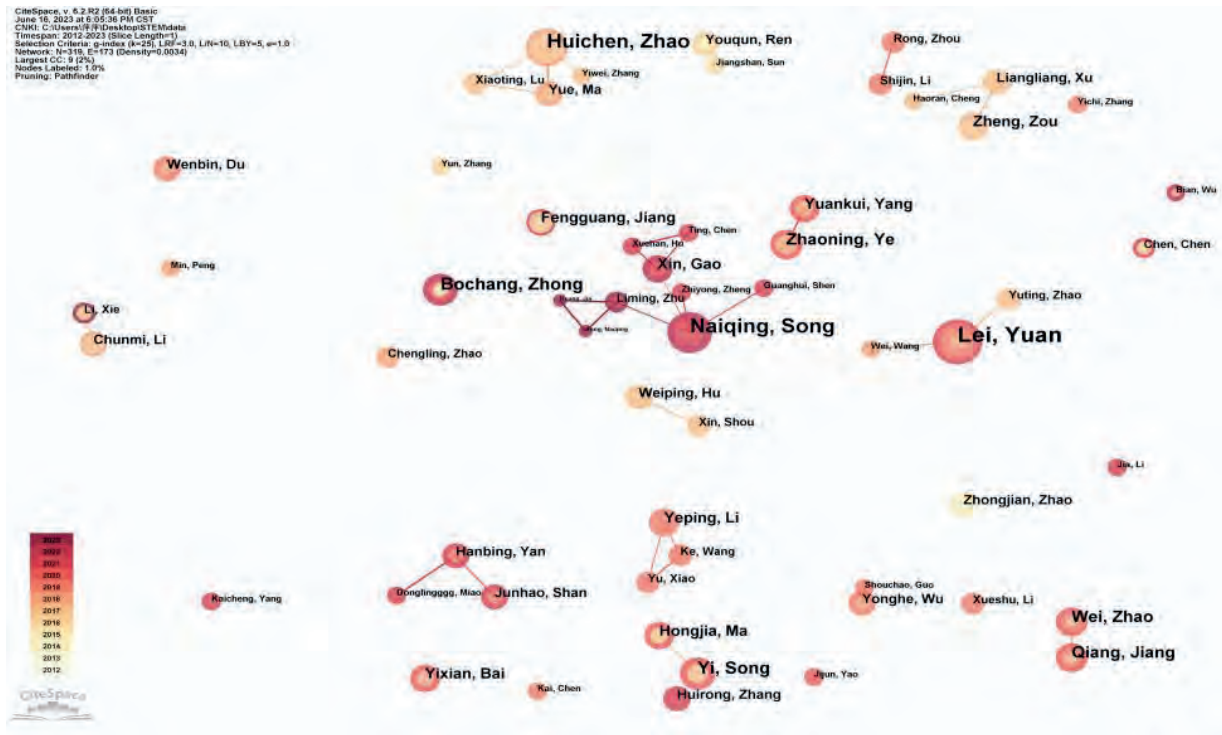
**Figure 1.** Distribution of annual publication volume from 2012 to 2023

The statistics of the 820 valid papers collected according to time distribution (Figure 1) reveal that: the year 2019 is the watershed year for STEM education research, and the number of studies from 2012 to 2019 shows a steady upward trend. From 2015 to 2019, STEM education research explodes, research content deepens, and STEM education receives increasing attention from scholars; from 2020 to 2023, although the number of publications is weak, even with the incomplete number of publications in 2023, the average annual volume of literature in this period reaches 103. This indicates that STEM education research in China has entered a phase of rapid development and is becoming a hot spot for scholars.

### 3.2. ANALYSIS OF THE NUMBER OF CORE AUTHOR PUBLICATIONS AND COLLABORATIVE NETWORKS

The development of STEM education research cannot be achieved without a core of researchers with a significant number of publications and scholarly research capabilities, so core authors need to be examined in terms of indicators such as author publications and author collaboration analysis. According to Price's law and Locat's law, the core authors can be identified by  $M = 0.749\sqrt{N_{\max}}$  ( $N_{\max}$  is the number of articles by the most prolific authors), the minimum number of articles by core authors in STEM education research in China from 2012 to 2023 is calculated as three. The most prolific author is Yuan Lei, and the top six core authors are presented: Yuan Lei(15 articles), Song Naiqing (13 articles), Zhao Huichen (13 articles), Zhong Bochang (9 articles), Song Yi(8 articles), Ye Zhaoning (8 articles). It can be seen that they are the high-output scholars in the field of STEM education in China, and they have made pioneering attempts in the pre-research work on STEM education in China.

Using CiteSpace (Author module) to analyse the collaboration of posting authors and plotting to form an author collaboration network map (Figure 2), the distribution and collaboration of core authors in STEM education can be obtained. In terms of author collaboration networks, six research teams have basically formed in the field of STEM education research in China. These research teams are mostly colleagues from the same institution, with less inter-institutional and interdisciplinary collaboration. There are also many independent authors outside the core authors, some of whom have collaborated on a single occasion, but the collaborations are fragmented and do not form a team.

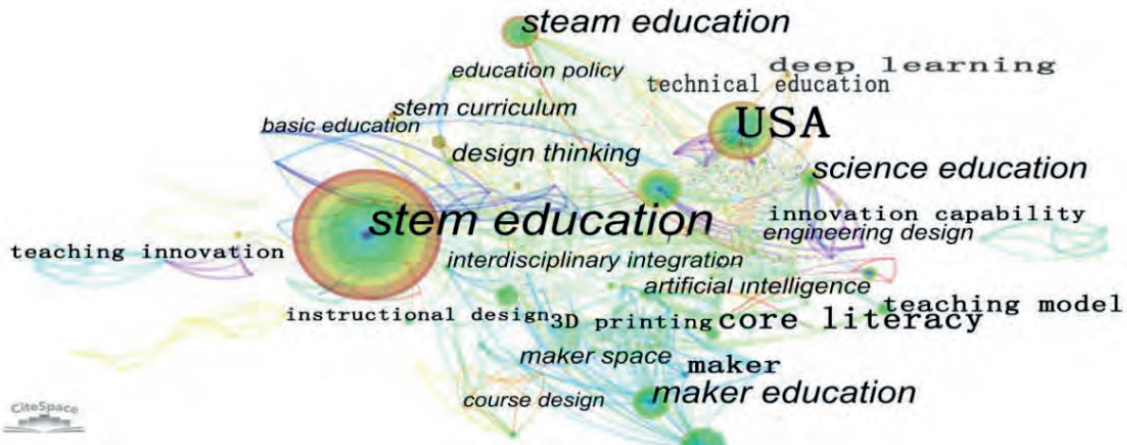


**Figure 2.** Mapping of the collaborative network of study authors

(Note: the brighter the colour and the thicker the line, the more collaborative the study author.)

#### 4. HOT TOPICS IN STEM EDUCATION RESEARCH

Knowing the research hotspots and research themes of a research field can plan future research directions. Therefore, through the analysis of keyword word frequency and co-occurrence clustering analysis, the hot topics of STEM education research in China can be further explored [9].



**Figure 3.** STEM education research topic word co-occurrence mapping

##### 4.1. KEYWORD WORD FREQUENCY AND CO-OCCURRENCE ANALYSIS

Keywords are a high level summary of the research topic of an article, and with the help of keyword word frequency analysis, the research hotspots and development trends of the research field can be obtained. CiteSpace (Keyword module) was used to analyse the keyword frequency statistics, with the annual interval of 2012-2023, the density between nodes was 0.0047. The top 14 most frequent keywords were extracted according to their frequency, forming Hot topic words in the field of STEM education research in China from 2012 to 2023, plotted to form a co-occurrence map of research topic words (Figure 3).

It can be seen that the current research in this field is mainly focused on STEM education, involving the research of STEM, science education, creative education, steam education, interdisciplinary, design thinking and other branches in the United States.

## 4.2. KEYWORD CLUSTERING ANALYSIS

After word frequency and co-occurrence analysis of keywords to obtain hot topics, clustering analysis can be performed to obtain research hotspots in STEM education. Keyword clustering was performed in CiteSpace and the effect of the clustering map was judged by the module value  $Q$  and the average profile value  $S$ <sup>①</sup> based on the network structure and the clarity of the clusters. After selecting pathfinder analysis, only the top 10 clustering labels were retained to improve the readability of the map, which was drawn to form a clustering map of STEM education research (Figure 4). The clustering atlas showed that the  $Q$  value = 0.8689 > 0.3, indicating a significant delineated association structure, and the  $S$  value = 0.987 > 0.7, indicating that the clustering was efficient and convincing. The STEM education cluster mapping therefore delineates associations with significant structure and good clustering, and is able to reveal development hotspots from the overall characteristics of STEM education research.

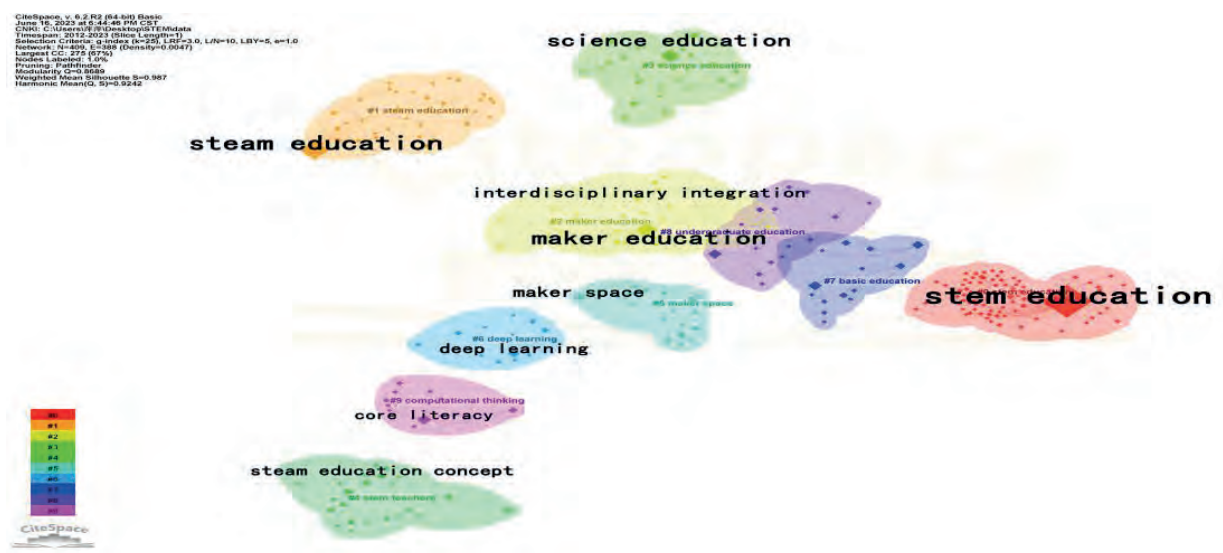


Figure 4. STEM education clustering mapping

In Figure 4, the ten main clusters are: #0 stem education, #1 steam education, #2 maker education, #3 science education, #4 stem teachers, #5 maker space, #6 deep learning, #7 basic education, #8 Undergraduate education, and #9 core literacy. By organizing the cluster information (Table 1), it can be found that “stem education” is the largest cluster, which indicates that stem education research embodies the STEM education concept. The clusters with the highest cluster efficiency are “stem education,” “stem education,” “maker education,” and “maker education. maker education” and “stem teachers”. As can be seen from Table 1, most of the clusters were born in 2016-2018 and 2019, which correspond to two “active periods” of STEM education research in China, during which the research scope gradually gathered and research results began to be abundant.

Using the clustering information aggregation function provided by CiteSpace and the content of the clustered class clusters, the 10 main keywords can be clustered into three

①  $Q$  value (Modularity) is a measure of modularity in the interval  $[0, 1]$ ,  $Q > 0.3$  means that the structure of the delineated associations is significant;  $S$  value (Weighted Mean Silhouette) is a measure of the homogeneity of the network,  $S > 0.5$  means that the clustering is reasonable,  $S > 0.7$  means that the clustering is efficient and convincing.  $S > 0.5$  means that the clustering is reasonable, while  $S > 0.7$  means that the clustering is efficient and convincing.

major hot topics of STEM education research. The three hot themes cover focus on STEM education philosophy and education policy (#0 stem education, #1steam education, #4 stem teachers), focus on curriculum design (#2 maker education, #3 science education, #4 stem teachers, #5 maker space, #6 deep learning, #7 basic education, #8 Undergraduate education), and focus on STEM literacy (#9 core literacy).

**Table 1.** Keyword clustering summary table

Subject Number	Cluster Number	Cluster Name	Silhouette Degree	Clustering Size	Average year
1	#0	stem education	1	78	2018
	#1	steam education	1	38	2018
	#4	stem teachers	1	24	2019
2	#2	maker education	1	28	2016
	#3	science education	0.984	28	2018
	#5	maker space	0.996	18	2018
	#6	deep learning	0.961	15	2019
	#7	basic education	0.967	15	2017
3	#8	Undergraduate education	0.959	14	2018
	#9	core literacy	0.875	11	2018

## 5. RESEARCH TRENDS IN STEM EDUCATION

With the time variable as the horizontal axis and the cluster name and number as the vertical axis, CiteSpace can be plotted into a cluster timeline mapping, showing the historical trajectory and time span of each cluster theme, which provides a reference for us to study the evolutionary path of each theme [10]. Based on the keyword timeline mapping, the research on STEM education in China from 2012-2023 can be divided into three phases:

Phase 1: The beginning of STEM education research (2012-2014). The number of STEM education research literature in this phase is relatively small, involving fewer subject terms and clusters, mainly related to STEM education, the United States, technology education and science education, and other subject terms and clusters have not yet been generated. The relevant articles mainly focus on topics such as STEM education philosophy, STEM education in the US and changes in education policies, which are positive guides for subsequent STEM education research.

Phase 2: The development period of STEM education research (2015-2019). The number of STEM education research literature in this stage has grown explosively compared to the nascent stage, involving more subject terms and clusters, and most high-frequency subject terms have been revealed in this stage. Relevant articles mainly focus on creative education, creative spaces, interdisciplinarity, project-based learning, artificial intelligence, computational thinking, core literacy and curriculum design, which have an important leading role in subsequent STEM education research.

Phase 3: The consolidation period of STEM education research (2019-2023). The number of STEM education research literature in this phase decreases compared to the previous phase but the average annual number of publications is still high, and new themes emerge from the existing themes, such as integration, deep learning, knowledge construction, innovation ability, and learning progression.



## 6. RESEARCH FINDINGS

This study based on the Internet The current situation, hot topics and development trends of STEM education research in China were discussed based on the Internet and artificial intelligence, and the following conclusions can be obtained:

First, in terms of the overall research trend, the wide range of sources of research papers published in journals and the high number of papers indicate that STEM education research in China is currently showing rapid development, with a new research high in 2019. It is evident that Chinese STEM education research is gradually maturing, and the future STEM education research fever will also be in a period of academic prosperity.

Secondly, from the co-occurrence map of core authors and research institutions, a core author research team has basically been formed for STEM education research in China, but the density of author and research institution cooperation network is low and the cooperation network is relatively scattered, indicating the lack of academic links between research authors and between research institutions. Teacher training colleges and universities are currently the main site of STEM education research, but further strengthening of the integration of theory and practice is needed.

Thirdly, from the keyword co-occurrence mapping, the more frequent subject terms are “stem education”, “United States”, “creator education”, “science education”, “steam education”, “maker education”, and “science education”, “science education”, “steam education”, “maker education”, “ science education”, “core literacy”, etc. Based on the keyword cluster analysis mapping, the three hot topics of STEM education research in China are sorted out: STEM education philosophy and education policy, STEM curriculum design and STEM literacy.

Fourth, the keyword timeline mapping and keyword emergence mapping reveal the development trend of STEM education research in China, and can be categorised into the starting period (2012-2016), the development period (2016-2019) and the consolidation period (2019 -2023). In addition, the analysis of timeline mapping and keyword emergence mapping summarises the next frontier directions of STEM education research development for reference in the next relevant research.

## FUNDING

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# RESEARCH AND DESIGN OF SYNCRETIC ONLINE SERVICE HALL BASED ON SERVICE GOVERNANCE

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## ABSTRACT

At present, the data of online service hall and application system cannot be exchanged in both directions, which leads to duplication or fragmentation of services between online service hall and application system. To this end, this paper designs a converged online service hall based on the service governance concept, frames the service hall platform, innovatively designs its service functions, and uses convergence technology and service governance technology to realize the deep integration of data, applications, services, messages, and pages, thus providing users with a unified service portal, and finally tests the platform, and the test results are consistent with the expected results. This shows that the data fusion technology effectively solves the data sharing problem, and the service flow technology effectively realizes the business system process reengineering.

## KEYWORDS

Syncretic online service hall; Service management; Data fusion technology; Service Governance Technology; Cordys

## 1. INTRODUCTION

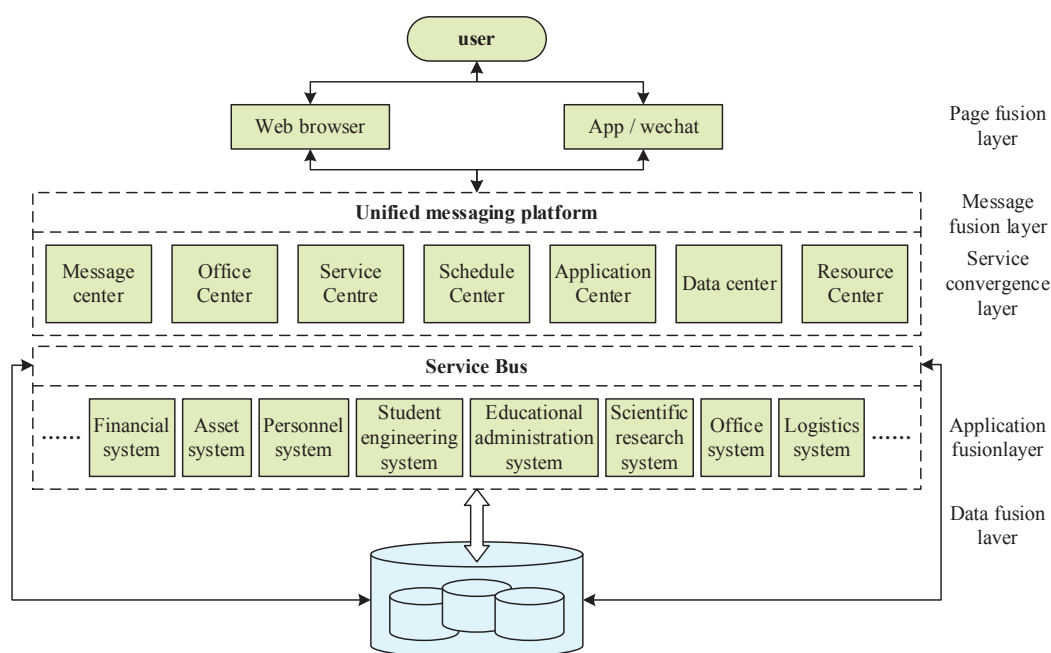
The informatization level of colleges and universities has experienced the stage of networking and digitization, and is entering the stage of smart campus construction. In the construction stage of smart campus, colleges and universities are in full swing to build various user-oriented portals and application systems, such as school website, information portal, OA office system, network teaching, campus card and various management systems. Each application system "acts in its own way", the business and data are separated, and the business work, filling in data. When searching for data, the application system is often switched constantly. It is difficult to find information, services and affairs, resulting in low utilization rate of the application system [1].

In order to solve this problem, colleges and universities have begun to build a unified portal, online service hall and one-stop service hall in recent years. They want to realize online service, online approval and provide one-stop service, but in fact the user experience has not been substantially improved. Therefore, based on the concept of service governance, an integrated online service hall is proposed. Through the integration and interworking of data layer, application layer and information layer, it provides teachers and students with one-stop services of unified page entry, unified information service, unified service, unified application service and unified data, so as to truly realize one-stop service [2].

## 2. PLATFORM ARCHITECTURE

The integrated online service hall based on service governance is based on the traditional online service hall. Driven by service, it microservices the application functions of each application system, separates the involved information, applications and data from the application system [3], integrates them according to business process and service process, and integrates them in the integrated online service hall to realize one-stop integrated service, provide a unified service entrance for teachers and students, and teachers and students do not need to pay attention to each application system.

Figure 1 is the system hierarchy diagram of the integrated online service hall, including five levels: data fusion layer, application fusion layer, service fusion layer, message fusion layer and page fusion layer from bottom to top.



**Figure 1.** Overall architecture of the system.

## 3. SERVICE FUNCTION DESIGN

(1) Message Service Center: The message center is to integrate news, notifications and messages from the platform, OA, information portal, WeChat official account and other platforms seamlessly to the fusion portal of the platform, forming the notification center of the fusion portal, and realizing the unified view, unified release and management of the fusion portal.

(2) Office Center: The service center aims to provide a visual process service platform, break the barriers between various departments and systems of the school, comprehensively integrate and reengineer the processes scattered in different fields with the advanced process service concept [4], and effectively realize the process connection and data integration of the business systems of various departments according to the service object, event type Business departments and other ways to provide services to users, establish an online service center that truly meets the campus affairs of teachers and students, and improve work efficiency and service quality.

(3) Service Center: The service center mainly provides various information services for teachers and students, such as service guidance, policy consultation and information inquiry services.

(4) Schedule Service Center: The schedule service center uniformly manages and notifies the schedules related to teachers and students, including meetings, activities, timetables, reports, lectures, business trips, school or department arrangements, etc.

(5) Application Service Center: The application service center gathers all business systems, micro applications, applets and other applications together to realize unified management, unified authentication and unified services, mainly including the following types of applications: first, put all business systems (including mobile applications), micro applications and applets of the school on this center to realize unified management and provide unified services through single point authentication; Second, it is open to teachers and students.

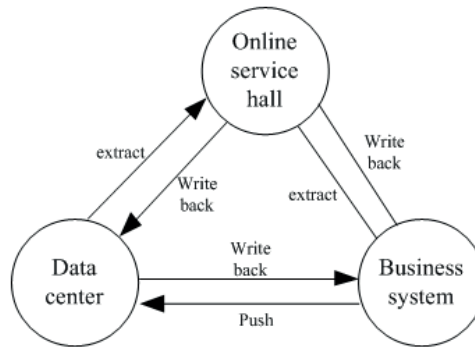
## **4. KEY TECHNOLOGIES**

### **4.1. DATA FUSION TECHNOLOGY**

The hall will eventually become the only entrance to the smart campus application of the school, that is, users can access any application and service only by installing the platform, so as to realize the unified entrance of data and business services, which will require the continuous exchange of data among the client, data center and business system database, so how to effectively solve the data exchange between the three will directly affect the data security and user experience [5].

(1) The traditional data exchange technology is a two-way exchange between the data center and the business system, while the network office hall only allows data to be obtained from the data center, and cannot directly obtain or write back data from the business system. It is mainly considered that it is difficult to achieve unified rules and real-time data synchronization when writing back data to the data center or business system. This will inevitably lead to data errors or inconsistencies between the data center and the data table of the business system [6]. However, data exchange according to the traditional mode is difficult to achieve data fusion, which greatly affects the user experience.

(2) Fusion data exchange technology. In order to solve the contradiction between data exchange security and user experience, the hall adopts data fusion technology to realize two-way and two-way exchange between the three, as shown in figure 2. It solves the problem of how to write data back to the business system after realizing the unified entrance of data collection. In order to enhance the sense of user experience, the integrated network office hall integrates all the data reporting functions originally scattered to various business systems into the unified data collection page of the data center of the network office hall, which solves the trouble of the original users jumping to different business systems to fill in data.



**Figure 2.** Data exchange mode of integrated network office hall.

## 4.2. SERVICE GOVERNANCE TECHNOLOGY

### 4.2.1. SERVICE PROCESS REENGINEERING DESIGN

By building a service platform independent of the business management system, the integrated online service hall drives business process reorganization with service, integrates business processes with the concept of service governance, separates user oriented services from the business system, seamlessly connects the service process with the business system process, and teachers and students have the same use experience of all service processes, There is no need to focus on services from specific business systems [7]. The idea of business process reengineering is as follows:

The first step is to reorganize all business systems of the school, reconstruct the business process according to the business life cycle, and construct the full life cycle business processes such as teacher development, student growth, equipment management, project construction, fund use, professional construction, curriculum construction, classroom teaching, campus consumption and school enterprise cooperation. The second step is to split each link of each life cycle business process into business processes or service processes. Next, take the student growth life cycle business process as an example.

### 4.2.2. SERVICE PROCESS IMPLEMENTATION TECHNOLOGY

In this paper, cordys is used to solve the problem of cross department and cross business system business process reengineering, which is developed and implemented based on cordys workflow engine [8], and on this basis, the functions of process template configuration, process initiation, to-do processing interface, multi-level branch signing, countersigning, transfer and so on are extended. The four steps of modeling, execution, monitoring and optimization are used to realize the business process reengineering of cross department and cross business system. Since the process template configuration uses the user-defined table to configure the process flow rules, the process flow needs to write the corresponding code to configure the rules, so as to realize the flow of the process engine according to its own intention. The main business process management of the network office hall is process modeling and process template configuration.

Process modeling: in order to meet the flexible configuration of process nodes and realize that all Link nodes can reach each other, it is necessary to select a flexible modeling method from the technical level, point to all all Link nodes through a judgment node, and then set the node number to the next Link to be equal to the Link node number. During the process operation, change the node number of the next phase of the current process as needed, so as to drive the process to the next phase. If there are three process link nodes, in order to realize

the mutual process of the three nodes, according to the original process modeling configuration, six lines need to be drawn to realize the mutual process of the three nodes. For the modified process modeling, as shown in figure 3, a judgment node is designed. When the process enters any link, it enters the judgment node first, When a node in the while loop sends a node for processing, the while loop will be triggered again. If you want Link 3 to be transferred to Link 1 and Link 2, you only need to configure the numbers of phase 1 and Link 2 in the Next\_Path field of the workflowstep table of Link 3.

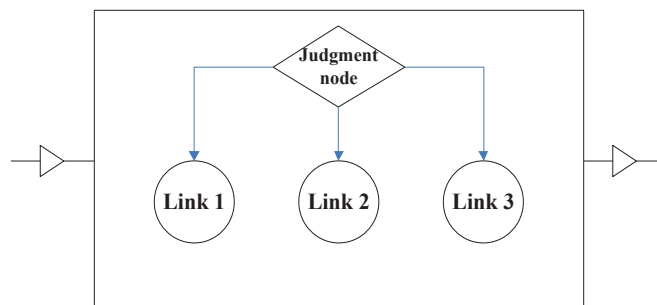


Figure 3. Cycle flow modeling diagram.

## 5. PLATFORM TEST

### 5.1. TEST ENVIRONMENT

Test environment: including the business module environment of the network office hall, shared data center, various business systems and cordys process engine environment, operating system: Linux, middleware: Apache server and Weblogic, database: Oracle and DB2.

### 5.2. DATA FUSION TEST

Data fusion test method uses page embedding to write back and push data. The test cases and test results are shown in table 1.

Table 1. Data fusion test

Method	Test case and description	Expected results	Actual results
Page embedding to write back and push data	Users can continuously enter scores through the score entry page of the educational administration system embedded in the online office hall.	The entered results can be found in the educational administration system database and data center, and displayed in the data center of the network office hall in real time.	Consistent with expected results
	Users input several papers continuously through the paper entry page of the scientific research system embedded in the online office hall.	The input papers can be found in the scientific research system and data center, and displayed in the personal data center of the network office hall in real time.	Consistent with expected results

### 5.3. PROCESS MANAGEMENT FUNCTION TEST

Cordys process management functions include process modeling, process template configuration, process link configuration, link switch maintenance and process monitoring. Test cases and test results are shown in table 2.

**Table 2. Test cases and test results**

Number	Test case and description	Expected results	Actual results
1	The administrator logs in to the cordys platform, creates a process template and publishes it.	The process template is successfully created and sent.	Consistent with expected results
2	Enter the link switch configuration function and add switch information.	Successfully added phase switch information.	Consistent with expected results
3	Enter the process monitoring function, click query to read the process instance table and view the currently running process instances.	The process instance table can be opened normally	Consistent with expected results

## 6. CONCLUSION

This paper focuses on two key issues affecting the user experience of online service hall. One is to design a data fusion technology for the data fusion and sharing among online service hall, data center and business system, which effectively realizes the two-way data exchange between online service hall and various business systems; Second, various user oriented applications and businesses are scattered in each business system center, which can not be effectively unified to provide services in the online service hall. Service process reengineering technology is used to effectively realize cross business system process integration. The solution of the two key problems effectively realizes the integration and interworking of data layer, application layer and information layer, and provides teachers and students with unified page entry, unified information service, unified service and unified data service. As the era of big data, big data centers have been built one after another. How to integrate the data and applications of big data centers with various business systems and application systems more intelligently and efficiently will need to be further studied. The next research work will focus on the big data center fusion technology to realize the efficient fusion storage and fusion application of big data.

## FUNDING

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2. This research was supported by the scientific research project of the national industrial and Information Vocational Education Teaching Steering Committee: Research on the construction and management of high-level professional groups in higher Vocational Colleges Based on big data application (gxhzw20201108).

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**RESEARCH ON ARTIFICIAL INTELLIGENCE METROLOGY SYSTEM AND  
DESIGN OF AUTOMATIC CORRECTION METHOD OF METROLOGY ERROR  
FOR BIG DATA TECHNOLOGY**

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**ABSTRACT**

This paper firstly describes the main components of the artificial intelligence metering system and the functions of the background system modules, mainly including user management module, measurement management module and calibration management module. Then the main sources of errors and methods to eliminate errors are analyzed, and the system error model is established and calibration algorithms are used for calibration or compensation to eliminate the system errors. Then the basic algorithm of DC bias and ratio-difference correction is studied. Finally, the system performance is analyzed using the system results compared with the actual results. With the system signal-to-noise ratio set to -3dB, the abnormal state of each meter to be measured recorded by using the system tracking error monitoring is basically the same as the real record, and the system stability is basically more than 30% since. The system in this paper can realize the error monitoring and tracking of

smart metering device measurement, and the error monitoring results are accurate and reliable, with high practical application effect.

## **KEYWORDS**

big data; artificial intelligence; metering system; error correction; DC bias; error tracking

## **1. INTRODUCTION**

Artificial intelligence has been developed in recent years, the level of technology has advanced greatly, and it is used in many fields, and the depth and breadth of its applications are increasing. [1]. Metrology is a measurement activity that uses technical means to achieve uniformity of units and to ensure accurate and consistent values [2].

The literature [3] suggests that to obtain new discoveries, achievements and progress in scientific research also requires attention to metrology, and that only by relying on advanced metrological instruments and equipment as well as accurate testing techniques can we continuously improve the level of scientific research, promote its capabilities and improve its methodological procedures. The literature [4] proposes the use of a measurement method applicable to fixed frequency conditions - random asynchronous sampling method. In the literature [5], in order to solve the problem of poor error stability caused by the digitization of metering devices, the system of simultaneous measurement of the overall error of digital metering devices and the single error of electronic transformers and digital energy meters is designed and simulated and verified. The literature [6] proposed a field calibrator metering error monitoring system based on a fusion model with multidimensional conditions. The literature [7] used an improved staking method to obtain a fusion model reflecting the influence of the multidimensional environment on the metering error of the field calibrator, and solved the influence of the complex field environment on the metering performance of the gateway-type energy meter. In the literature [8], an improved template-matching measurement method based on image rule edges is proposed for the problem of difficult detection of varying morphologies.

This paper first introduces the module and function introduction of the artificial intelligence metering system. Then the error sources, and error correction methods are introduced, which are mainly caused by the current standard transformer, inaccurate internal reference of the metering device, zero drift of the op-amp, DC bias, gain offset, differential nonlinearity, integral nonlinearity, etc. The DC bias error and ratio difference correction methods are used to eliminate the effect of DC bias. Finally, the

performance and practical application effects of the smart metering system are analyzed.

## **2. ARTIFICIAL INTELLIGENCE MEASUREMENT**

### **2.1 ARTIFICIAL INTELLIGENCE MEASUREMENT INTELLIGENCE SYSTEM**

Artificial intelligence-based measurement of intelligent systems will be integrated from inspection and testing, control processing, results analysis and data application of each intelligent platform has the degree of intelligence to handle a range of work processes, with an intelligent interface for interaction with people, tacit collaboration with people, can complete the processing of big data and other applications to achieve all the measurement needs. Intelligent system is the brain of the measurement work, forming a neural network-like system, building application development framework, and human interaction to complete the measurement work.

### **2.2 BACKEND SYSTEM MODULE FUNCTION DESIGN**

The backend is to manage the functions of the whole system, including user, measurement, calibration, analysis and visualization platform modules, and also contains the core business management of the system.

User management: The administrator can add users and administrator operations in the background, and the successfully added users can log in in the foreground, and the successfully added administrator can log in in the background. At the same time, the administrator can delete users and administrator operations in this page.

Measurement management: collect and analyze sensor data, and convert parameters such as detection working current, voltage, power and electricity into bookable data.

Calibration management: compare and analyze the system data with the standard value to calculate the system error, and use the calibration algorithm to calibrate or compensate the system error to eliminate the system error.

Platform visualization management: visualize the data completed by the system conversion to facilitate real-time reception and monitoring of platform data.

## **3 AUTOMATIC CORRECTION OF MEASUREMENT ERRORS**

### **3.1 ERROR SOURCES AND ANALYSIS**

Part of the system error remains unchanged or measured under the same conditions, the error change is following a certain law in the change of the error is called the system error, which is caused by the internal factors of the whole device system, such as the error caused by the current standard transformer, measurement device internal reference inaccuracy, zero drift of the op-amp, DC bias, gain offset,

differential nonlinearity, integral nonlinearity and other factors. Since the system error has a certain regularity, the measurement instrument can be analyzed from the root cause of the system error, establish the system error model, and use the calibration algorithm to calibrate or compensate in order to eliminate the system error. According to the different sources of error of the measurement device can be mainly divided into hardware circuit error and software error. The hardware circuit error is mainly caused by the electronic components in the circuit with dispersion, sampling resistance network and A/D analog-to-digital converter.

### 3.2 DC BIAS AND RATIO DIFFERENCE CORRECTION

DC bias refers to the amount of bias misalignment caused by electronic components with dispersion in the hardware circuit, sampling resistor networks, and A/D analog-to-digital converters. The offset varies with the electronic components and the ambient temperature. To achieve accurate measurement of power parameters under dynamic loads with high accuracy, the effect of DC bias must first be eliminated.

DC bias error and ratio difference correction. Let the discrete signal of the A/D voltage sampling channel be  $u(n)$ , the discrete signal of the current sampling channel be  $i(n)$ , the DC bias voltage be  $u_{DCV}$ , and the DC bias current be  $i_{DC}$ . Since the system is sampled at a determined time equal interval for uniform sampling, the DC bias voltage  $u_{DCV}$  and DC bias current  $i_{DC}$  are the discrete voltage signal and the discrete current signal respectively in a fixed sampling time of several integer times the sampling time. The average value of the discrete voltage signal and discrete current signal in a fixed sampling time. When the discrete sampling point voltage and current values within a number of integer times sampling time are time  $\bar{U}_n, \bar{I}_n$ . Then we have  $U_{DCV} = \bar{U}_n, i_{DC} = \bar{I}_n$ , then the corrected expressions of DC bias error of voltage and current channels are:

$$u_1(n) = u(n) - u_{DCV} \quad (1)$$

$$i_1(n) = i(n) - i_{DC} \quad (2)$$

In the signal conditioning circuit used are high-precision 1%, good temperature characteristics of the resistor, but due to the function of electronic components and the discrete nature of the parameters, so that the actual value of the components and the

nominal value of the error between. Therefore, the actual input A/D in the voltage and current values  $u_{in}(n)$ , and the ratio of its corresponding voltage divider network have proportional error correction coefficients  $k_u$ ,  $K_i$ , namely:

$$k_u = \frac{u_1(n)}{u_i(n)} = \frac{u(n) - u_{DCV}}{u_{in}(n)} \quad (3)$$

$$K_i = \frac{i_1(n)}{i_{in}(n)} = \frac{i(n) - i_{DC}}{i_{in}(n)} \quad (4)$$

The measurement method of power under dynamic load of the system adopts the instantaneous power measurement method of IEEEStd 1459-2010 standard, so the product of the voltage signal channel ratio difference coefficient  $K$ . and the current signal channel ratio difference coefficient  $K'_i$ ,  $K'_p$ , which is the ratio difference correction coefficient of active power is:

$$K'_p = K'_u K'_i \quad (5)$$

#### 4. SYSTEM ERROR CORRECTION PERFORMANCE ANALYSIS ANALYSIS

This paper takes a metering institute as the experimental object, uses this paper system error monitoring, this measurement station in the smart metering device data measurement, through this paper system error monitoring results obtained from the field tester, and the comparison of the results of the real state record, test the performance of this paper system and practical application effect.

The test uses the field comparison method to test the performance of this system, through this system monitoring to obtain the meter error to be measured, compared with the meter error to be measured by the 0.06 level field tester, through the comparison results to verify the rationality of this system design. The rated current is 10A, the expected accuracy is 0.05 level for active and 0.2 level for reactive, and the field tester model is LWS3800. 3 measuring instruments are randomly selected from the experimental design institute as the parameters to be measured. Table 1 shows the comparison results of the error of the meter to be measured.

The absolute difference between the active power error of each meter to be measured by the system monitoring and the field tester is less than 0.05%, and the absolute difference between the reactive power error is less than 0.2%, which are in line with the expected accuracy, thus indicating that the performance index of the system can reach the expected standard and meet the requirements of the

metrological regulations, which can replace the field tester and other relevant test equipment applied for manual testing.

**Figure 1** Error monitoring alarm records versus realistic records

Parameters				
Results from this system	Current/A	1.23	0.23	0.331
	Voltage/V	103.6	105.76	108.4
	Power Factor	0.88	0.45	0.83
	Active power/W	256.8	234.5	54.5
	Reactive power/VAR	29.6	36.7	-29.4
	Active power error	0.019	-0.98	-0.016
	Reactive power error.	-0.177	2.56	0.063
Field tester results	Current/A	1.386	0.234	0.316
	Voltage/V	103	1.567	109.7
	Power Factor	0.88	0.45	0.85
	Active work/W	0.76	36.5	53.6
	Reactive power/VAR	0.065	-9.7	-29.4
	Active power error	0.045	-0.063	-0.046
	Reactive power error.	-0.345	0.163	-0.018

Figure 1 shows the comparison results between the error monitoring alarm records and the real state records of the system. With the system signal-to-noise ratio set to -3dB, the abnormal state of each meter to be measured using this system tracking error monitoring record is basically the same as the real record. It can be seen that this system can realize the tracking error monitoring of smart metering device data measurement, and timely implementation of the alarm and record according to the error monitoring abnormalities, the error monitoring results are accurate and reliable, with high practical application effect. Figure 1 shows the comparison between the alarm record and the real record of error monitoring.

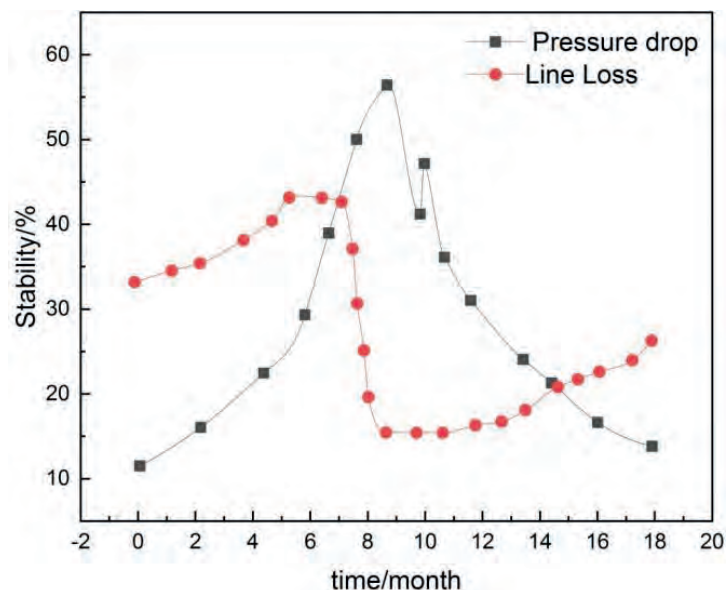


Figure 1 Error monitoring alarm records versus realistic records

## 5. CONCLUSION

This paper verifies through experiments that the system in this paper has high performance and practical application effect, the error monitoring results are highly accurate and can replace the manual test equipment to implement error monitoring. It can achieve the expected standard of smart metering device data measurement error monitoring, meet the requirements of metrology regulations, can replace the field testers and other relevant test equipment applied to manual testing, solve the problem of high labor, material and time spent on the error monitoring method of manual field testing, realize the tracking error monitoring of smart metering device measurement, and the error monitoring results are accurate and reliable, with high practical application. The results are accurate and reliable, and have a high practical application.

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# THE CONSTRUCTION OF INFORMATION MANAGEMENT SYSTEM OF CONSTRUCTION PROJECT BASED ON BIM5D

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## **ABSTRACT**

With the gradual acceleration of people's pace of life, the traditional process and management mode can no longer meet the requirements of modern construction projects. Through the study of BIM5D, construction projects are no longer limited to the modeling calculation of BIM5D, and gradually BIM5D is used as an intelligent engineer to manage most of the contents of the building from the contract period to the acceptance period, such as the progress of both sides of the contract on the construction period, and the expected distance from the target, how to control resources in terms of cost, how to make the best possible use of materials and even reduce the waste of materials completely, etc. The application of BIM5D in building construction realizes the parameterization, visualization and integration of the whole project, improves the information level and quality of green construction, and achieves good implementation effect.

## **KEYWORDS**

BIM5D; information management; construction engineering; cost control; green construction; assembly building

## **1. INTRODUCTION**

In recent years, against the background of the steady development of the construction industry, each construction enterprise has gradually changed its management mode, and new management techniques and management concepts have been gradually promoted and applied in construction projects [1]. At present, the overall development of the construction industry has accelerated, and if the traditional construction management mode is still adopted, it is not only unable to achieve the

management and control of various dynamic factors, but also unable to achieve effective collaborative management [2-3]. And BIM5D technology can play a good management effect in dynamic management and collaborative management, so that all engineering resources in construction projects can play their maximum value and realize the optimization of construction project management [4-5].

The literature [6] proposes that the high degree of digitization being experienced in the construction industry requires a re-examination and re-conceptualization of the collaboration between project teams. The literature [7] proposes that building information models generate accurate information in an explicit manner and enable project participants to easily access various types of information, thus greatly improving the transparency of information in the facility lifecycle. The literature [8] relates contemporary industry management experience to the industry reality of construction projects and analyzes ways to improve the design management of construction projects. The literature [9] makes a horizontal comparison of project management in the domestic and foreign architectural design industry and illustrates the need to use project management in engineering design.

In this paper, BIM technology is introduced into the construction industry for information management research. The application of information management of construction projects is based on the traditional management of quality, progress, cost and safety, information management of construction sites, combination of prior control and dynamic control, continuous improvement, seeking to coordinate the economic interests of the project with the protection of resources and ecological environment, unification with people and society, and striving for the maximum harmony between project personnel and the social and natural environment of the project site Unification.

## **2. CONSTRUCTION PHASE BIM5D DEEP INTEGRATION RESEARCH AND APPLICATION**

### **2.1 INFORMATION CREATION AND INTEGRATION**

The establishment and integration of information need to be developed around the various aspects of the project, such as deepening the design, construction progress, resource management, construction site and other aspects, so that a scientific and perfect engineering information management model can be truly established, and the establishment of project information based on the whole life cycle management can be realized, and the continuity and integrity of information will thus better serve the utility of BIM technology.

## **2.2 THREE-DIMENSIONAL INTERPRETATION OF TWO-DIMENSIONAL FLAT DRAWINGS**

Establish a complete model before construction, solve problems in plan drawings in advance, merge and collision check the models of each profession, deal with the contradiction points between each profession, solve problems in advance and reduce the temporary adjustment of each profession later. Integrate the 3D model into the daily project work such as drawing review, technical delivery and program simulation.

## **2.3 ESTABLISHMENT OF INFORMATION-BASED PROJECTS**

Today, with the popularity of smart devices, modernization can be effectively used to widely arrange information points in the project, each of which can convey project-related information and show the project image to the outside. By establishing a BIM information sharing platform, project personnel can freely extract and upload project information with a terminal device to achieve information sharing.

## **3. CONSTRUCTION PHASE BIM TECHNOLOGY RESEARCH AND APPLICATION**

### **3.1 CIVIL PART MODEL**

The BIM modeling process of the assembled building is different from the traditional modeling. The civil part of the traditional building generally adopts the building and structure modeling method separately, but through research and practice, the assembled building is more suitable to adopt the prefabricated part and cast-in-place part modeling method separately.

### **3.2 3D DRAWING REVIEW AND COLLISION CHECK**

After the modeling is formed, each profession can first run the spatial collision check, retrieve the parts where the components conflict or do not meet the spatial distance, and make preliminary adjustments to the model. Then, according to the integration of the model, run the collision check again, adjust and deepen the model of each profession, until the final deepening design model.

### **3.3 SITE MASTER PLAN**

Using the three-dimensional visibility of BIM, the construction site plan is planned, mainly including the layout of the temporary construction, the installation and dismantling of large machinery, the positioning of the construction yard, the planning of the construction road, etc.. It is also managed in the information management platform, and the construction site components are updated and managed according to the construction progress, so that the construction site layout is updated according to the construction progress.

### **3.4 BIM5D CONSTRUCTION SIMULATION, INTEGRATED INFORMATION CONTROL**

With the support of BIM technology application, time and resource dimensions, the "5D-BIM" model can establish "dynamic construction planning" based on the project's resource input and construction reality. The "5D-BIM" model can establish "dynamic construction planning" based on the project's resource input and construction reality, which can clarify the information of resource input, phased funding, schedule arrangement and construction process of the assembled building. The "5D-BIM" model can also achieve a high level of simulation of construction planning problems, and at the same time carry out reasonable optimization in conjunction with the problems, so that the construction unit may cause delays and cost increases caused by poor consideration can be better avoided. It is worth noting that the "5D-BIM" model can also ensure that the technical and management personnel of the project have a deep understanding of the cost and resource input and construction process arrangement of the whole project, so that the cash flow optimization, rational arrangement of resource supply, construction plan and sequence optimization can be carried out to truly realize the dynamic cost and schedule planning of the project construction. management.

## **4. O&M STAGE BIM TECHNOLOGY RESEARCH AND APPLICATION**

### **4.1 IMPROVE EQUIPMENT MAINTENANCE MANAGEMENT IN THE OPERATION AND MAINTENANCE PHASE**

With the support of the information management platform based on BIM technology, the project can establish prefabricated components and equipment operation and maintenance system, which can provide strong support for the development of building operation and maintenance work. Take the emergency management and data management functions of BIM technology as an example, if a sudden fire occurs in the operation and maintenance stage of an assembled building, firefighters can accurately locate the location of the fire with the support of building and equipment information provided by BIM technology, so that the target of fire extinguishing and rescue work can be guaranteed. In addition, BIM technology can also better serve the maintenance of assembled buildings and ancillary equipment, through direct access to model, parameters, manufacturers and other prefabricated component information from the BIM model, the efficiency of maintenance work can naturally be better guaranteed.

## **4.2 STRENGTHEN THE QUALITY AND ENERGY CONSUMPTION MANAGEMENT IN THE OPERATION AND MAINTENANCE PHASE**

The assembled building can realize the whole life information of itself under BIM technical support, so the operation and maintenance management personnel can easily obtain the important information of the assembly building prefabricated components manufacturers, transporters, installers, etc., and if the assembly building prefabricated components have late quality problems, BIM technology can be applied to realize the traceability from the operation and maintenance stage to the production stage, and the clear attribution of responsibility can be realized. It is worth noting that the green operation and maintenance management of prefabricated buildings is also inseparable from the support of BIM technology, with BIM technical support to carry out energy consumption monitoring and analysis, you can accurately find the location of high energy consumption and targeted treatment, the use of BIM technology to screen the secondary development of assembled buildings to recycle resources, but also to avoid the waste of resources when the building is dismantled.

## **5. ESTABLISHMENT OF ENGINEERING INFORMATION MANAGEMENT SYSTEM BASED ON BIM TECHNOLOGY**

### **5.1 BIM APPLICATION PLAN**

The project takes green construction as the purpose, the construction party in the process of construction, in order to ensure safety, quality and. Under the premise of the construction period, the construction company will implement the guiding ideology of giving priority to environmental protection and the efficient use of resources, pursuing environmental protection, high efficiency and low consumption, and achieving the green construction mode of maximizing the comprehensive benefits of environmental protection, economy and society.

To ensure more efficient implementation of the green construction mode and to meet the requirements of the construction side, the construction side of the project introduced BIM technology in the green construction process, and the BIM project application plan is shown in Table 1. The technology is fully used in deepening the design, construction process, project progress, site management, information integration with the main daily management system of the construction party, and information integration with the project operation management system, so as to fully realize the objectives of the project in terms of schedule, cost, quality, safety, environmental protection, etc. The establishment of engineering information management system with BIM application as the carrier can improve the project construction efficiency, improve the level and quality of building construction, shorten the construction period, save resources and reduce costs to a certain extent.

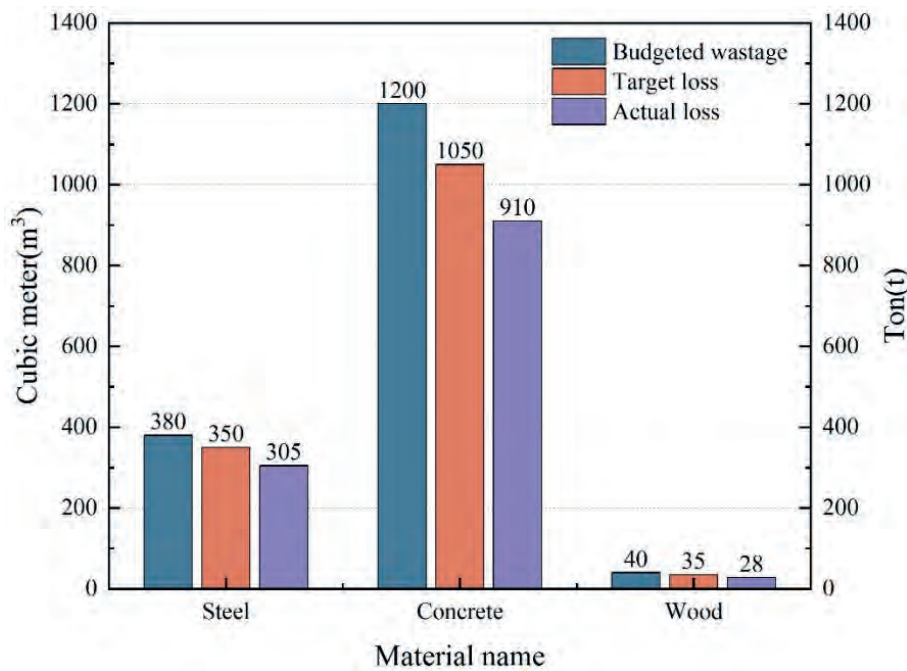
The application of BIM in engineering needs to rely on a practical work plan to clarify the work content and application effect. Combining the overall goal of BIM application, actual project duration requirements, project construction difficulties and characteristics, the BIM application plan of the project was formulated.

**Table 1** BIM project application plan

Serial No.	Project Name	Project Layering
1	BIM model building	Civil construction professional model
		Steel structure professional model
		Mechanical and electrical professional model
2	Deepening the design	Comprehensive pipeline deepening design
		Complex node deepening design
		Curtain wall deepening design
3	Construction Program Planning	Surrounding environment planning program
		Site layout plan
		Special construction plan
4	General Contractor Construction Project Management	Construction Equipment Management
		Construction Material Management
		Construction Environment Management

## 5.2 CONSTRUCTION IMPLEMENTATION EFFECT OF BIM TECHNOLOGY

The application of BIM technology in the construction of building projects achieves the application objectives of BIM, realizes the parameterization, visualization and integration of the whole project, improves the information level and quality of green construction, and achieves good implementation results. Figure 1 shows the implementation effect of saving material resources utilization. It can be seen that the budgeted loss of steel is 380t, the actual consumption is 305t, the budgeted loss of concrete is 1200m<sup>3</sup>, the actual consumption is 910m<sup>3</sup>, the budgeted loss of wood is 40m<sup>3</sup>, the actual consumption is 28m<sup>3</sup>. 19.7% of steel, 24.2% of concrete and 30% of wood are saved after the establishment of engineering informatization management system. Table 1 shows the overall economic benefit analysis of the construction. The final cost saving of the project reached 2.34 million RMB, and the saving far exceeded the expected 1.45 million RMB. Therefore, the BIM5D-based construction information management system achieved a good cost control effect, and the construction cost of the whole project did not exceed the budget of safety and civilization construction cost, and also reduced the total construction and building cost to achieve good economic benefits. It shows that the use of BIM technology-assisted construction can not only ensure the implementation effect of construction, but also save the cost of construction.



**Figure 1** Effect of material saving implementation

**Table 2** Analysis of overall economic benefits of construction

project	Target value	Actual value
Construction increase cost	≤490000 yuan	430000 yuan
Construction cost saving	≥2 million yuan	2.67 million yuan
Total cost savings	≥1.45 million yuan	2.34 million yuan
Cost savings as a percentage of total output	≥0.6%	1.7%

## 6. CONCLUSION

In the context of vigorously developing information management of construction projects, the combination of engineering management and BIM technology has triggered the deep integration and rapid development of construction industry and information industry. Among them, the wide application of key technologies about conflict detection, green building, cost and schedule management, safety and quality management, supply chain management, operation and maintenance has begun to promote the effect of the development of the whole industry chain of construction industry. The BIM5D-based information management system for construction projects built in this paper has resulted in 19.7% savings in steel, 24.2% savings in concrete, and 30% savings in wood in the construction application of building projects. The final cost saving of the project reached 2.34 million RMB, and the savings far exceeded the expected 1.45 million RMB. Therefore, BIM technology has an extremely important role in the current construction industry, especially in the development of project management.

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# DESIGN OF 3D LASER IMAGE PROCESSING SYSTEM BASED ON INTELLIGENT ALGORITHM

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## ABSTRACT

In this paper, the target figure acquired by 3D laser scanning is segmented by edge contour, and the segmented feature points are mapped to 2D space for 3D information reconstruction of the object. In the image processing, a series of improved algorithms such as denoising processing, image grayscale binarization and laser stripe refinement are used to better achieve the extraction of laser stripe image information, thus obtaining a more ideal effect map. Compared with the traditional method, the accuracy of the system in this paper is improved by 28.47% and the processing time is reduced by 22.14%. Therefore, the object images collected by the 3D laser image processing system in this paper are clearly targeted and achieve a better image processing effect.

## KEYWORDS

3D laser scanning; Image processing; 3D information reconstruction; Edge contour segmentation; Grayscale binarization; Laser stripe refinement

## 1. INTRODUCTION

3D laser scanning technology is the latest technology in the whole system of 3D data acquisition and reconstruction techniques, which aims to obtain 3D contour data of the object under test and mainly includes data measurement and subsequent processing of the data [1-2]. It can quickly obtain the coordinates of the spatial position of each sampling point on the surface of the object, and then with the help of computer software processing, the three-dimensional model is described in the form of points, lines, polygons, curves, and surfaces, and then the surface model of the entity can be reconstructed [3-4].

The literature [5] used 3D laser scanners for bridge appearance scanning with its high-density point cloud data and high-resolution image data to provide apparent information of the bridge, which can be used as a new method for bridge health diagnosis and safety monitoring. In the literature [6], the point cloud data collected by the 3D laser scanner followed the decreasing time interval of sampling and the data increased, and the load size of the system increased proportionally to the amount of point cloud data to the extent that the data volume increased to a certain level leading to the system not operating properly. The literature [7] extracts target feature points can be directly used to achieve a method of 3D reconstruction of the target using 3D laser scanning data, and constructs feature lines and feature surfaces from feature points to reconstruct 3D targets. The literature [8] analyzed the error sources of 3D laser scanner, analyzed the quantitative relationship between single-point point position error, coordinate component error and distance, vertical angle and horizontal angle in detail from theory, and summarized the distribution law of error.

In this paper, we perform edge contour segmentation on the graphics acquired by 3D laser scanning, map the segmented feature points into 2D space for 3D information reconstruction, and perform edge enhancement and sharpening of the image. In the process of image processing, after denoising, binarization and laser stripe refinement, a more ideal effect map can be obtained. In this paper, the algorithm is studied and improved to a certain extent in terms of denoising, binarization threshold selection and refinement processing, and the theory and practice show that the algorithm can significantly improve the accuracy.

## 2. 3D LASER SCANNING IMAGE PROCESSING

### 2.1 3D LASER SCANNING IMAGE EDGE CONTOUR SEGMENTATION

In order to achieve the reconstruction of 3D laser dynamic information, it is necessary to first carry out image acquisition, image acquisition using 3D laser scanning method, laser detection method to obtain massive data of target information, and then carry out coarse and fine alignment of scanned laser images, remove the noise generated by image acquisition, and carry out sampling of key points of target information, based on which the target reconstruction is realized:

$$E_{\text{int}}(v_i) = \frac{1}{2} \left( \alpha |d - |v_i - v_{i-1}|^2 + \beta |v_i - 1 + 2v_i + v_{i+1}|^2 \right) \quad (1)$$

Where  $d = \frac{1}{n} \sum_{i=0}^{n-1} |v_i - v_{i-1}|$ , indicates  $d$  is the average distance between the control

points of the initial profile, and the chromatic contrast of the rendered graphics is improved by the 3D fiber to provide an accurate model basis for the drawing of the moving target image features.

## 2.2 DESIGN OF 3D LASER DYNAMIC INFORMATION RECONSTRUCTION ALGORITHM

The segmented feature points are mapped into two-dimensional space for three-dimensional information reconstruction, the edge enhancement and sharpening of the image are performed, the dynamic feature points are sampled by the sampling point lasso method, and the Euclidean distance between the feature points and the edge pixel points is minimized as the constrained cost function to obtain the maximum weight of the edge features of the three-dimensional laser scanning image calculated as:

$$Int(C) = \max_{e \in MST(C,E)} w(e) \quad (2)$$

Where  $w(e)$  is the full domain vector decomposition vector, the target image is feature decomposed, the edge pixel points of the image form a closed loop interval after feature segmentation, the nesting technique is used to contour point marker to the reconstructed figure, the contour point marker set is  $G$ , where  $g_i = (g_{ix}, g_{iy}, g_{iz}) (i = 0, 1, \dots, N_g - 1)$  is the  $i$ th vertex in the center vector  $V$  of the contour point marker, using the scale center distance invariance, the fixed point information of the scanned grid model is obtained as  $G(x, y, t)$ , the edge enhancement operator of the image is introduced, and the edge enhancement result of the 3D laser image is obtained as:

$$f(g_i) = c_1 \tilde{\lambda}_i \frac{\sum_{j=0}^{N_{np}} \frac{\rho_j \vec{v}_{ij}}{|\vec{v}_{ij}|^{\sigma_1} + \varepsilon}}{\sum_{j=0}^{N_{np}} \frac{\rho_j}{|\vec{v}_{ij}|^{\sigma_1} + \varepsilon}} \quad (3)$$

Where,  $c_1$  denotes the center distance of the target image features plotted,  $\tilde{\lambda}_i$  is the pose invariance coefficient, and  $\varepsilon$  is the interference parameter.

### 2.2.1 DENOISING PROCESS

The magnitude of noise and the location of its appearance are generally random and essentially isolated points, and they are irregular and have the nature of scattered data points. In order to pick out these spurious points, a comparison method is designed in this paper, given two thresholds  $g$  and  $N$ , such that  $H(i, j)$  denotes the gray value of the pixel in the  $j$ th column of the  $i$ th row without loss of generality, assuming that there is no noise at the  $(i, j)$ th pixel, i.e.,  $H(i, j)$  is a normal gray value, if there is :

$$|H(i+1, j) - H(i, j)| < g \quad (4)$$

Then it is proved that the grayscale value is continuously changing and pixel  $(i+1, j)$  is not a noise point that should be rejected.

### 2.2.2 IMAGE GRAYSCALE BINARIZATION

Image binarization is one of the most basic and crucial problems in the field of image processing, which refers to the division of a multi-gray level image into two fields, namely object and background, i.e., transforming into a binary image with two gray levels of black and white. Binarization is beneficial to image recognition, extraction and highlighting of signal features, image segmentation and reconstruction, and compression of image data, which not only compresses data in a large amount, but also greatly simplifies the later analysis and processing and improves the speed of video measurement. Image binarization principle: Let the original image be  $f(x,y)$ , find a gray value  $t$  in  $f(x,y)$  as a threshold with certain criteria, segment the image into two parts, and the segmented binary image  $g(x,y)$  as:

$$g(x,y) = \begin{cases} 1 & f(x,y) \geq t \\ 0 & f(x,y) < t \end{cases} \quad (5)$$

The part of 0 is considered as background and the part of 1 is considered as target. In this way, the target is distinguished from the complex scene and its shape is extracted, and the selection of the threshold value is the key of image binarization technique. If the threshold is chosen too high, too many target points will be mistaken for the background. If the threshold is too low, the opposite will happen, which will affect the size and shape of the target in the segmented binary image, or even make the target be overwhelmed.

### 2.2.3 LASER STRIPE IMAGE REFINEMENT

Laser stripe refinement is the process of continuously removing contour pixels on the curve that do not affect the connectivity, so as to obtain the central skeleton of a single pixel. But no matter what refinement algorithm is used, it should meet the refinement results should be maintained with the original map of topological equivalence, should maintain the continuity of the graphics in the original map, should be (or close to) the center of the original line shape, refinement of the line width should be a pixel, refinement results are not sensitive to the original map boundary noise, retain the curve endpoints, cross part of the center line is not distorted, refinement speed and other characteristics.

For refinement of laser scan lines, the surface contour of an object is usually recovered by extracting the set of highest brightness points of the laser line image or the centerline of the line area, characterizing the intersection line between the brightest light plane within the beam and the surface of the object. However, the obtained stripe image may be partially missing due to various reasons. For example: The material of the object itself is not homogeneous, and some black spots, dark spots may appear. The object's surface may be obscured by protrusions, so that some of the stripes cannot be captured. Imaging system lens or CCD itself caused by defects.

### 2.2.4 LASER LIGHT BAR CENTER EXTRACTION ALGORITHM

The image has been denoised, assuming that all noise signals have been removed, and the main information of the image has been retained intact in the processed image. We use a front contour line detection method to extract the position of the laser light bar. The laser light blade will form a light bar with a certain width when it hits the object. Due to the high brightness of the laser, there is an obvious brightness change compared with the background image, so the front contour line (or the back contour line) of the light bar can be extracted as the light bar. A non-lightbar information pixel point in the image, if its neighboring pixel points are lightbar information, then the difference between the brightness of these two pixel points will be very

obvious, the response in the light intensity Gaussian distribution graph is expressed as a steeper tangent line of the point, then the point with the steepest slope is both the frontier critical point pixel. Thereafter, the slope is gradually moderated until the extreme value point (that is, the brightest pixel in the center of the light bar).

### 3. EXPERIMENTAL DESIGN AND CONTENT

#### 3.1 PERFORMANCE COMPARISON WITH TRADITIONAL METHODS

A number of images were selected as data sets for testing in response to the experimental need to accomplish the requirements of fast and effective image processing. Comparing the traditional method with the processing method of this paper, this research method uses 5 nodes, 1 master node and 4 slave nodes. Using the determined image data size of 2,000, 4,000, 6,000, and 8,000 experiments to view the time required to process the images for both methods will reflect the relationship between the time and number of images processed, as shown in Figure 1.

When processing 100 images, there is not much difference in time consumption between the two methods. However, as the image data size increases to 2000 images, the time calculated by the method in this paper is 198.43s less than that of the traditional processing method, which takes longer time. It can be seen that when 6000 and 8000 images are selected, the processing method time starts to grow slowly, and the method in this paper is 22.14% less than the traditional method, which can perform fast processing of large-scale image data.

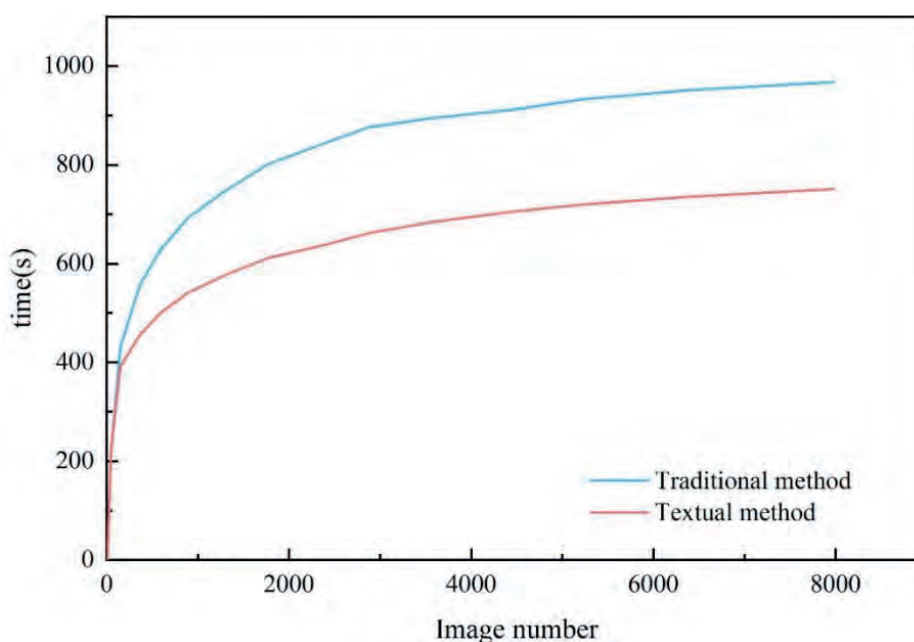


Figure 1. Image processing speed comparison

#### 3.2 ALGORITHM PROCESSING SPEED

Most of the existing image segmentation uses accuracy rate to measure the performance of image segmentation algorithms, and a set of metrics is defined for the comparison of crack segmentation algorithms.  $P_r$  is the accuracy rate,  $T_p$  is the number of correctly detected objects,  $F_p$  is the number of mis-detected objects,  $P_r = T_p / (T_p + F_p)$ . The parameters of the algorithms corresponding to the accuracy rate are shown in Table 1, from which it can be seen that the accuracy rate of this research method can reach 87.41%, which is a significant improvement over other traditional algorithms and can process images better.

Table 1. Comparison of accuracy rates

Methods	Number of images	Accuracy
Ostu	2000	48.84%
Canny	2000	58.94%
FD	2000	55.37%
Methodology of this article	2000	87.41%

#### 4. CONCLUSION

This paper discusses the algorithmic process of optical strip image processing in laser 3D scanning technology, using the high directionality and high brightness of the laser to form fine and bright contour lines on the surface of the object, and then using a CCD camera to capture hundreds of contour lines on the surface of the object in a short period of time. These images are pre-processed by image pre-processing such as image denoising, filtering, binarization and image post-processing using laser stripe center extraction, and sent to a computer system for real-time processing to calculate the 3D coordinates of the measured object shape. The studied system based on the algorithm of this paper reduces the image processing time by 22.14% compared to the traditional method, and the accuracy of the algorithm of this paper reaches 87.41%, which is 28.47% higher than Canny.

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# 3D VIBROSCOPIC LASER SCANNING IMAGE PROCESSING BASED ON INFORMATION FUSION TECHNOLOGY

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## ABSTRACT

In this paper, we adopt 3D oscilloscopic laser scanning technology for image acquisition and information measurement of the target, combine the envelope contour detection method for image noise reduction processing, adopt the information fusion filtering model for feature enhancement and scalar information extraction of the 3D laser scanning image of the target, and realize the arithmetic optimization design of the target information model. The error between the simulated and calculated results of the constructed model is less than 1%, the

linear relationship between laser power and current, the system distance error and angle error are less than 1.25mm and 1.02° respectively, which indicates that the constructed model can effectively control the 3D oscillator laser scanning system for high precision laser scanning.

## **KEYWORDS**

Information fusion technology; 3D vibroscopic laser; Image acquisition; Information measurement; Image noise reduction; Envelope detection method

## **1. INTRODUCTION**

The creation of laser technology has led to a new era of awareness of the surrounding environment. Industries employing laser distance measurement and detection are proliferating. Laser devices are gradually replacing the original optical instruments because of their small size, high accuracy and speed [1-2]. In most construction companies, the use of laser instruments is also gradually being upgraded and transformed. Laser scanning is one of the most applied technologies in recent years, and the most used in the application of laser scanning technology is the 3D vibrating mirror laser scanner [3]. The so-called laser oscillator refers to the laser scanning instrument that uses the reflected beam deflection to image the object for scanning [4]. The use of three-dimensional vibrating mirror laser scanners allows rapid acquisition of spatial data and rapid spatial reconstruction [5].

In the literature [6], laser 3D marking based on the vibroscope was realized and the technique was used to achieve the positioning of the compound layout and the positioning of the aircraft skin making holes. In recent years, some researchers have started to abandon the traditional idea of modeling the system based on the actual construction principle of the vibroscope system, and instead adopt a new modeling idea for the calibration of the vibroscope system. The literature [7] implemented a laser cutting shearing of feathers based on the vibroscope system based on the calibration method of the vibroscope system completed by the camera calibration algorithm. In the literature [8], the 3D coordinates of the laser spot in the monocular camera coordinate system were used as the model output data, and the 2D coordinates of the spot in the camera image plane together with the deflection of the vibrating mirror system corresponding to the spot were used as the input data of the model, and a triangulation model based on the vibrating mirror system was constructed with the help of neural networks, support vector machines, ridge regression and other fitting means.

In this paper, we propose a method of calculating target object information model based on 3D vibrating mirror laser scanning technology. The 3D vibrating mirror laser scanning technology is used for image acquisition and information measurement of target objects, combined with the envelope contour detection method for image noise reduction processing, and the information fusion filtering model is used for feature enhancement and scalar information extraction of 3D laser scanned images of buildings to realize the optimized design of target object informatization model arithmetic, and finally simulation experiments are conducted to draw conclusions on the effectiveness.

## **2. IMAGE ACQUISITION AND INFORMATION MEASUREMENT OF BUILDINGS**

### **2.1 3D LASER SCANNING BASED BUILDING IMAGE ACQUISITION**

In order to design the building information model arithmetic based on 3D laser scanning technology, 3D laser scanning image acquisition of the building needs to be carried out first, and the fuzzy laser scanning images acquired are edge-enhanced to improve the accuracy of information quantification processing. The 3D laser scanned image is disturbed by the additive



noise term  $\eta(x, y)$ , and the image detection is performed with the laser  $X$  ray beam to obtain the template pixel values of the original image, and the scanned template of the image is divided into 3x3 pixel blocks by the 4x4 neighborhood grid distribution method of seed points to obtain an estimate of the original image  $\hat{f}(x, y)$ . In the reconstruction of the building image, the laser scanned pixel statistics values of the image acquisition are decomposed by vector quantization obtained:

$$d = \frac{1}{n} \sum_{i=0}^{n-1} |v_i - v_{i-1}| \quad (1)$$

$d$  of the above equation is the average distance between the laser scanning points, and the quantitative statistical values of the image feature distribution vary in characteristics  $H$  and  $\eta$ . When  $H$  and  $\eta$  have more information, the obtained building informatization feature estimate  $\hat{f}(x, y)$  will be closer to  $f(x, y)$ .

The fusion process of the image pixel-level neighborhood parametrization is performed, and the information measurement of the building image acquisition is obtained by adaptive local noise reduction as:

$$g(x, y) = f(x, y) + \eta_m(x, y) \quad (2)$$

Where,  $f(x, y)$  denotes the input image,  $g(x, y)$  denotes the grayscale value of the output building image after 3D laser scanning,  $\eta_m(x, y)$  denotes the feature difference value between pixel points, and satisfies  $\eta_m(x, y) \in \{-1, 0, 1\}$ . By the above processing, the 3D laser scanning-based building image acquisition is realized.

## 2.2 BUILDING 3D LASER SCANNING INFORMATION MEASUREMENT

The empirical modal decomposition (EMD) method is used to discretize the 3D laser scanned images of buildings, and the multi-grained coarse pixel feature expression is performed using the transverse scan and block scan models, and the modal function of the separated frequency band information measurement of each feature point frame of the laser scan is described as follows:

$$x(n) = \frac{1}{\sqrt{N}} \sum_{k=0}^{N-1} X(k) \exp(j2\pi kn/N), n = 0, 1, \dots, N-1 \quad (3)$$

where  $X(k)$  is the magnitude characteristic of the laser-scanned frame and  $\exp(j2\pi kn/N)$  is the separated phase characteristic of the data in both frames.

In order not to lose generality, a batch model is used for feature segmentation of the laser scanned building images, such that the normalized expression for the gradient value of the 3D laser scanned information measurement of the building is:

$$K = \frac{(\text{Grad} - \min \text{Grad})}{(\max \text{Grad} - \min \text{Grad})} \quad (4)$$

The gradient value of the 3D laser scan image calculated by the above method realizes the accurate measurement of the 3D laser scan information of the building and provides an accurate data base for framing the building information model.

## 2.3 OPTIMIZED DESIGN AND IMPLEMENTATION OF BUILDING INFORMATION MODEL

### 2.3.1 IMAGE NOISE REDUCTION PROCESSING

Based on the image acquisition and information measurement of the building using 3D laser scanning technology, an optimal design analysis of the building information model calculation is carried out. Combined with the envelope contour detection method for image noise reduction processing, the  $(p+q)$ nd order dark primary color feature spectrum of 3D laser scanning imaging  $f(x, y)$  is calculated for:

$$m_{pq} = \sum_{m=1}^M \sum_{n=1}^N x^p y^q f(x, y) \quad (5)$$

Combined with grayscale feature segmentation, the global search for noise of 3D laser scanning building imaging is carried out for image noise reduction processing, and the discriminant function of image noise reduction is obtained as:

$$x_i(t) = [w_{i1}^{lk}, \dots, w_{in}^{lk}] [x_1(t-k), \dots, x_n(t-k)]^T \quad (6)$$

where is the quadratic polynomial kernel function of the  $[w_{i1}^{lk}, \dots, w_{in}^{lk}]$  building informatization model, and  $[x_1(t-k), \dots, x_n(t-k)]^T$  is the error control coefficient after the image noise reduction process.

### 2.3.2 BUILDING INFORMATION FEATURE ENHANCEMENT AND SCALAR INFORMATION EXTRACTION

An information fusion filter model is used for feature enhancement design of 3D laser scanned images of buildings, and a cascade filter model is constructed as a filter structure model for building information feature extraction, and the output  $I_{(k)}(i, j)$  of the rate feature enhancement of the building information pixel value  $I(i, j)$  is obtained as follows:

$$I(i, j) = \sum_{k=1}^P I_{(k)}(i, j) \times 2^{k-1} \quad (7)$$

Combined with the information fusion filtering model, the envelope contour detection result of the image is obtained as:

$$g_i^* = \begin{cases} Rs_j & z \leq i \leq x - y \\ g_i & otherwise \end{cases} \quad (8)$$

where,  $R$  a normative constant, divides the set of building laser scan image results from the detection output into several subsets, and obtains the modular subset of building information as :

$$g(x, y) = f(x, y) + \varepsilon(x, y) \quad (9)$$

where  $f(x, y), g(x, y), \varepsilon(x, y)$  represents the output error amount of the building information model within the same subset, respectively, denoted as  $\sigma_n^2$ . Through the above processing, the feature enhancement and scalar information extraction of the 3D laser scan

image of the building are carried out using the information fusion filtering model to realize the arithmetic optimization design of the building information model.

### 3. RESULTS AND ANALYSIS

ZEMAX software can realize the modeling and analysis functions within the optical system, covering all the functions required in the optical design process, and also has the advantages of good tolerance performance, speed and flexibility. Therefore, ZEMAX software is used to simulate and analyze the mathematical model of the 3D oscillator laser scanning system constructed in this paper. Using ZEMAX software this paper model control under the three-dimensional oscillator laser scanning system simulation focal length of 40 mm, 320 mm, 560 mm of the three focusing lens, the distance between the first focusing lens and the second focusing lens is 360 mm, the distance between the second focusing lens and the third focusing lens is 0 mm. In comparison with the simulation results of ZEMAX software, the relationship values between the moving distance of the focus point  $\Delta S$  and the moving distance of the first lens  $Z$  were obtained by calculation, and the results are shown in Table 1.

There is a nonlinear relationship between the first lens travel distance  $Z$  and the spotting point travel distance  $\Delta S$ , and the relationship between them is close to a straight line, which means that the first lens travel distance  $Z$  and the spotting point travel distance  $\Delta S$  are in a uniform state, and the error between the simulation results and the calculation results does not exceed 1%. The experimental results show that the model-controlled 3D oscillator laser scanning system is feasible.

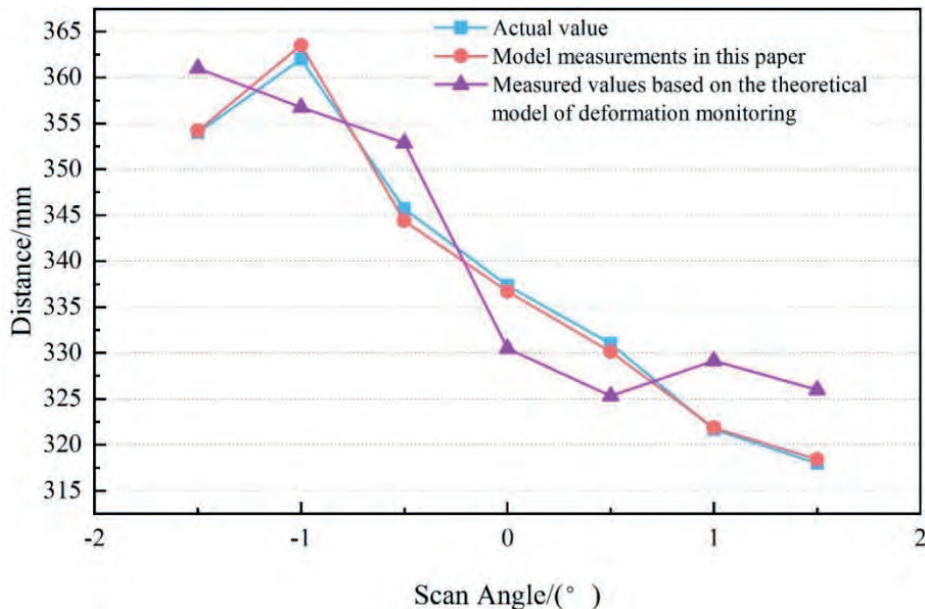
**Table 1.** ZEMAX software simulation parameters table

First lens moving distance Z/mm	Distance between the focusing point and the third lens/mm	Focusing point moving distance simulation fruit/mm	Calculation result of moving distance of focus point/mm	Error between simulation result and calculation result/%
0	549.52	0	0	0
2	555.82	6.11	6.04	0.86
4	562.23	11.49	10.67	0.88
6	568.84	18.21	17.94	0.90
8	575.76	24.89	23.42	0.91
10	582.71	31.88	30.86	0.93
12	590.13	39.42	37.43	0.94
14	597.76	47.02	46.97	0.95

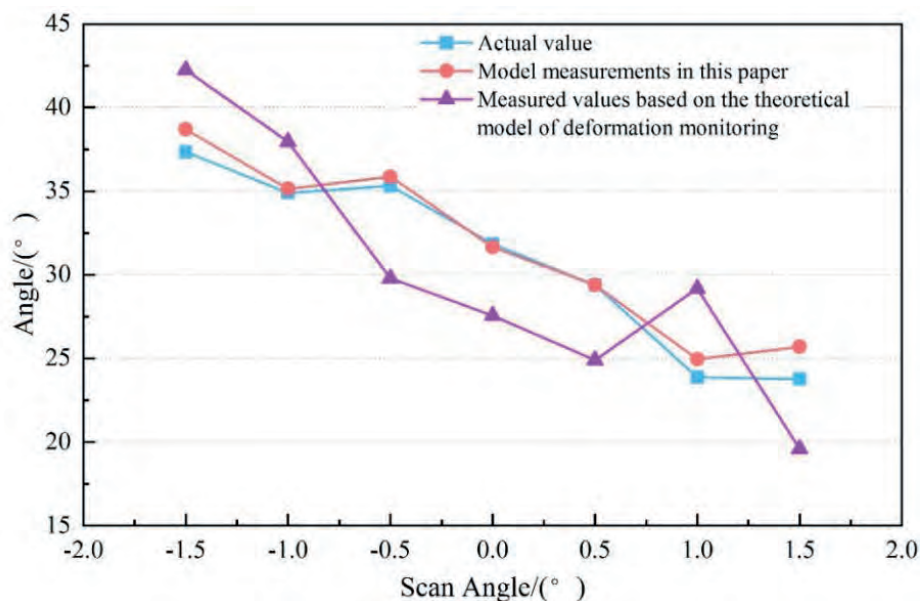
In order to verify the correction effect of the three-dimensional oscillator laser scanning system under the control of the model of this paper, the experimental objects are selected using the model of this paper and the mathematical model of the three-dimensional oscillator laser scanning system based on the theory of deformation monitoring. Under the control of this model, the average number of calculations is 5 when the 3D oscilloscope laser scanning system is corrected for the ranging error, and the corrected distance value is obtained according to the real moving angle of the motor when the angle error is corrected. Figure 1 shows the experimental results of range error and Figure 2 shows the experimental results of angle error.

During the ranging process of the three-dimensional vibrating mirror laser scanning system controlled by the model in this paper, the acquired measured values are basically consistent with the actual values, and the error is controlled within 1.25 mm. The error between the measured value and the actual value obtained by the three-dimensional vibrating mirror laser scanning system controlled by the mathematical model based on the deformation monitoring

theory is between 2.1 and 4.6 mm. The error between the measured value and the actual value obtained by the model in this paper is within 1.02, while the error between the measured value and the actual value obtained by the 3D vibrating mirror laser scanning system based on the deformation monitoring theory mathematical model is between 1.47 and 3.2% when testing the range angle error of different models. These experimental results show that the three-dimensional vibrating mirror laser scanning system under the control of the model in this paper has a good error correction effect and can achieve high precision laser scanning.



**Figure 1.** Experimental results of distance measurement error



**Figure 2.** Angle error experimental results graph

#### 4. CONCLUSION

In this paper, we construct a new 3D oscilloscopic laser scanning method to correct the ranging error and angular error in the system respectively, and improve the scanning accuracy of the scanning system. The 3D laser scanning of buildings using this paper effectively improves the image quality, provides effective image input for the measurement of building information, and finally realizes the feature enhancement and scalar information extraction of 3D laser scanning images of buildings. The study shows that the range error and angle error of the 3D oscilloscope laser scanning system in this paper are lower than 1.25mm and 1.02°,

respectively. The results show that the model in this paper can effectively control the smooth operation of the 3D oscilloscope laser scanning system, and the error correction effect is good, which can improve the scanning accuracy of the 3D oscilloscope laser scanning system.

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# ANALYSIS OF THE DYNAMIC RESPONSE OF 3D WOVEN COMPOSITES BASED ON BIRD IMPACT RESISTANCE

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## ABSTRACT

The optimal structure of the 3D woven composite is derived from the analysis of the response to the anti-bird impact. In this paper, 3D woven composite panels with different structures are constructed based on the simulation system, and simulation experiments of bird impact are designed. Comprehensive response analysis is carried out in terms of impact pressure at the impact surface, deformation process during impact, response changes of different units and damage. Based on the analysis results, attention should be paid to the amount of 45° plies to be laid down in the impact resistant design of the 3D woven composite to avoid excessive stress values during the impact. The research in this paper provides an effective reference for the enhancement of bird impact resistance of 3D woven composites.

## KEYWORDS

Bird impact resistance; Three-dimensional woven materials; Impact pressures; Cell response; Composite materials; Damage analysis

## 1. INTRODUCTION

Bird collision is a type of flight accident that accompanies the emergence of aircraft. It is the abbreviation for a flight accident caused by the collision of a flying machine, etc. with a bird flying in the sky [1]. The parts of a bird strike include high risk parts such as engines, air intakes, radiators, windshields and radomes and low risk parts such as wings and landing gear [2].

The literature [3] suggests that there are still many problems with the numerical simulation analysis of bird collisions, and that the numerical simulation results do not match the experimental results to a high degree and cannot be used directly to guide the design development of aircraft windshields. The main reasons for this are: the intrinsic relationship between the bird body and the aircraft windscreen, the shape of the bird body, the damage criterion of the aircraft windscreen, etc. The literature [4] suggests that composite materials have high specific stiffness and strength as well as low density and other characteristics that

can effectively absorb impact loads. When designing the leading edge of the flat tail structure, the reasonable use of composite materials can effectively reduce the impact of weight gain due to the design of bird collision resistance, and improve the safety of civilian aircraft while greatly improving the economy. The literature [5] suggests that for composite materials, the mechanical properties are mainly dependent on the properties of the reinforcement and matrix materials, as well as the interface bond between them. In [6], the effect of the preparation of plain weave laminated composites on the mechanical properties was investigated, and these studies have given great insight into the improvement of the mechanical properties of laminated composites. The literature [7] used the coupled solution method to systematically analyse the bird impact problem of aircraft windshields, and recently some research has also been carried out on the bird impact problem of composite structures. The literature [8] investigated the failure behaviour of laminated structural composites in wet environments.

This paper focuses on the bird impact resistance of 3D woven composites, analysing the pressure and response during impact, which is important for the study of the mechanical properties of composites.

## 2. ANALYSIS OF THE DYNAMIC PRESSURE OF THREE-DIMENSIONAL WOVEN COMPOSITES AGAINST BIRD IMPACT

In the initial phase of the impact, as the bird body comes into contact with the plate, the velocity of its contact part changes abruptly so that a large shock wave is generated and propagates backwards. The pressure on the surface of the plate can be expressed by the following equation:

$$PH = pv_s v \frac{p' v_s'}{p' v_s' + pv_s} \quad (1)$$

Where  $p$  indicates the density of the bird body,  $p'$  the density of the plate,  $v_s$  the propagation velocity of the shock wave in the bird body,  $v_s'$  the propagation velocity of the shock wave in the plate and  $v$  the impact velocity of the bird body. Afterwards, as the bird body in contact with the plate section rheologises and spreads outwards, this creates an unloading wave, whereupon the pressure of the bird body on the plate is consequently reduced and the bird impact enters a phase of constant flow.

During constant flow, a stationary point with velocity 0 is created at the centre of impact of the bird body, and if the plate is assumed to be rigid and the bird body to be non-compressible flow, the pressure at the centre of impact can be expressed as follows:

$$p_s = \frac{1}{2} pv^2 \quad (2)$$

Taking into account the influence of non-ideal conditions, the following correction to the formula is often made in practical applications:

$$p_s = \frac{k}{2} pv^2 \quad (3)$$

$k \geq 1$  in the formula. The impact pressure will eventually become 0 as the impact process progresses.

The 3D woven composite damage model established for bird impact composites is explored in terms of both dynamic response and damage, respectively, so as to provide a

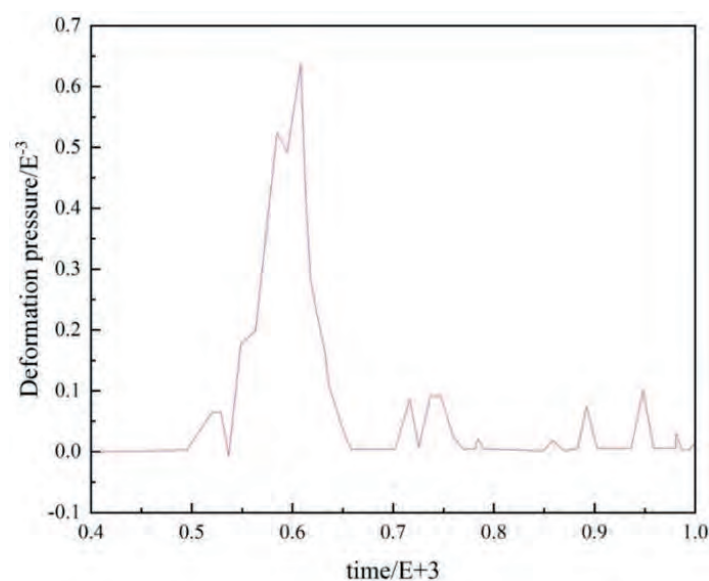
basis for the design of 3D woven composites for composite materials.

In the dynamic response analysis of the 3D woven composite, a 3D woven composite with a lay-up of [0/45/90/45/0] was selected, and the bird body and the surrounding air domain were given a relative velocity of 120 m/s to impact the four-sided solidly supported composite 3D woven composite head-on.

### 3. IMPACT PROCESS AND DEFORMATION OF BIRD BODY AND PLATE

Figure 1 shows the variation of contact pressure with time at the centre of impact of the 3D woven composite. The bird body is falling rapidly while rheologising in the plane of the 3D woven composite, and at the same time the 3D woven composite is failing from damage due to its impact on the 3D woven composite, which is eventually penetrated by the rheological bird body. At  $t=456.96\mu\text{s}$  the bird body just starts to contact the 3D woven composite, at this time neither the bird body nor the plate is deformed. After that the bird body rapidly descends and the 3D woven composite is deformed, at  $t=674.87\mu\text{s}$  it can be seen that the bird body has penetrated the 3D woven composite due to damage to the 3D woven composite and some of the bird body rheology has reached the bottom surface of the 3D woven composite. As the impact process continues, the bird body continues to impact downwards and the rheological bird body continues to extrude through the damaged parts of the 3D woven composite to the bottom surface of the 3D woven composite.  $t=845.99\mu\text{s}$ , the 3D woven composite has produced a large deformation and a large scale penetration of the bird body has occurred. At  $t=100\mu\text{s}$ , the bird impact process ends due to the programmed setting, at which point the three-dimensional woven composite has the largest deformation and the largest damage area.

At approximately 0.52 ms, the impact begins, at which point the pressure increases rapidly and begins to decrease after reaching a maximum of 68.5 MPa, followed by a continuous oscillation of the pressure value, although the amplitude decreases and the pressure value eventually reaches zero due to the complete failure of the cell. It can be seen from this process that the 3D woven composite also exhibits four stages of rapid pressure build-up, pressure decay, pressure stabilisation and pressure termination when subjected to a bird strike, similar to the dynamic response of an aluminium plate when subjected to a bird strike, which is mainly determined by the characteristics of the impact load, i.e. due to the rheology of the bird body during the high speed impact.



**Figure 1.** Pressing pressure variation curve at the centre of the composite



#### 4. DIFFERENT CELL RESPONSE VARIATIONS FROM CENTRE TO EDGE

Variation of response of different cells from the centre to the edge To further investigate the response process of bird impact, five cells on the same line from the centre to the edge of the 3D woven composite were selected in this paper to extract their contact pressure. Figure 2 shows the variation of the contact pressure of the selected cells.

Cell A, which is at the centre of the three-dimensional woven composite, is the first to suffer the impact, so its stress value first reaches the maximum, and then decays rapidly, while the pressure change trend of cells B, C, D and E is similar to that of A. This is due to the rapid decrease in speed and pressure increase when the bird first hits, but the pressure decays rapidly again due to the rheological changes of the bird's body; when the time reaches 0.8 ms, cell C decays after of the stress starts to increase again, and when it reaches a certain value it starts to decay a second time, while cell B has the same trend at 0.9 ms, which is due to the second increase in stress caused by the rebound of the shock wave, and D and E do not show similar phenomena due to the termination of the calculation time.

This shows that after a three-dimensional woven composite suffers a bird impact, on the one hand its stresses will increase rapidly and spread around, and on the other hand the stress waves will also pass back and forth in the plate in an oscillating manner, thus interacting continuously with the plate until they finally decay to zero.

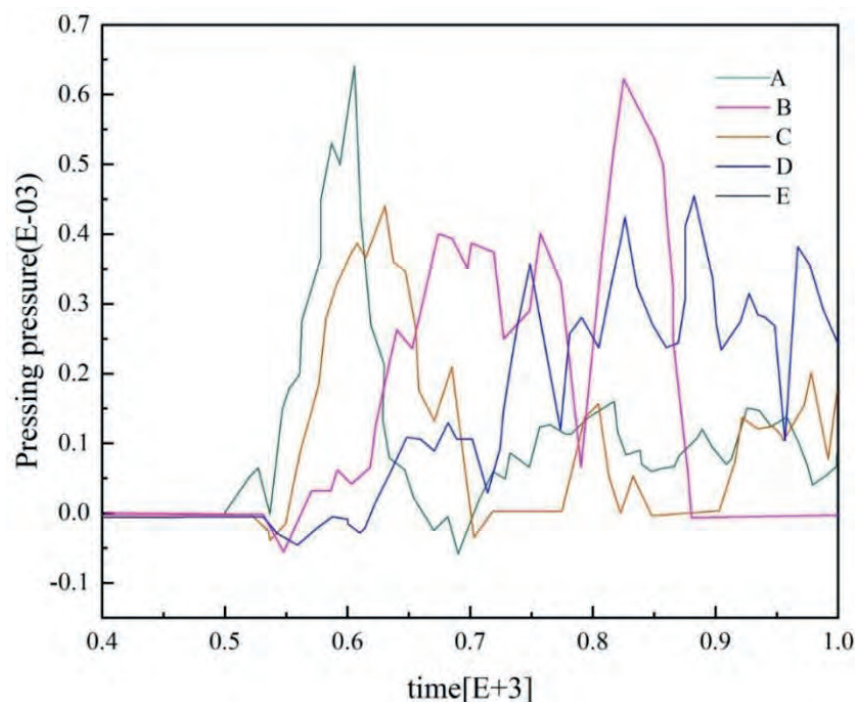
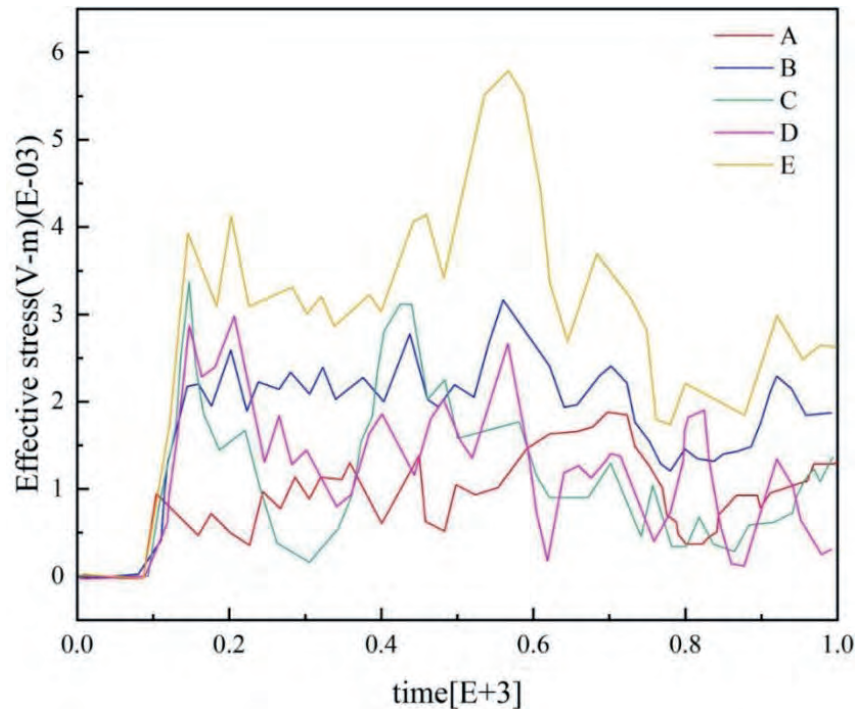


Figure 2. Variation in contact pressure of selected units

#### 5. 3D WOVEN COMPOSITE DAMAGE ANALYSIS

Figure 3 shows the variation of the equivalent effect force with time for each layer of a unit in the centre of the 3D woven composite. A~E in the figure represent the 1~5 layers of the 3D woven composite from top to bottom, i.e. 0°, 45°, 90°, 45° and 90° layers respectively. It can be seen from the graphs that the overall trend of the equivalent stresses for the five layers is basically the same, all increasing at the beginning of the impact, followed by a decrease in the stress value as the bird body rheologically changes, and then increasing again when the stress wave rebounded again, followed by another decrease, followed by oscillations until the end of the impact process. The difference is that the stress values are higher and fluctuate more in the 45° plies compared to the 0° and 90° plies. The amount of 45° plies should

therefore be taken into account in the impact design of 3D woven composites in order to avoid excessive stress values during the impact process.



**Figure 3.** Equivalent force diagram for each layer of a cell in the centre of the composite

## 6. CONCLUSION

This paper focuses on the bird impact resistance of three-dimensional woven composites and analyses the change in contact pressure of the woven composites during impact as well as the change in cell response from the centre to the edge of the woven material and the damage of the composite woven material at five different locations. The following conclusions are drawn:

1. During the impact, the impact starts at about 0.52 ms, when the pressure of the woven composite increases rapidly and starts to decrease after reaching a maximum of 68.5 MPa, followed by a continuous oscillation of the pressure value, although the amplitude decreases and eventually the pressure value becomes zero due to the complete failure of the cell.
2. In terms of losses, the stress values in the 45° layer are higher and fluctuate more in comparison to the 0° and 90° layers.
3. Unit A, being at the centre of the three-dimensional woven composite, is the first to be impacted, whereupon its stress values first reach their maximum and then decay rapidly, while the pressure trends of units B, C, D and E are similar to those of A.

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# SIMULATION OF HIGH-SPEED IMPACT DAMAGE BEHAVIOUR OF CARBON FIBRE MATERIALS

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## ABSTRACT

Based on the principle of high-speed impact damage to carbon fibre composites, the finite element software Abaqus was used to simulate and analyse the damage state of carbon fibre composites and their internal stress changes after being subjected to high-speed impact. According to the damage pattern of the target plate and the final deflection deformation at the centre of the target plate, the plain weave plate is better than the multidirectional laminate after the speed is greater than 10 m/s. Although both of them are isotropic in structure, the deformation ability of the plain weave plate is significantly better than that of the multidirectional laminate. After a velocity greater than 20m/s, the multidirectional laminate is the first to reach damage. It can be concluded that for the low speed impact of the target plate, the smoother the outer surface of the impacting object, the better the impact resistance of the target plate when other conditions are certain. In addition, due to the woven form of plain weave panels, the impact resistance of plain weave panels is generally better than that of multidirectional laminates.

## KEYWORDS

Carbon fibre materials; High speed impact; Abaqus simulation; Deflection deformation; Plain weave laminate; Multidirectional laminate

## 1. INTRODUCTION

Carbon fibre composites are widely used in the design of lightweight structures for advanced equipment such as spacecraft, high-speed rail vehicles and high-performance vehicles due to their excellent tensile properties [1-2]. With the increasing complexity of the application environment, in-plane weaving has received much attention as an important way to effectively improve the mechanical performance of carbon fibre composite panels [3-4].

Identifying the effect of in-plane braiding on the mechanical behaviour of carbon fibre composite foundations is key to further improving the design and application of carbon fibre composite structures in transient strong dynamic loading environments [5].

The literature [6] investigated the mechanical properties of carbon/basalt fibre reinforced epoxy composites by experimental and numerical research methods. The experimental results showed that the stacking order had a significant effect on the strength and bending modulus of the composite sheets, but had a small effect on the tensile modulus. Literature [7] et al. investigated the effect of stacking order and blending ratio on the mechanical properties and damage modes of the composites in tensile, compression and bending, and the experimental results showed that the tensile, compression and bending properties of the blended composites were significantly improved compared with those of the polyimide fibre composites, while the damage strain and damage energy were better than those of the carbon fibre composites. In [8], quasi-static tests were carried out on triaxial woven composites under in-plane transverse loading conditions and finite element analysis was performed to study their damage behaviour. A mesoscale model was proposed and validated, which can be further used to study the mechanical properties of similar materials. The literature [9] et al. investigated the indentation mechanical characterisation of carbon nanotube-reinforced polymer composites, and the results showed that the addition of small amounts of carbon nanotubes improved the fracture interface stiffness and prevented the evolution of microcracks, which well improved the mechanical properties of the composites.

This paper is based on the Abaqus finite element analysis method to simulate and analyse the damage behaviour of carbon fibre composites under high speed crash conditions. The damage patterns and impact resistance of multidirectional laminates and plain weave laminates are mainly discussed. The effects of different impact objects and different impact velocities on the damage pattern are also analysed in relation to the centre point deflection and final deflection.

## **2. TRENDS IN CARBON FIBRE COMPOSITES**

Due to the high specific strength, high specific modulus, high thermal conductivity and low coefficient of thermal expansion and many other excellent properties of carbon fibres, carbon fibre composites as structural materials for spacecraft have a significant effect on their weight reduction. As a result, carbon fibre composites are rapidly developing into a basic structural material for the aerospace industry, and the proportion of their use in the aerospace sector is already as high as 80%, showing an incomparable potential for application.

With the increasing demand for carbon fibre composites from the cutting-edge science and technology of the aerospace industry, carbon fibre composites are developing in several directions:

(1) High performance, including the high performance of raw materials and high-performance composite products. For example, the carbon fiber used for aerospace products has gradually developed from T300 to T700, T800 and even T1000 with higher strength and modulus, while the traditional epoxy resin has also been gradually replaced by toughened epoxy resin with higher temperature resistance and better toughness, bismaleimide resin and polyimide resin. The performance of composite products is also gradually developed into light weight, radiation resistance, high temperature resistance and oxidation resistance, etc.

(2) Low-cost, requiring from raw materials, production processes and quality control and other aspects of cost reduction.

(3) Multi-functionalization, advanced composite materials for aerospace are gradually realizing the integration of structure and function, i.e. gradually developing from pure structural type to multi-functionalization.

Thermoset resin matrix composites, as an essential and important material in the aerospace sector, have been an important aspect of high performance carbon fibre . An important aspect of composite research. Epoxy resin as the most widely used resin system in carbon fiber composites, with its excellent mechanical and thermal properties, excellent electrical properties, good heat and moisture resistance and processability and many other characteristics, has been the main body of matrix resin for high-performance composites in the aerospace industry. Such as solid engine shell using fiber winding molding epoxy resin-based composite manufacturing, so that its density is small, high strength, good rigidity, good dimensional stability, and has excellent corrosion resistance, high temperature resistance and radiation resistance performance. For example, epoxy-based and epoxy phenolic fiber-reinforced composites are used to manufacture solar cell array substrates, missile warheads and satellite fairings, as well as exothermic materials for spacecraft, which can greatly reduce the quality of the structure and improve the radiation resistance, high temperature resistance and oxidation resistance of the structure. Over the years, bisphenol A epoxy resin has been in the application of aerospace epoxy resin matrix occupies a dominant position, such as in the United States of America's "Trident-1", "Trident-2" missiles and "Pegasus The "Pegasus" rocket has been widely used. Carbon fibre/epoxy composites have also been successfully used in China's aerospace industry, such as the antenna system of the Dongfang communication satellite (DFH-2, DFH-3) and the solar array structure of the first sun-synchronous orbiting "Feng Yun-1" meteorological satellite, which both use carbon fibre composites. However, as epoxy resins have relatively poor impact damage resistance and low heat resistance, and are usually used at temperatures not exceeding 150 degrees, general-purpose epoxy resins can no longer meet the increasingly demanding requirements of the aerospace industry. Bismaleimide (BMI) resin overcomes the disadvantages of the relatively poor heat resistance of epoxy resins, while having the advantages of high temperature resistance, humidity and heat resistance, radiation resistance of polyimide resins, as well as the advantages of easier processing similar to epoxy resins, therefore, BMI resin-based composites have become a new research hotspot with its excellent performance, and the application in the aerospace field has begun to accelerate.

### 3. THEORETICAL EQUATIONS FOR HIGH-SPEED COLLISIONS

The collision process of this test is a non-linear dynamic contact problem, including static mechanical analysis and transient dynamic analysis of carbon fibre materials. This study uses the Standard module in Abaqus to solve the non-linear structural statics problem of the system, and the Explicit module to solve the simulated transient dynamic impact process, using the Lagrangian description increment method, the collision process of the whole test system follows the energy conservation, and the energy conservation equation is:

$$E = Vs_{ij}\varepsilon_{ij} - (p + q)V \quad (1)$$

Where:  $V$  is the volume of the present configuration.  $\varepsilon_{ij}$  is the strain tensor.  $s_{ij}$  is the strain deflection.  $q$  is the strain pressure. During the simulation, the stress on the experimental projectile consists of the static and dynamic intrusion resistance, which is expressed by the equation:

$$\sigma_n = mY_t + n\rho_l v^2 \quad (2)$$

Where:  $m$  is the static penetration resistance.  $n$  is the dynamic resistance coefficient, which is related to the shape of the projectile.  $Y_t$  is the yield strength of the target material.  $\rho_t$  is the density of the target material.  $v$  is the velocity. In the process of high-speed collision, when the change in material elongation line reaches the material itself brittle breaking elongation line strain, the material will fracture damage, so that the maximum strain criterion conditions for damage is:

$$(\sigma_x - v_x \sigma_y) \leq X_t \quad (3)$$

$$(\sigma_y - v_y \sigma_x) \leq Y_t \quad (4)$$

#### 4. ANALYSIS OF THE IMPACT PARAMETERS ON THE IMPACT RESISTANCE

Figure 1 gives a graph of the maximum deflection and final deflection of the centre point of the backside plate of the plain woven plate under the effect of different velocities of the ball-head impactor. rate is much larger than the final deflection, when the speed is greater than 20m/s, the two deflection values of the target plate almost no longer change, so at this time, the target plate has reached the stage of near-complete destruction, the speed reaches 25m/s or so target plate has been destroyed. From the growth rate of the two curves, the carbon fibre plain weave plate shows brittleness and the final deflection after impact is very small before damage, which indicates that the plain weave plate is less inclusive in terms of damage. Further from the difference between the maximum and final deflection at the same velocity, the difference between the two gradually increases until 20m/s and remains almost unchanged when greater than 20m/s, indicating that the difference between the maximum and final deflection at the centre point does not change with increasing velocity after the failure of the target plate.

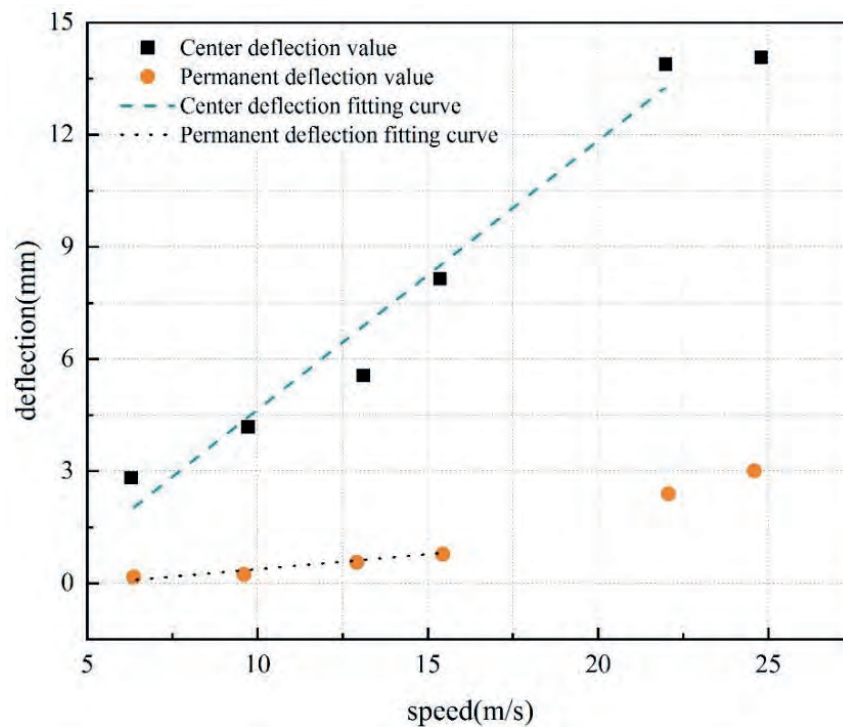


Figure 1. Maximum deflection and final deflection

## 5. ANALYSIS OF THE IMPACT RESISTANCE OF THE WEAVE WITHIN THE FIBRE FACE

The structure of carbon fibre composite panels has a large influence on the mechanical properties of the target panels. Therefore, it is also necessary to investigate the impact resistance of carbon fibre plates with different in-plane weave forms. In this section, the maximum deflection and final deflection of the centre of the back panel of carbon fibre multidirectional laminates and plain weave panels of the same thickness are selected for analysis and comparison under the action of a ball impactor. Figure 2 shows the fitted curves of the maximum deflection and final deflection of the two target plates with the change of velocity, comparing the fitted curves of the maximum deflection of the two, it can be seen that the two curves have an intersection point (the point corresponds to the impact velocity of about 10m/s). The maximum deflection of the plain weave laminate is significantly greater than that of the multidirectional laminate after 10 m/s. This indicates that the impact resistance of the two laminates is comparable when the impact velocity is less than 10 m/s, whereas after the velocity is greater than 10 m/s, the plain weave laminate outperforms the multidirectional laminate, although both are isotropic in structure, the deformation capacity of the plain weave laminate is significantly better than that of the multidirectional laminate. In addition, comparing the final deflections of the two, it was found that the final deflections of the two were basically the same before the speed of 20m/s, indicating that the two recovered the deformation ability equally. After velocities greater than 20m/s, the multidirectional laminate is the first to reach damage.

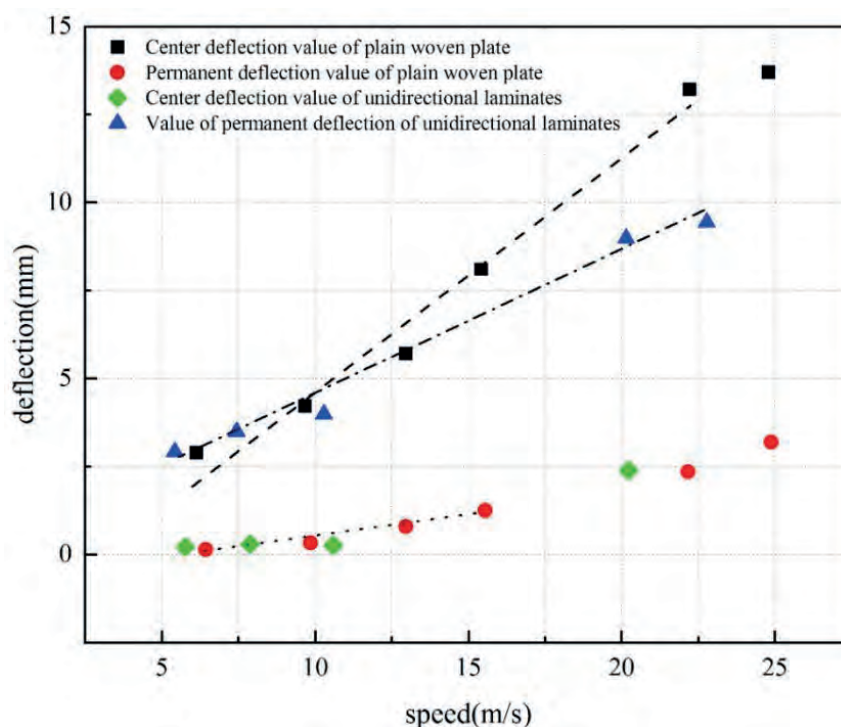


Figure 2. Maximum and final deflections

## 6. CONCLUSION

According to the simulation of the high-speed impact damage behaviour of carbon fibre materials, as well as the analysis of the target plate centre point and final deflection deformation according to the target plate damage mode, after the speed is greater than 10m/s, the plain weave plate is better than the multi-directional laminate, although both show isotropic structure, but the deformation ability of the plain weave plate is significantly better than the



multi-directional laminate. After a velocity greater than 20m/s, the multidirectional laminate is the first to break. In summary, the impact resistance of the plain weave laminate is generally better than that of the multidirectional laminate.

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# RESEARCH ON NEURAL NETWORK-BASED COMPUTER STEREO 3D POSITIONING METHOD

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## ABSTRACT

In order to solve several problems in computerized stereo 3D positioning, a neural network-based measurement method is proposed based on the principle of stereo vision. This paper uses neural networks to establish a non-linear mapping relationship between spatial point world coordinates and image coordinates, enabling the system to correspond two-dimensional image coordinates (input) to three-dimensional object coordinates (output) one-to-one without complex calibration of internal and external camera parameters, and compares it with traditional localization methods. Experiments show that the average value of the synthetic position deviation is 0.082 and verify that the method is effective and feasible, simplifying the calibration and positioning calculation of the vision system, more scientific than the traditional method and achieving good results in terms of positioning accuracy. This study reduces the positioning error and achieves fast and highly accurate spatial positioning with this structure.

## KEYWORDS

Computers; Stereoscopic 3D; Neural networks; Vision principles; Non-linear mapping relationships; Localization errors

## 1. INTRODUCTION

Stereo vision measurement is based on the parallax of the same 3D spatial point in images taken by two (more) cameras at different spatial locations, and the spatial geometric relationship between the positions of the cameras to obtain the 3D coordinate values of the point [1-2]. The greatest difficulty facing stereo vision measurements, the accuracy and precision of spatial feature points extracted and matched across multiple digital images, is among other issues [3-4]. The use of binocular stereo vision to provide coarse target depth information, combined with improved image segmentation algorithms, can segment target locations in video images in a high-speed environment, while traditional target segmentation algorithms have difficulty in obtaining satisfactory results in a high-speed real-time environment [5-6].

The literature [7] suggests that the key technologies involved in binocular positioning and tracking systems are camera calibration, stereo matching and 3D reconstruction. In the 3D reconstruction stage, the least squares method is used to calculate the 3D coordinates of the markers on the positioning target using the matching results. In the literature [8], a 3D positioning algorithm based on binocular stereo vision was proposed for the lunar rover. A framework diagram of the lunar rover 3D positioning system based on binocular stereo vision was established and the main modules in the framework were analysed. The image processing aspects such as image pre-processing, feature point extraction, stereo matching of feature points, 3D reconstruction and tracking matching algorithm of feature points were studied to obtain matching environmental features before and after the motion of the lunar rover.

This paper presents a new method for 3D coordinate measurement of target points, which uses a Nikon camera as an image sensor to identify the location of feature points and an artificial neural network to learn the relationship between image information and 3D information directly, without determining the specific internal and external parameters of the camera, or knowing a priori knowledge about the model or parameters. In the case of binocular vision, the relationship between the positions of the two cameras does not need to be found specifically, but is implicit in the neural network. The RBF network structure is linear in output and weight, and the training method is fast and easy, with no local optimum problems and fast convergence. As the input vector is mapped directly to the hidden layer space, this non-linear mapping relationship is determined once the centre of the RBF is determined. Therefore, the learning algorithm of the RBF first determines the centre of the radial basis function, and then solves the output layer weights by linear equations, and finally verifies the feasibility of this research through simulation experiments.

## 2. STEREO 3D POSITIONING METHOD

### 2.1 TRADITIONAL STEREO VISUAL POSITIONING METHODS

In a body vision system, the  $C$  matrices of the left and right cameras are:  $C_1, C_2$ , and the coordinates of a point  $P_i$  in space in the world coordinate system are  $(x_i, y_i, z_i)$ , and the coordinates of the left and right images are:

$$\begin{bmatrix} ut \\ vt \\ t \end{bmatrix} = \begin{bmatrix} c_{11} & c_{12} & c_{13} & c_{14} \\ c_{21} & c_{22} & c_{23} & c_{24} \\ c_{31} & c_{32} & c_{33} & c_{34} \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix} \quad (1)$$

$$\begin{bmatrix} u_{ir} t_{ir} \\ v_{ir} t_{ir} \\ t_{ir} \end{bmatrix} = C_r \begin{bmatrix} x_i \\ y_i \\ z_i \\ 1 \end{bmatrix} = \begin{bmatrix} c_{r00} & c_{r01} & c_{r02} & c_{r03} \\ c_{r10} & c_{r11} & c_{r12} & c_{r13} \\ c_{r20} & c_{r21} & c_{r22} & c_{r23} \end{bmatrix} \begin{bmatrix} x_i \\ y_i \\ z_i \\ 1 \end{bmatrix} \quad (2)$$

$$[x_i, y_i, z_i]^T = [A^T A]^{-1} A^T B \quad (3)$$

$(u_{il}, v_{il})$  and  $(u_{ir}, v_{ir})$ , we have equations (1) and (2). In equations (1) and (2), we can eliminate  $t_l$  and  $t_r$  respectively to obtain four equations about the relationship between  $(u_{il}, u_{il}, u_{ir}, v_{ir})$  and  $(x_i, y_i, z_i)$ , and when  $(u_{il}, v_{il}, u_{ir}, v_{ir})$  and  $C_l, C_r$  are known, we can find the spatial coordinates  $(x_i, y_i, z_i)$  of the point  $P_i$  through equation (3), which is the traditional

method of solving three-dimensional coordinates by stereo vision.

$$A = \begin{bmatrix} u_{il}c_{l20} - c_{l00} & u_{il}c_{l21} - c_{l01} & u_{il}c_{l22} - c_{l02} \\ v_{il}c_{l20} - c_{l10} & v_{il}c_{l21} - c_{l11} & v_{il}c_{l22} - c_{l12} \\ u_{ir}c_{r20} - c_{r00} & u_{ir}c_{r21} - c_{r01} & u_{ir}c_{r22} - c_{r02} \\ v_{ir}c_{r20} - c_{r10} & v_{ir}c_{r21} - c_{r11} & v_{ir}c_{r22} - c_{r12} \end{bmatrix} \quad (4)$$

$$B = [c_{l03} - u_{il}c_{l23} \quad c_{l13} - v_{il}c_{l23} \quad c_{r03} - u_{ir}c_{r23} \quad c_{r13} - v_{ir}c_{r23}] \quad (5)$$

## 2.2 STEREO VISUAL LOCALIZATION OF RBF NETWORK MODELS

RBF network is a good performance forward network, compared with other forward networks (such as the widely used BP network), it not only has the global approximation property, but also has the best approximation performance, RBF network structure has output, weights linear relationship, while the training method is fast and easy, there is no local optimum problem, and convergence speed is fast.

The number of nodes in the input layer, the hidden layer and the output layer are  $n$ ,  $m$  and  $s$  respectively, and there are  $p$  sets of input samples  $(X^{(i)}, Y^{(i)})$ ,  $i = 1, \dots, p$ , where  $X^{(i)}$  and  $Y^{(i)}$  are  $n$  and  $s$  dimensional vectors respectively, the connection weights from the input layer to the hidden layer are set to 1, and the activation function of the hidden layer points is an  $n$  dimensional radial basis function.

$$\Phi(x) = \Phi\left(-\|x^{(i)} - c_j\|\right), (j = 1, \dots, m) \quad (6)$$

$c_j$  is the centre of the basis function,  $\|\cdot\|$  is the distance measure, usually the Euclidean distance, and the output of the network can be expressed as:

$$y^{(i)}_k = \sum_{j=1}^m w_{jk} \Phi^{(i)}_j + \theta_k \quad (k = 1, \dots, s) \quad (7)$$

Where  $w_{jk}$  is the connection weight from the hidden layer node  $j$  to the output layer node  $k$ ,  $\Phi^{(i)}_j$  is the output value of the hidden layer node and  $\theta_k$  is the threshold value of the output point. Expressed in matrix form as:

$$y = \Phi w, \Phi \in R^{p \times (m+1)}, w \in R^{s \times (m+1)} \quad (8)$$

$$y = \begin{bmatrix} y_1^{(1)} & y_2^{(1)} & y_s^{(1)} \\ y_1^{(2)} & y_2^{(2)} & y_s^{(2)} \\ \dots & \dots & \dots \\ y_1^{(p)} & y_2^{(p)} & y_s^{(p)} \end{bmatrix}, \Phi = \begin{bmatrix} \Phi_1^{(1)} & \Phi_2^{(1)} & \Phi_m^{(1)} \\ \Phi_1^{(2)} & \Phi_2^{(2)} & \Phi_m^{(2)} \\ \dots & \dots & \dots \\ \Phi_1^{(p)} & \Phi_2^{(p)} & \Phi_m^{(p)} \end{bmatrix}, w = \begin{bmatrix} w_{11} & w_{12} & w_{1s} \\ w_{21} & w_{22} & w_{2s} \\ \dots & \dots & \dots \\ w_{m1} & w_{m2} & w_{ms} \\ \theta_1 & \theta_2 & \theta_s \end{bmatrix} \quad (9)$$

Commonly used radial basis functions include Gaussian functions, multi-quadratic functions and thin-slab spline functions, etc. In this paper, Gaussian functions are used as radial basis functions. As the input vector is directly mapped to the hidden layer space, this non-linear mapping relationship is determined after the centre of the RBF is determined, so the learning algorithm of the RBF firstly determines the centre of the radial basis function, and then solves the output layer weights by linear equations. A K-mean clustering-based approach is used to

determine the centre of the basis function, and the least squares method is used to determine the hidden layer to output layer connection weights, denoted as:

$$y^{(1)} = \Phi_1^{(1)} w_{11} + \dots + \Phi_m^{(p)} w_{m1} + \theta_s \quad (10)$$

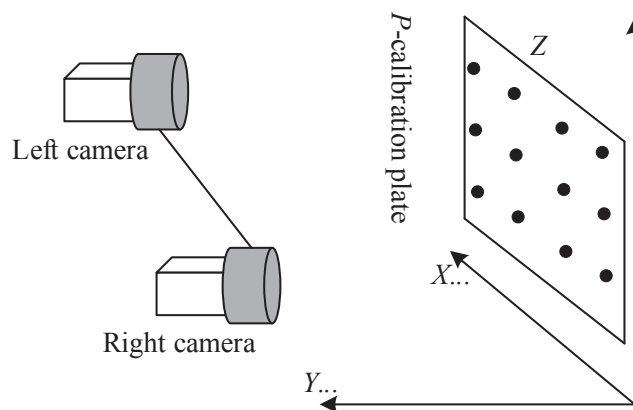
This is a linear system of equations solution problem, where  $W$  can be obtained by least squares:

$$W = (\Phi^T \Phi)^{-1} \Phi^T Y \quad (11)$$

The normalisation process is applied to ensure that the input data is in the range of (-1, 1) by applying the normalisation formula. The sample data is then used to train the RBF neural network to complete the calibration of the system, and the trained network can then be used for the measurement of spatial target points.

### 3. ANALYSIS OF SIMULATION EXPERIMENTS

Figure 1 shows a stereo vision system. The simulation conditions are: two cameras with the same internal parameters, two cameras with parallel optical axes, with a baseline length of 0.5 m and a focal length of 12 mm, two cameras with parallel optical axes and image coordinate systems with axes  $u$  and  $v$  parallel to axes  $X$  and  $Z$  of the world coordinate system respectively. The image resolution is  $1024 \times 1024$  pixels. The  $Y$  coordinate can be 45, 50 or 55 in mm.



**Figure 1.** Experimental system

Let  $(X_w, Y_w, Z_w)^T$  be the 3D coordinates of the point  $P$  of the object in the 3D world coordinate system and  $(u, v)^T$  be the image coordinates of the corresponding point on the image plane.  $(u_1, v_1)^T$  denote the coordinates of the point on the left image and  $(u_2, v_2)^T$  denote the coordinates of the point on the right image.

The network structure is shown in Fig. 1. A three-layer feedforward network is used, with the input of the network being the image coordinates  $u_1, v_1, u_2, v_2$  of the corresponding points in the two images, and the output of the network being the 3D coordinates  $X_w, Y_w, Z_w$ . 3 neurons are used in the hidden layer, and the experimental procedure is as follows:

#### 3.1 SYSTEM CALIBRATION

Moving the target  $P$  backwards and forwards in parallel in  $W$ , 36 sample data pairs (projection  $u, v$  of the target point in the two cameras, 3D coordinates in the world coordinate system  $W$ ) are collected and the network is trained with the weights. and the results are stored

in the computer.

### 3.2 POSITIONING CALCULATIONS

A white noise of 0 mean  $\sigma$  standard deviation is added to the image data to obtain the projection of the two cameras as input to the network. Using the above calibrated stereo vision system, the spatial position of the target point is calculated using equation (3) using the position calculation method presented in this paper.

### 3.3 RESULTS AND ANALYSIS

The simulation results are shown in Figure 2, which shows that the neural network model has a relatively strong resistance to noise. The maximum deviation in direction  $X$  is 0.2658 and the minimum is 0.006, the maximum deviation in direction  $Y$  is 0.1513 and the minimum is 0.003, the maximum deviation in direction  $Z$  is 0.131 5 and the minimum is 0.007 8, and the average synthetic position deviation is 0.082.

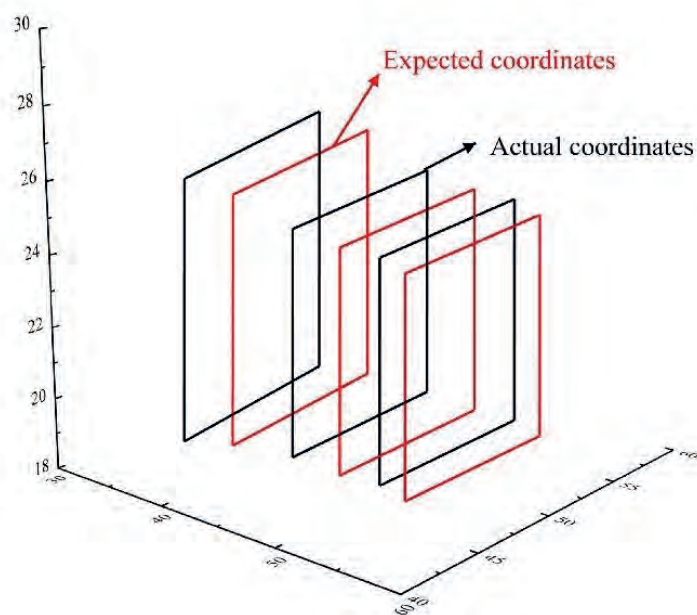


Figure 2. simulation result

The spatial coordinates of each feature point were calculated using the traditional stereo vision method and compared with the spatial coordinates of each feature point calculated using the neural network localisation method, with the distances taken as 45, 50 and 55, respectively, and averaged. The results are shown in Table 1:

Table 1. error comparison of the two methods

Relative error of general solution			Relative error of neural network solution		
$x$ coordinate	$y$ coordinate	$z$ coordinate	$x$ coordinate	$y$ coordinate	$z$ coordinate
1.410	0.304	0.357	0.570	0.120	0.141
0.693	0.151	0.176	0.323	0.067	0.071
0.369	0.081	0.073	0.153	0.039	0.035

#### 4. CONCLUSION

This paper combines binocular vision measurement methods and proposes the use of neural network methods for camera calibration, without the need to pre-build the model structure of the imaging system or make too many assumptions about the nature of the system itself, but by directly learning the input and output data of the system and generalising the input-output relationship of the imaging system. The effectiveness, rationality and realizability of the method in solving spatial localization problems are verified through simulation experiments. Compared with traditional stereo vision localization methods, the localization error is reduced and fast and high-precision spatial localization is achieved under this structure.

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# A STUDY ON MARXIST RURAL INDUSTRIAL REVITALIZATION BASED ON OPTIMIZATION THEORY

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## **ABSTRACT**

Through theoretically guided research, countermeasures for rural industrial revitalization can be better proposed. This paper discusses the optimization path of rural industrial governance based on optimization theory, and studies the methodology of rural industrial revitalization under the guidance of Marxism. Then, through the analysis of rural revitalization problems, countermeasures for rural revitalization are proposed. In the current rural industrial structure, the contribution of primary industry to regional economic development is low. This study helps to promote the breakthrough development of rural industries in the new situation.

## **KEYWORDS**

Optimization theory; Marxism; rural industrial revitalization; industrial structure

## **1. INTRODUCTION**

Industry is the foundation and breakthrough for any countryside to achieve revitalization. If the industry thrives, the countryside thrives [1-2]. When industry is strong, farmers will be rich. Only when a countryside achieves sustained industrial prosperity can it ensure the stability of rural economy and society, promote farmers' continuous income and wealth, and realize the prosperity of rural society [3-4]. Therefore, the status of industrial development is crucial in the rural revitalization strategy, and governments, societies and farmers at all levels must take industrial revitalization as the task of rural revitalization to grasp it tightly.

The research results on rural industrial development are relatively abundant and are divided into two major categories here according to the different research objects and elements. One category is the macroscopic research on the development of



Chinese rural industries, which mainly analyzes the scientific connotation of the revitalization of rural industries with Chinese characteristics, clarifies the key tasks of the revitalization of rural industries with Chinese characteristics and the support policies to accelerate and improve the revitalization of rural industries with Chinese characteristics [5-7]. The other category is the perspective of northern Shaanxi region and the research aspect of rural industrial development in its region, mainly discussing the problems in the structure of leading industries in the county economy of northern Shaanxi as well as the selection and development countermeasures of leading industries in the future [8-9]. Accordingly, this paper explores the path of rural industrial revitalization in the new era under the guidance of optimality theory and Marxist thought.

## **2. RURAL GOVERNANCE AND INDUSTRIAL REVITALIZATION**

### **2.1 OPTIMIZATION THEORY**

Optimization theory is the theory and methodology of optimal design, optimal control, and optimal management problems of a system. Optimization is the process of organizing a system to have the desired optimal function under certain constraints. It is to make the optimal choice from many possible options so that the objective function of the system is maximized or minimized under the constraints. Optimization is the basic purpose of the system approach. There are several basic elements of optimization methods: the system objective, the possible options for achieving the objective, the price paid for implementing each option, and modeling the system.

### **2.2 OPTIMIZATION OF RURAL INDUSTRIAL GOVERNANCE**

#### **2.2.1 INDUSTRIAL MARKET OPTIMIZATION**

The choice of governance method to achieve the "optimization" of village governance is undoubtedly an inevitable issue in rural governance. In the field of economics, microeconomics is concerned with the behavior of individual consumers and vendors in the market, and market transactions are seen as an interaction between individuals. Individuals always seek to maximize their profits. The buyers and sellers in the commodity market are similar to the plaintiffs and defendants in the courtroom in terms of behavior patterns. The choice of behavior under the rule of law and the choice of behavior under the market price reside in the same mechanism. Both sides of the lawsuit pursue the optimization of rights.

#### **2.2.2 OPTIMIZATION OF INDUSTRIAL ORDER**

Whether to choose the rule of law or the traditional governance model or a combination of the two has been hotly debated in the academic community, and I believe that this is actually an optimal choice for rural governance. Whether through

judicial, administrative, civil mediation or any other means, and whether or not lawyers intervene. An important part of building a constitutional democracy in China is that the Chinese peasants actually become citizens and actually enjoy the rights directly granted by the state, instead of enjoying local rights and having to rely more on networks of acquaintances or natural communities for help, as is the case in many areas today.

## **2.3 RURAL INDUSTRIAL REVITALIZATION FROM A MARXIST PERSPECTIVE**

### **2.3.1 AGRICULTURAL MODERNIZATION**

Marx Engels' theoretical thought of agricultural modernization fully reflects the characteristic that Marxism is essentially a science of development. Marx believed that the modernization of agriculture and the commercialization and marketization of agricultural products are mutually accompanying processes. Therefore, the process of modernization of agriculture can be understood as a process of realizing commodity economy in the field of agriculture. Industrialization in the field of agricultural production has led to the gradual replacement of the traditional smallholder economy by modern large-scale agricultural production, and the capitalization and entrepreneurial operation of agriculture have contributed to the establishment of modern agricultural production methods in developed capitalist countries.

### **2.3.2 AGRICULTURAL COOPERATIVE**

Marx and Engels were very supportive of the development of various types of agricultural cooperatives, especially agricultural production cooperatives. Marx and Engels believed that in the operation and development of agricultural cooperatives, the state should focus on supporting the development of agricultural cooperatives. Marx and Engels advocated achieving economies of scale through centralized production. Thus, it can be seen that the concept about agricultural cooperatives and scale production was put forward as early as the time of Marx and Engels, which provided the basic theoretical followings for promoting the development of modern agricultural cooperatives and realizing high-quality scale benefits of agricultural industries.

### **2.3.3 AGRICULTURAL INDUSTRIALIZATION**

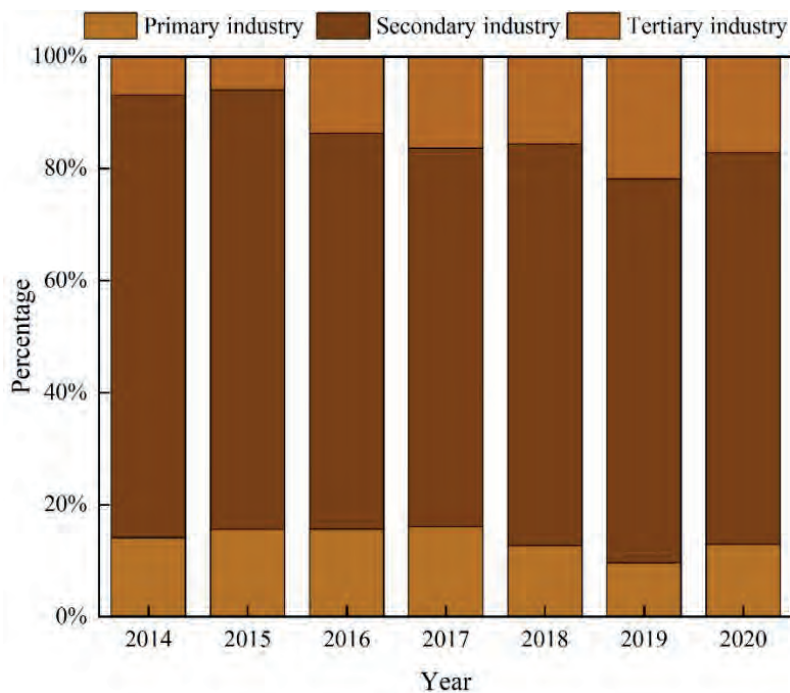
Marxist industrialization of agriculture is to break the old pattern of business system and inherent management mode, realize the optimal combination of all factors, improve the level of productivity, and thus increase the supply of commodity market. The Marxist idea of industrialization of agriculture is embodied in China as under the premise of adhering to the guiding position of Marxism and the theoretical system of socialism with Chinese characteristics, and under the premise of stabilizing the family contract responsibility system in the market economy system, facing the domestic and

foreign markets, improving the efficiency of the market economy and accelerating the transformation from subsistence agriculture to modern commodity agriculture.

### 3. ANALYSIS OF RURAL REVITALIZATION UNDER OPTIMAL MARXIST GUIDANCE

#### 3.1 ANALYSIS OF RURAL REVITALIZATION ISSUES

The distribution of the scale structure of rural industries is shown in Figure 1. The industrial classification of rural areas is mainly manifested in the primary industry, which is dominated by farming, the secondary industry, which is supplemented by petroleum, coal and by-product food processing, and the tertiary industry, which is supplemented by rural tourism, leisure tourism and e-commerce logistics. From the proportion of the three industries to GDP from 2014 to 2020, the primary industry accounts for the smallest proportion, where the proportion of the primary industry to GDP from 2014 to 2020 shows a continuous growth trend, and the proportion of the primary industry from 2019 to 2020 shows a decreasing trend. The secondary and tertiary industries account for a relatively large proportion, of which the proportion of the secondary industry from 2014 to 2020 is a continuous downward trend, and in 2019 to 2020 is a growth trend; the proportion of the tertiary industry in general shows a growth trend, with a slight decline in 2020. From the overall situation, among the three industries, the contribution of the primary industry to economic growth is always small, and the contribution of the secondary and tertiary industries to economic growth is larger, of which the contribution of the tertiary industry to economic growth increases year by year.



### **Figure 1 Rural industrial scale structure distribution**

From the above analysis, it can be seen that the contribution of primary industry to regional economic development is low, and economic growth mainly relies on the drive of secondary and tertiary industries. As the development of the primary industry is the main development of the vast rural areas, how to optimize the adjustment of industrial scale structure, to achieve the development of the primary industry, mainly farming industry to the rural economy drive is particularly urgent and important.

### **3.2 RURAL REVITALIZATION STRATEGY**

In order to guarantee the orderly implementation of rural revitalization and improve the implementation efficiency of rural revitalization, it is recommended that the government organize the preparation of industrial development planning at the city, county, town and village levels, implement planning-led actions, and guide and regulate rural revitalization. In the planning process, it should comprehensively promote the pace of scientific and technological innovation of rural industries in Yan'an, continuously accelerate the pace of transformation of production and operation mode of modern agricultural industries, increase the standardized production and promotion of modern agricultural industries, and vigorously promote industrial integration. Vigorously develop the countryside agricultural products processing industry. Use the advanced concept of industrialization to manage and guide the development of agricultural industry, attach great importance to the rearrangement of agricultural industry, continuously extend the industrial chain, and vigorously promote the integration and upgrading of rural industry.

### **4. CONCLUSION**

Under the perspective of optimization theory and Marxism, this paper explores the problems of rural industrial revitalization and proposes countermeasures for rural industrial revitalization. The revitalization of rural industries needs a step-by-step process, and it is impossible to achieve the goal of China's rural revitalization strategy overnight, and it requires continuous exploration, adjustment and optimization in reality. In particular, rural revitalization involving specific regions needs to be combined with the actual situation and specific analysis of specific problems, so as to find a targeted way to achieve it.

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