

Education Reform and Development

Honorary Editor-in-Chief

Heng Xu

Shanxi University of Chinese Medicine, China

Editors-in-Chief

Liping Zhou

School of Management, Jiangsu University, China

Hongde Gao

Hebei University of Architecture, China

BIO-BYWORD SCIENTIFIC PUBLISHING PTY LTD

(619 649 400)

Level 10

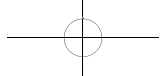
50 Clarence Street

SYDNEY NSW 2000

Copyright © 2024. Bio-Byword Scientific Publishing Pty Ltd.

Complimentary Copy





ISSN (ONLINE): 2652-5372

ISSN (PRINT): 2652-5364



Education Reform and Development

Focus and Scope

Educational Reform and Development is a peer-reviewed, open-access international professional academic journal. The column of *Educational Reform and Development* includes comments, basic researches, literature reviews and research letters. Manuscripts should be scientifically advanced, readable and practical, with prominent points, concise words, reliable data, standard writing and accurate expression. The main readers of this journal are principals, teachers, education administrators, education researchers, and domestic and foreign researchers concerned with adolescent education.

Education Reform and Development mainly reflects the latest development and scientific research achievements of education, explores the rules of education, promotes academic exchanges at home and abroad, and serves for deepening educational reform and prospering educational science.

Topics covered by not limited to:

- Educational Story
- Education Facts and Comments
- Investigation and Research on Educational and Teaching Problems
- Project Research Report
- The Latest Achievements of Educational Reform and Development
- Feasibility Analysis of Innovative Teaching Methods
- Research on the Rules of Education

About Publisher

Bio-Byword Scientific Publishing is a fast-growing, peer-reviewed and open access journal publisher, which is located in Sydney, Australia. As a dependable and credible corporation, it promotes and serves a broad range of subject areas for the benefit of humanity. By informing and educating a global community of scholars, practitioners, researchers and students, it endeavors to be the world's leading independent academic and professional publisher. To realize it, it keeps creative and innovative to meet the range of the authors' needs and publish the best of their work.

By cooperating with University of Sydney, University of New South Wales and other world-famous universities, Bio-Byword Scientific Publishing has established a huge publishing system based on hundreds of academic programs, and with a variety of journals in the subjects of medicine, construction, education and electronics.

PublisherHeadquarter

BIO-BYWORD SCIENTIFIC PUBLISHING PTY LTD

Level 10

50 Clarence Street

Sydney NSW 2000

Website: www.bbwpublisher.com

Email: info@bbwpublisher.com

Table of Contents

- 1 Research on the Teaching Reform of Linux Operating System Course under the Mixed Teaching Mode of Online and Offline**
Weiwei Xiao, Zhi Liu
- 7 Research on the Teaching Strategy of High School Chinese Large Unit Based on Core Accomplishment**
Kuan Xing
- 13 Research on Generative Artificial Intelligence in Innovate Strategies of Teaching Interaction**
Xiaodong Li
- 25 A Study on the Current Situation and Strategy of College Students' Career Planning Education**
Luhong Chen, Yize Dong
- 31 Research on Employment and Entrepreneurship Education of College Students from the Perspective of New Quality Productivity**
Shijie Wu
- 38 Analysis and Countermeasure Research of College Students Participating in Voluntary Service**
Yu Xia, Kaiwei Huang, Tianmei Hao
- 44 Research on Employment Problems and Countermeasures of College Graduates from the Perspective of High-quality Economic Development**
Li Zhang
- 50 An Analysis on The Cultivation Path of Application-oriented Undergraduate Talents in Higher Education under the Background of Education Digitization**
Kai Wang, Liying Guo, Liyan Wang, Rongrong Zheng, Haiyue Wang, Yaoyao Bai, Xueying Yu
- 58 The Analysis of "Exploring Teacher Beliefs and Classroom Practices through Reflective Practice: A Case Study"**
Danqing Zhang

- 63 The Logical Starting Point, Realistic Dilemma and Path Selection of Digital Literacy Improvement of Rural Teachers in Primary and Secondary Schools**
Xiaoqing Lan, Zhongyuan Liao
- 70 Study on Tune C-E Translation from the Perspective of Translation Aesthetics: Taking Ascendant Peace in the Four Seas, A Religious Play in Zhejiang and Anhui Province as an Example**
Wenjun Li, Xiuzhong Yang
- 77 Exploration of PLC Application Technology Course Practical Training Teaching Design**
Lele Qi
- 84 Study on the Key Points and Paths of the Collaborative Education of Ideological and Political Curriculum**
Yong Wei, Zheng Zhang, Xuefeng Liu, Qian Zhao, Fujian Yang, Dongmin Yin
- 92 Study on Home-school Cooperative Education Mechanism of College Students' Mental Health Under Precise Ideological and Political Thinking**
Yin Peng, Hongbo Li, Shunjuan Hu, Guiying Sun, Yanyan Zhu, Jun Du
- 100 Ways to Effectively Practice Junior High School English Teaching from the Perspective of Informatization**
Haiyan Zhang
- 107 Exploration on the Construction of Wisdom Classroom for Biological Science Majors**
Chuan-Lei Dong
- 113 The Significance and Path of the Organic Integration of High School English Teaching and Chinese Excellent Traditional Culture**
Jing Su
- 119 Research on the Construction of Blended Courses in Labor Economics Empowered by Knowledge Graphs**
Renren Li
- 127 Analysis on the Innovative Path of Ideological and Political Course Teaching Empowered by AR Technology**
Tingmeng Shen
- 134 Practice Exploration of Community Elderly Care Service under the Mode of "Five-Social Linkage": Taking X Community as an Example**
Jiale Zhao, Qing Wang

- 142 Research on the Reform and Innovation of College English Teaching under the Background of New Media**
Yunxi Shao
- 148 A Preliminary Study on the Teaching Reform of Biological Instrument Analysis Course**
Ye Xu, Liang Yuan, Han Wang
- 154 Research on the Integration of Chinese Traditional Cultural Elements in Xinjiang Landscape Design**
Yi Zhang
- 160 Research and Practice on the Interaction between Modern Educational Technology and University Physics Teaching**
Ying Shao
- 166 Educational Applications of Collaborative Innovation under Engineering Accreditation: A Case Study of “Digital Signal Processing”**
Wei Dai, Changpeng Ji, Ying Liu, Wenxin Ji
- 177 Teaching Innovation Practice of “Cultural and Creative Product Design” Course in Applied Universities - A Case Study of Qingdao City College**
Huiyu Li, Wei Wei, Yizhi Sun
- 184 Thought and Politics Class of English Speech Course for Business English Majors in Undergraduate Universities**
Ziyuan Liao
- 189 Research on the Teaching Reform of College Computer Basic Courses Driven by Intelligent Technology**
Qisheng Dou
- 196 Research on the Teaching Design of Pre-school Children’s Game Course under the Background of Curriculum Ideology and Politics**
Jia Li
- 203 Discussion on Teaching Reform and Practice of College Physics under the Background of New Engineering**
Gaige Huang
- 209 Primary School Information Technology Teaching Practice and Thinking Towards Computational Thinking**
Honghao Li

- 215 The Application of AI Technology in College Accounting Teaching**
Juan Lin
- 222 Study on Chinese Curriculum Reform in Applied Colleges and Universities from the Perspective of Vocational Core Literacy Education**
Ren Sha
- 228 Study Style Construction Path of College Students under the Background of “Five education”**
Min Song
- 235 Opportunities and Challenges of Teaching Non-English Majors of Higher Vocational Education Spoken English in the Artificial Intelligence Era**
Caixia Sun, Xiaoqing Zhang
- 241 The Statistical Analysis and Thinking of the Illustration of High School Physics Textbook in Human Education Edition**
Rui Xu, Xiaoheng Yang, Ge Chen
- 248 Research on the Reform of Mixed Teaching of Cross-school Credit Courses**
Nannan Liu
- 254 A Study on Employment Intentions and Employment Outcomes of Chinese Major Students at Souphanouvong University in Laos**
Yuyao Xie
- 260 Application and Practice of “Learning-Practice-Innovation” Integrated Teaching Model in Civil Engineering Drawing**
Wenyu Zhao, Haichen Zheng, Hongbin Ma
- 267 Research on Transformation Path of Teacher Education Model and Construction of New Ecology under AI Empowerment**
Shanxi Lan
- 273 Research on Strategies for Improving College Students’ English Writing Skills Based on Internet Online Corpora**
Hang Li
- 278 Research on the Path of Integrating Literary Creation with Tourism Product Development Based on the Inheritance of Intangible Cultural Heritage**
Wenjing Li

284 Pedagogical Practice of Integrating VLSI Design Automation Tools into University-Level IoT Curriculum

Yu Zhou, Yiguo Cheng, Ming Jin, Kun Zhang

291 Exploration and Application of Educational Elements in Botany Teaching from Ideology and Politics Education

Liming Wang, Yannan Liu, Yating Shi, Tianyi Peng, Jiahui Gao, Shuiqin Shi

302 An Empirical Analysis of ChatGPT Translation Error Types in Texts of Chinese Red Culture Based on the MQM Quality Assessment Framework

Yiming Li, Yuanpeng Huang

315 “What is Design?” An Open-Ended Inquiry Among Design Students

Tadiboina Samantha Kumar, P Lakshmi Prasanna, Srinivas Daketi, Ramesh Srikonda

326 A Study on the Cultivation of English Learning Interest of Art Students in Colleges and Universities

Bing Zhang

Research on the Teaching Reform of Linux Operating System Course under the Mixed Teaching Mode of Online and Offline

Weiwei Xiao^{1*}, Zhi Liu²

¹Guangxi Science & Technology Normal University, Laibin 546199, Guangxi, China

²School of Economics and Management, Guangxi University of Science and Technology, Liuzhou 545006, Guangxi, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: This paper studies the significance and strategy of Linux operating system course teaching reform under the mixed teaching mode of online and offline, aiming to provide relevant experience for professional course teachers, so that front-line teachers can better teach Linux course teaching, and students can better learn with purpose. Through the exploration and research of the curriculum teaching reform, students are encouraged to have an interest in learning Linux courses, give full play to the advantages of the teaching design combining online and offline, and enable students to master the technology and integrate certain ideological and political teaching content, so that students can have good professional ethics and better contribute to the development of the country.

Keywords: Online and offline mixed teaching mode; Linux operating system; Curriculum teaching reform

Online publication: April 28, 2025

1. Introduction

The Linux operating system, with its open source, stability and security characteristics, can be applied in the world. The state also attaches special importance to the information work, therefore, the Ministry of Education issued a letter on the fourth meeting of the 13th National Committee of the CPPCC No. 4271 (Education category No. 437) proposal reply, clearly pointed out that it is necessary to improve the integration mechanism of online and offline education, promote education and teaching reform, improve the quality of education^[1]. The development of colleges and universities should be in line with the trend of national development, to go further. This article through some strategies to reduce the difficulty of learning, stimulate students' interest in learning, and improve students' ability of independently learning.

2. The problems of traditional teaching methods

2.1. The low enthusiasm of students in learning

Traditional teaching methods often adopt the way that teachers teach and students passively accept, resulting in a lack of initiative and enthusiasm of students in the learning process. The Linux operating system course itself commands a variety of complex operations, students in their first contact often find it difficult to adapt, especially compared with the Windows operating system. Linux command line operation mode is unfamiliar and confusing to students^[2]. In this case, students are prone to fear difficulties and even conflict with the course, thus affecting the learning process. In addition, the experimental teaching under the traditional teaching mode is often set up to verify the theory, and students lack the guidance and drive of practical problems in the experiment process, making it is difficult to convert theoretical knowledge into practical operational ability, and further reducing the enthusiasm of students.

2.2. Disconnection between theory and practice

In the course of the Linux operating system, theory teaching and practice teaching are usually carried out separately; the teacher teaches the theoretical knowledge in the classroom, and then the students carry out the experiment operation in the computer room. However, this kind of teaching method often leads to the disconnection between theory and practice. It is difficult for students to deeply understand the practical application scenarios of knowledge in theoretical learning, and the lack of sufficient theoretical guidance in experimental operation greatly reduces the learning effect greatly reduced. Due to the limitations of experimental conditions, students can only get access to the Linux operating system within the experimental time stipulated in the course, and a lack of enough practical opportunities, resulting in the effective improvement of students' practical ability.

2.3. Teaching resources and environmental restrictions

On the one hand, the teaching resources under the traditional teaching method are relatively scarce, and it is difficult for students to obtain rich learning materials and cases, which makes it difficult to solve problems in the learning process. On the other hand, due to the limitation of experimental conditions, students often can only carry out experimental operations in a specific time and place, which lacks of flexibility and convenience.

3. The significance of exploring the teaching reform of the Linux operating system course under the mixed teaching mode of online and offline

3.1. Reduce the difficulty of learning and improve the teaching effect

As the second level of the three-level teaching of the computer major, the importance of the Linux operating system course is self-evident. However, because the knowledge points of this course are many and abstract, students often feel confused and confused in the learning process. Traditional teaching methods tend to pay attention to the teaching of theoretical knowledge, but ignore the importance of practical operation, which makes it difficult for students to apply what they have learned to practice^[4]. The introduction of the online and offline mixed teaching mode reconstructs complex knowledge points utilizing online preview and offline practice, takes tasks as the driving force, enables students to master relevant knowledge in practice, uses virtual simulation technology to simulate the actual working environment, reduces the difficulty of building experimental environment, and enables students to complete the operation of actual cases on their computers. Greatly improve the teaching effect.

3.2. Stimulate students' interest in learning, skillfully integrate ideological and political elements, and improve independent learning ability

Online and offline hybrid teaching mode pushes teaching videos, tasks, and other learning resources through online platforms to stimulate students' learning interest and curiosity. Students can choose the corresponding learning content according to their own learning progress and interest, and carry out independent learning and exploration. At the same time, teachers should design reasonable ideological and political teaching content matching with professional content according to the teaching process of each module, and naturally integrate it into the professional teaching of the Linux operating system. Offline classroom teaching adopts a heuristic explanation and a subtask-driven model to guide students to actively think and solve problems, and cultivate students' independent learning ability and innovative thinking.

4. The teaching reform strategy of the Linux operating system course under the mixed teaching mode of online and offline

4.1. Personalized exploration of the Linux file system to promote comprehensive development

Teachers can combine online and offline mixed-mode teaching in systematic teaching^[6]. Online, teachers can fully consider the differences and diversity of students, and design a task about Linux file system, requiring students to explore the structure and function of Linux file system through practical operation, while recording their findings and problems^[7]. It can also release some exercises for students to answer, which also has a feedback mechanism. Teachers can check the students' learning progress and answer questions, can record the problems and puzzles in the process of students. Offline, teachers can organically integrate students' questions with the teaching content of the course. In this way, teachers can understand students' learning habits and problems, and carry out targeted teaching content reform on this basis, so that students can fully understand and master the knowledge points related to Linux operating system, stimulate students' learning interest, understand the structure and function of Linux file system, help students consolidate theoretical knowledge, and improve practical operation ability. Stimulate students' learning interest and enthusiasm, and promote their all-round development.

4.2. Integrated teaching method combined with virtual simulation technology to deepen the cognitive ability of the operating system

In the traditional teaching mode, file system management, process management, storage management, equipment management and other contents are divided into independent chapters for teaching, which makes it difficult for students to form a comprehensive and systematic cognition of the Linux operating system^[9]. Therefore, teachers can use a virtual machine, VMware Workstation to simulate the actual working environment, design a thorough task, link each part of the content, and form a complete knowledge system. For example, when a network communication shell program is input from a student, the local operating system needs to provide a user interface to accept the system, and then the program needs to be stored on a disk in a specific format. When the program needs to run, the operating system needs to import it from the disk to the memory and allocate the necessary resources to it. Then it communicates with other operating system processes on the VM and invokes their related resources, which involves process management and network device management^[10]. Finally, the result of the program running will be displayed on the display device. In the teaching of Linux course, it can also adopt the teaching form of integration of theory and practice, and rely on the concept of OBE achievement

transformation, based on the innovation of Boppps teaching mode. In the course, teachers first stimulate students' learning interest through the introduction stage of Boppps teaching mode. Then, in the target stage, the teacher defines the learning results, so that students know the skills they need to master, and then through the pre-test to understand the basis of students, and then in the participatory learning stage, combined with the actual operation of the Linux system, so that students can deepen the theoretical knowledge in practice. In the post-test phase, students are tested to ensure that they have achieved the expected learning outcomes. In short, students are helped to consolidate what they have learned and reflect on the learning process.

4.3. Online questionnaires help the Linux operating system teaching and optimize teaching strategies

In the teaching of computer courses, especially in the complex and practical field of the Linux operating system, students' learning progress and difficulties often vary according to individual differences and environmental conditions ^[12]. Among them, a significant problem is that some students may lack the necessary computer equipment or network conditions, and cannot fully participate in the application of the operating system, which will undoubtedly harm their learning effect. In order to effectively deal with this problem, teachers need to adopt more flexible and targeted teaching strategies, among which, using an online questionnaire to communicate is an effective means. Teachers can set up detailed online questionnaires according to students' understanding of what they learned in the last class, the review after class, the difficulties and challenges they encountered, and the suggestions and expectations for the next class, to collect students' learning feedback. In the classroom, this form can also be used. For example, the teacher can design the following questions: "Please briefly describe the basic principles of the process management of the Linux operating system that we learned last class" ^[13]. "When reviewing after class, what did you encounter that was difficult to understand or remember?" To understand which knowledge points are generally well mastered by students and which need to be further explained and emphasized, and to find out which students are facing difficulties due to the lack of computer equipment or Internet conditions, so as to provide personalized help and support. For students who do not have access to computer equipment, teachers can suggest that they use the school's public computer room to practice, or recommend some resources and platforms suitable for online learning. For students with limited Internet access, teachers can provide offline learning materials so that students can reduce their Internet dependence. By communicating with students in the form of online questionnaires, teachers can fully grasp the learning dynamics and difficulties encountered by students and then adopt more accurate and effective teaching strategies.

4.4. Linux operating system teaching reform, multi-dimensional optimization and innovative practice

The teaching reform of the Linux operating system course is a multi-dimensional and deep exploration process, which requires teachers to optimize and innovate in various aspects of teaching content, teaching methods and teaching evaluation. First, for the online teaching content, teachers can help students build a solid theoretical framework through video and interactive Q&A. Online forums can be used for students to ask questions and share their experiences. In the offline part, I completed the installation, configuration, management and Shell script programming of the Linux system through group cooperation ^[14]. Second, in terms of teaching methods, teachers can combine the project-driven method based on online and offline to design tasks related to the application of the Linux operating system, so that students can receive new knowledge in solving problems. It can also combine the case analysis method, choose a specific case, let the students to analyze, each module to

apply the knowledge, to test the overall ability of students. Third, from the perspective of the evaluation system, since Linux is a highly practical subject, we should not only pay attention to students' final exam scores, but also pay attention to students' mastery of the system in the classroom. We should leave a practical homework at the end of the semester to see how students complete and master the system. Fourth, the ability of teachers is the key step in the implementation of these aspects, so colleges and universities should have a complete set of processes to improve the skills of teachers, ensure that they can use online and offline resources, design high-quality teaching programs, and provide students with better teaching services. All these are a systematic project.

5. Conclusion

“Talent training must be the process of educating people and educating talents, and educating people is this.” Therefore, in the process of implanting knowledge, teachers should pay attention to students' professional ethics and political tendencies to strengthen the “moral cultivation,” pay attention to the overall improvement of students' comprehensive quality, deepen curriculum reform, and strive to make contributions to the development of educating people and better the country.

Funding

2021 Guangxi Science and Technology Normal University of University-level undergraduate higher education teaching reform project, “Research on the Up-down Mixed Teaching of Linux Operating System based on Task-driven + Virtual Simulation” (Project No.: 2021GKSYGB08); Guangxi Higher Education Undergraduate Teaching Reform Project. “Research on Project Micro-course Design of Program Courses based on FCM” (Project No.: 2015JGB285)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Luo Y, Wen Y, 2024, Construction of Operating System Teaching Materials to Strengthen System Ability Training. *Computer Education*, 2024(11): 18–21.
- [2] Wu Y, Zhang R, Yang Z, 2024, Linux Application Technology Curriculum Teaching Reform from the Perspective of Digital Literacy. *Fujian Computer*, 40(11): 108–113.
- [3] Peng Y, Yao H, 2024, Reform and Practice of Shared Curriculum for Higher Vocational Professional Groups—Taking “Linux Operating System” Course as an Example. *Journal of Yueyang Vocational and Technical College*, 39(5): 32–35.
- [4] Wu Y, Zhao L, Sui M, 2019, Research and Application of Baseline Verification and Hardening Technology Based on Windows and Linux Operating System. *Computer Knowledge and Technology*, 20(28): 72–74.
- [5] Fan X, 2024, Teaching Design and Implementation of Linux Application Basic Course Based on Teaching Ability Competition. *Modern Commerce and Industry*, 45(19): 247–249.
- [6] Xia B, 2024, Research on Teaching Digitization of “Linux Operating System” Course in Higher Vocational Colleges

Under the Background of Artificial Intelligence. *New Curriculum Research*, 2024(27): 7–9.

- [7] Wang L, Deng X, 2024, Research on Linux Teaching Innovation in Applied Undergraduate Universities. *Journal of Sichuan University of Arts and Sciences*, 34(5): 115–121.
- [8] Sun P, Shi Y, 2024, A Practical Exploration of Linux Operating System Course Teaching from the Ideological and Political Perspective. *Computer Knowledge and Technology*, 20(25): 150–152 + 180.
- [9] Dong N, 2019, The Exploration and Practice of Scientific Research Feeding Teaching in Linux System Curriculum. *Information and Computer (Theoretical Edition)*, 36(16): 246–249.
- [10] Wu S, Zai K, 2019, Employment-Oriented Teaching Reform and Practice of “Linux System Fundamentals” Under the Integration of Schools and Enterprises. *Public Science and Technology*, 26(4): 147–149 + 158.
- [11] Wang B, Jin L, Zhang Q, 2019, Security Protection Method of Network Communication Data Transmission Based on Open-Source Community Linux. *Yangtze River Information and Communication*, 37(8): 111–113.
- [12] Ge W, Gong J, Pan G, 2019, Exploration on Linux Operating System Programming Teaching Reform for Xinchuang Talent Training. *Computer Knowledge and Technology*, 20(21): 142–144.
- [13] Liu W, Hao P, Duan X, 2024, Teaching Reform and Practice of Linux Operating System for Internet of Things Engineering. *Office Automation*, 29(13): 17–20.
- [14] Zhang Y, Gao S, 2019, Application of Project-Driven Teaching Method in College Computer Courses—A Case Study of “Linux Operating System” Course. *Journal of Shanxi Open University*, 29(2): 73–76.
- [15] Wu J, 2019, The Reform and Practice Exploration of Political Teaching of “Linux System Application and Management” Course. *Journal of Taizhou Vocational and Technical College*, 24(3): 48–51.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on the Teaching Strategy of High School Chinese Large Unit Based on Core Accomplishment

Kuan Xing*

Hengyi Senior High School, Fuzhou 350011, Fujian, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: The new curriculum standard emphasizes the guiding role of core accomplishment, requires the senior high school Chinese curriculum to “adjust, reorganize and supplement” the teaching content, break through the traditional narrow view of textbooks and teaching concept, gradually enhance the practicality and comprehensiveness, and change the students’ learning style. In this context, the front-line teachers to the application of large unit teaching strategy for beneficial exploration, looking for a new fulcrum to move the teaching transformation, the formation of more innovative, efficient teaching model, for students to learn high school Chinese courses, multidimensional enhancement of core literacy to provide a new field. This paper first analyzes the characteristics of high school Chinese teaching based on core literacy, and then puts forward feasible, practical strategies for the specific problems existing in the current teaching implementation, aiming to provide references for the implementation of the new curriculum standards.

Keywords: Core literacy; Senior high school; Chinese; Large unit teaching; Strategy

Online publication: April 28, 2025

1. Introduction

In the current Chinese teaching in senior high school, large unit teaching is an effective strategy to cultivate students’ core quality, which provides important support for students’ comprehensive development. In the process of teachers carrying out large unit teaching, the unit is the foundation, the theme is the clue, the activity is the carrier, and the teaching implementation method is the key guarantee of students’ learning quality and the training effect of core literacy. Starting from the core quality, exploring how to promote the teaching of large units in senior high school Chinese through effective strategies and giving full play to the advantages of large unit teaching is an important issue that needs to be studied in the educational reform in the new era.

2. The characteristics of high school Chinese large unit teaching based on core accomplishment

2.1. Focus on core literacy

Senior high school Chinese teaching needs to focus on core literacy, taking into account students' test-taking skills, basic Chinese knowledge learning, as well as the development of culture, aesthetics and thinking, through appropriate means to promote students' systematic and structured learning, and provide a new field for students to cultivate core literacy of Chinese subjects in multiple dimensions ^[1].

2.2. Have a core of control

Different from the traditional teaching mode, the large unit teaching emphasizes the dominant role of the theme and the controlling role of the big concept. It is necessary to choose a clear theme or core concept as the core, and then set teaching activities, teaching tasks, and teaching content around it to promote orderly and effective teaching work ^[2].

2.3. Pay attention to the structure of teaching content

In contrast, the large-unit teaching mode emphasizes more systematism and structure in the construction of teaching content, requiring teachers to avoid simple piling of fragmented knowledge, and integrate teaching content around clear themes or core concepts in teaching design, so that it breaks the original boundaries of textbook units and forms a new unit ^[3].

2.4. New changes have taken place in learning forms

The large unit model further emphasizes students' subjectivity and requires teachers to take big concepts as guidance and "big tasks" as the basis to organize students to carry out learning. Therefore, students' learning forms have changed significantly compared with the past. They need to cooperate in task-driven exploration and think independently to achieve predetermined learning goals ^[4].

3. The present situation of high school Chinese teaching based on core accomplishment

3.1. The theme of the unit is broad

In the large unit teaching of Chinese in high school, teachers need to play the leading role of the theme, organize the teaching content and activities with a specific theme as the clue, and each teaching link is carried out under a certain theme framework, to ensure the integrity and effectiveness of teaching ^[5]. In fact, some teachers in the process of carrying out high school Chinese large unit teaching based on the core quality, there is a phenomenon of broad unit theme, they designed the unit theme is often not clear enough, the meaning is relatively broad, cannot clearly reflect the teaching objectives, resulting in the lack of students' independent inquiry systematic and directional, difficult to achieve the expected learning results ^[6]. Therefore, teachers need to reasonably formulate the unit theme, refine and clarify the unit teaching objectives, so as to provide a clear direction for students' independent exploration and lead them to complete the learning task according to the plan ^[7].

3.2. Lack of reasonableness in the setting of unit content

High school Chinese teaching in large units pays attention to the structure of teaching content, requires teachers to reconstruct teaching content around a certain theme or a big concept, build a suitable content unit, and reorganize

teaching content and teaching resources. In fact, some teachers fail to accurately grasp and deeply understand the connotation and concept of large unit teaching, neglect this aspect in teaching practice, and the selection of teaching content is not reasonable enough, resulting in a lack of close integration of part of the content and unit theme in the unit, and the failure of some teaching resources to fully reflect the integrity of Chinese knowledge. This results in a large gap between the actual teaching effect and the expected one. This not only affects the play of the advantages of large unit teaching, but also limits students' independent exploration, which is not conducive to the all-round development of students' core literacy^[8].

3.3. The implementation method and process lack of interest

Some teachers failed to break through the shackles of traditional teaching thinking and methods, adopted teaching means and methods that lack innovation, and teaching implementation methods that are relatively simple cannot effectively attract students' interest and attention, resulting in low participation of students and, lack of interest in learning. In this case, students inevitably feel that the implementation method and process of large-unit teaching lacks interest. In this regard, teachers need to understand students' learning interests and preferences, constantly innovate the implementation methods and methods of large-unit teaching, enhance the attractiveness of the whole teaching process to students, and encourage students to actively participate in it^[9].

4. Based on the core quality of senior high school Chinese teaching practice of a large unit

4.1. Condensing the unit theme and clarifying the direction of inquiry

It is an important way for teachers to implement the reform goal of Chinese teaching in senior high school to carry out large unit teaching with the direction of core accomplishment. Under the new educational background, students' learning needs have changed significantly, and the traditional teaching mode is gradually unable to meet the needs of students. Teachers need to carry out more beneficial exploration in the innovation of teaching methods. Teachers should make clear the direction of teaching innovation, carry out large-unit teaching based on the current situation of students' core quality cultivation, and improve the adaptability between "teaching" and "learning"^[10]. In view of the problem of broad themes in the current Chinese teaching of large units in senior high schools, teachers can clarify the direction of students' exploration by condensing the unit themes and guiding them to complete their learning tasks smoothly. Take a unit of high school Chinese textbook as an example, this unit has been compiled into several excellent articles such as "Qinyuchun · Changsha," "Standing on the edge of the Earth to release numbers," "Red candles," "The side of the Eriduo Snow Peak," and their themes are directly related to youth, respectively reflecting the heroic, power, determination and will of youth. Through in-depth analysis of the content of the textbook, teachers can condense the theme of the unit and design the teaching, learning and evaluation objectives around the theme to guide the teaching activities and learning behaviors. According to the content characteristics of these texts, teachers can design the unit theme as "the background color of youth," and guide students to analyze the poems and taste the articles along this clue, and explore the attitudes and emotions expressed by the authors^[11].

4.2. Refine the big concepts around the teaching content

The big concept is the entry point of the whole high school Chinese teaching activities, which has a very important impact on the development of teaching activities and the promotion of learning activities. In the

context of core literacy, the “big concept” in senior high school Chinese teaching emphasizes the subject knowledge of “understanding-based,” requiring teachers to grasp the teaching direction with the guidance of big concepts, build a scaffold for students to learn related content, and guide them to complete various learning tasks. Therefore, before refining the big concept, teachers need to deeply analyze the new curriculum standards and textbook content, and design the big concept according to the internal connection between the core quality and the teaching content, so as to lay the foundation for the orderly development of subsequent teaching activities. Based on the careful study and analysis of the unit prompts provided by the textbook, important information should be extracted by combining the requirements of unit learning tasks, learning prompts and unit leads. It is necessary to analyze the learning situation, fully understand the students’ knowledge base, accurately grasp their cultivation and accumulation in literary literacy, knowledge and experience, and design a big concept based on it. For example, when teaching a unit, teachers can carry out large unit teaching design along the above ideas, highlighting the controlling effect of big concepts on teaching activities, teaching tasks and teaching content ^[12]. First of all, combined with the new curriculum standards’ interpretation of the core literacy of Chinese, teachers can design the core literacy objectives of this unit as follows: strengthen students’ understanding and perception of literary images ^[12]. Guide students to experience and perceive the images created by literary works, as well as the linguistic characteristics of literary works. Guide students to understand the content of the text in connection with real life, so that students can get ideological inspiration ^[13].

These contents focus on the three aspects of “emotion,” “language,” and “image,” so they can be used as the direction of the big concept in the teaching of this unit. Next, the teacher comprehensively analyzes the unit learning tasks, learning prompts and unit leads in the textbook, and extracts the core vocabulary emotion, image and language according to the analysis results. Finally, according to the students’ learning situation and the teaching content involved in this unit, the teacher can further clarify the big concept, carry out teaching design and practice around it, and promote the improvement of students’ core literacy in all aspects.

4.3. Create the real task situation and optimize the activity links

Different from the traditional teaching mode, large unit teaching requires the construction of real task situations, advocates guiding students’ learning through real situations, arousing their desire for knowledge inquiry, and driving students’ learning inquiry through tasks, so that they can realize the improvement and development of core literacy relying on task inquiry activities. Based on this, teachers need to change their teaching concepts, break the limitations of traditional teaching models and concepts, accurately grasp the connotation and characteristics of teaching in large units, carefully design teaching situations and inquiry tasks, and then encourage students to actively and fully participate in classroom activities through appropriate guidance and guidance, so as to complete the cultivation goal of core literacy. For example, for the first unit of the high school Chinese textbook compiled by the ministry, teachers can focus on the teaching goal of the large unit, combine the humanistic theme of the unit and the actual learning situation of students in the class, build a life-oriented and authentic exploration situation, guide students’ learning behavior, and stimulate students’ thinking and emotions. Specifically, the situation is: “The school decided to hold ‘My youth spent this way’ theme activity. What do you need to do as the general director of this theme?” This situation is highly consistent with the teaching objectives and core concepts of the big unit, and closely connects with students’ real life, which can shorten the distance between students and the unit theme to a greater extent, and encourage them to take the initiative to participate in class activities under the inspiration and guidance of the situation. In addition, in order to further optimize the classroom activities and encourage students to participate more fully in the teaching of large units, teachers

should take this task situation as the basis to design more detailed and specific learning tasks and guide students to conduct independent exploration ^[14].

4.4. Highlight the student center and optimize the setting of learning tasks

With the gradual increase of students' Chinese knowledge and learning methods, they usually form a new understanding of the course of high school Chinese, and show a stronger sense of autonomy in the learning process. When carrying out large unit teaching of Chinese in high school, teachers should adhere to the principle of "student-centered", design learning tasks that meet students' learning needs and ability level, and lead students to carry out independent exploration around the unit theme. For example, when learning the text of a unit, students have accumulated a certain learning method and knowledge foundation, and hope that they can play a greater main role in the process of completing the learning task. Teachers should optimize the learning task design based on the unit theme and content, and provide corresponding help and resources for students in the process of completing the task. First of all, teachers should develop information-based teaching resources based on the teaching content of the unit, visually present the unit theme and text content, build a birth activated and intuitive Chinese situation, arouse students' memories of life experience, and encourage them to explore around the unit theme by combining their existing life experience and Chinese knowledge. In the development and application of information-based teaching resources, teachers should attach importance to the reconstruction of the "unit" and avoid the simple "copy" of the textbook content ^[15]. Secondly, they should design learning tasks for students and encourage them to carry out task-driven learning to help them deepen their understanding of the knowledge points of this unit.

5. Conclusion

To sum up, focusing on the core quality needs of students, this paper explores how to promote the teaching of high school Chinese in large units through effective strategies, so that it can break through the constraints of traditional narrow teaching materials and teaching concepts, help to implement the new curriculum standards, and meet the requirements of "adjusting, reorganizing and supplementing" teaching content proposed by it more quickly. In daily teaching practice, teachers should take such strategies as condensing unit theme, refining big concepts around teaching content, creating real task situation and optimizing learning task setting to enhance teaching practicability and comprehensiveness to solve the problems of lack of interest in implementation method and process, lack of rationality in unit content setting and broad unit theme in current senior high school Chinese teaching. To create conditions for students to enhance their core literacy in multiple dimensions.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Zhu Y, 2023, Exploration of High School Chinese Teaching in Large Unit Based on Situation. Chinese Teaching Communication D Journal (Academic Journal), 2023(12): 23–25.
- [2] Li H, 2023, Realistic Dilemma and Practical Strategy of Large Unit Teaching of Chinese Labor in High School – A

Case Study of Unit 2 of the First Volume of Compulsory High School Chinese in Unified Edition. *College Entrance Examination*, 2023(36): 84–86.

- [3] Sun Y, Liu J, Gao R, et al., 2023, Research on the Practice of Project-Based Learning in Large Unit of High School Chinese from the Perspective of Big Concept. *Proceedings of the 7th Annual Conference of Chengdu Tao Xingzhi Research Association*, Chengdu Tao Xingzhi Research Institute, Chengdu Longquanyi District Education Science Research Institute, Tianjiabing Middle School, Chengdu: 7.
- [4] Ma X, 2023, Building Efficient Classroom Based on Core Accomplishment – An Exploration of Teaching Strategies for Large Units of Chinese in High School. *Chinese Loose-Leaf Literature (Teachers Edition)*, 2023(16): 124–126.
- [5] Wang Z, 2023, Research on the Focus and Innovation of Large Unit Teaching of Chinese in Senior High School – Taking Unit 2 of the Second Volume of Compulsory Edition as an Example. *Chinese Teaching Communication D Journal (Academic Journal)*, 2023(11): 28–30.
- [6] Gong L, 2024, Research and Practice on Teaching Design of Large Unit of Learning Task Group “Thinking Reading and Expression” in Senior Chinese, thesis, East China Normal University.
- [7] Qi Z, Du S, 2023, Research on the Teaching Design and Practice Path of High School Chinese Large Unit Based on Thinking Perspective. *Heilongjiang Education (Education and Teaching)*, 2023(11): 58–59.
- [8] Shi L, 2024, Research on Optimization Strategy of High School Chinese Large Unit Teaching Design Under Core Accomplishment. *Progress*, 2024(6): 123–125.
- [9] Fan J, 2024, Research on Teaching Strategies of High School Chinese in Large Units Under the Guidance of Core Accomplishment. *Chinese Teaching Communication*, 2024(20): 21–23.
- [10] Shen D, 2023, Research on the Teaching Strategy of Integrating Ancient Chinese Poetry into Primary School Music Classroom. *Chinese Times (Principal)*, 2023(1): 66–67.
- [11] Liao Y, 2023, Optimization Strategy of Teaching Design of Chinese Large Units in High School Under Core Accomplishment. *Literary Education (II)*, 2023(9): 179–181.
- [12] Ren K, 2022, Optimization Strategy of Teaching Design of Chinese Large Unit in Senior High School Under Core Accomplishment. *Collection of Research on Educational Theory of New Curriculum Reform*, 25.
- [13] Shao S, 2022, Senior High School Chinese Teaching Strategy Based on Core Accomplishment. *Chinese Loose-Leaf Selection: Senior High School Edition*, 2022(4): 3–5.
- [14] Li L, 2023, The Teaching Strategy of Large Unit in Senior High School Chinese from Macroscopic and Microscopic Perspectives – A Case Study of Unit 2 in the Second Volume of Compulsory High School. *Science People: Wisdom Education*, 2023(7): 11–12.
- [15] He J, 2024, A Discussion on the Teaching Strategy of Combining Reading and Writing with Chinese in Primary School Under the New Curriculum Concept – A Case Study of Unit 5 and Unit 1. *Education Progress*, 14(11): 5.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on Generative Artificial Intelligence in Innovate Strategies of Teaching Interaction

Xiaodong Li*

University of Science and Technology Beijing, Beijing 100083, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In this modern era, effectively integrating artificial intelligence (AI) technology into classroom teaching interactions presents a novel challenge for many university educators. This paper begins by outlining the theoretical foundations of generative AI and teaching interaction. It then provides an analysis of the challenges that classroom teaching interactions face in today's context, along with the benefits that generative AI can offer to such interactions. Additionally, it examines the current state of generative AI applications in classroom teaching interactions and explores innovative strategies for leveraging generative AI in these settings. The aim is to provide valuable insights for enhancing the innovation and development of classroom teaching interactions in higher education institutions, thereby improving both the quality of classroom interactions and the overall learning experience for students.

Keywords: Generative artificial intelligence; Teaching interaction; Innovation strategies

Online publication: April 28, 2025

1. Introduction

As artificial intelligence technology continues to advance and generative AI becomes increasingly integrated into daily life, the realm of higher education is experiencing significant transformations. Leveraging deep learning and natural language processing, generative AI can produce text, images, audio, video, and even instructional frameworks, offering boundless opportunities for enhancing interactive classroom teaching in universities. On one hand, generative AI can tailor educational content and interaction methods based on students' learning progress and requirements. This customized approach to teaching interaction plays a crucial role in fostering student engagement and improving overall classroom effectiveness. Moreover, generative AI assists educators by automating tasks such as grading assignments and creating personalized study plans, significantly reducing their workload. This allows teachers to allocate more time and effort toward enhancing the quality of their instruction. On the other hand, the integration of generative AI into classroom interactions introduces innovative concepts and methodologies for advancing university education. By incorporating this technology, traditional teaching models can be disrupted, encouraging the evolution of educational philosophies and teaching strategies. For instance,

generative AI can replicate real-world classroom scenarios and multi-role dynamics, providing educators with advanced tools for lesson preparation and pedagogical research. This proves especially beneficial for novice instructors, helping them navigate diverse educational contexts and content areas more effectively. Additionally, through collaborative learning experiences with generative AI tools, students are motivated to engage more actively in classroom activities, thereby strengthening their critical thinking and problem-solving skills.

2. Overview of generative artificial intelligence and teaching interaction

2.1. Basic overview of generative artificial intelligence

Generative artificial intelligence involves the creation of new content through automated learning, leveraging deep learning technologies such as neural networks and variational autoencoders. Upon receiving instructions, generative AI can mimic human creativity by composing music, creating art, or writing texts. By analyzing extensive datasets, generative AI is capable of predicting and generating novel content that satisfies specific criteria. Currently, the use of generative AI in education is expanding, particularly in fostering innovative teaching interactions. Through the integration of generative AI technologies, educators can develop more tailored learning materials for students, assist them in identifying personalized learning paths, and enhance the engagement and appeal of classroom instruction ^[1]. Technologies like Wen Xiaoyan, Chat GPT, IFlyspark, and Doubao contribute positively to improving classroom quality and supporting teachers in interactive teaching practices. With their support, instructors can better align teaching activities with curricula and plans, enabling more creative educational reforms. For instance, students can engage in contextual conversations with virtual characters produced by generative AI software to enhance their English proficiency and reinforce their comprehension and application of learned vocabulary and grammar concepts.

2.2. Theories related to teaching interaction

Teaching interaction plays a crucial role in the communication and collaboration among teachers and students, as well as among students themselves, within professional courses. Effective teaching interaction can not only successfully impart knowledge and skills to students but also strengthen emotional connections between teachers and students, as well as among students. This form of interaction encompasses not only instructors' guidance and feedback to students but also includes various aspects of students' active exploration and engagement in knowledge dialogues. In contemporary educational frameworks, teaching interaction is considered a pivotal element for enhancing learning efficiency, fostering deeper comprehension, and nurturing innovative capabilities. The primary features of teaching interaction include: First, teaching interaction is characterized by its interactivity. This involves a bidirectional or multidirectional communication process that encompasses not only instructors guiding students but also students providing feedback to instructors and engaging in discussions and collaborative activities among themselves. Second, teaching interaction exhibits a dynamic nature. It is not static, as the curriculum progresses and students' cognitive levels evolve, the methods, content, and goals of classroom interactions must be adjusted accordingly. Teachers need to design adaptable interactive activities that align with varying instructional themes and cater to students' learning needs. Third, teaching interaction is goal-oriented. All forms of interaction should support the achievement of educational objectives, whether these involve knowledge acquisition, skill development, or the cultivation of emotional attitudes. Interactive activities must remain focused on this central aim. Fourth, participation is a critical component of teaching interaction. Active involvement from students is essential. Each student plays a central role in the interaction process. Through questioning, discussion,

and practical exercises, teachers can facilitate an environment where students gain knowledge and enhance their competencies^[2]. Fifth, effective teaching interaction takes diverse forms. Beyond traditional question-and-answer sessions, teachers can employ group discussions, case studies, role-playing, and other methods. The choice of interaction mode should be tailored to the specific teaching content to maximize effectiveness.

2.3. The impact of generative artificial intelligence on teaching interaction

Currently, numerous universities and colleges have incorporated generative AI into classroom interaction, leveraging it to enhance teaching content, methods, and evaluations, thereby improving the quality and effectiveness of classroom interactions. Regarding teaching content, generative AI serves as a robust tool for integrating educational resources, benefiting both instructors and students. Through generative AI software, they can swiftly locate essential teaching materials, including relevant English references, foreign visual resources, and diverse interactive classroom activities, which significantly contribute to enriching teaching content and boosting student engagement. In terms of teaching approaches, educators can utilize generative AI to facilitate interactive classroom instruction. This not only refines the traditional teacher-centered model but also enables the design of personalized interactive activities tailored to the actual learning needs of students. This type of personalized teaching approach not only fulfills the learning requirements of diverse students but also lessens the workload for teachers. Educators can leverage the instructional recommendations generated by AI to offer more precise support and direction to students, thereby enhancing the effectiveness of interactive classroom instruction. In terms of assessment, as opposed to traditional methods where teachers manually grade homework and tests, generative AI employs deep learning and natural language processing techniques to swiftly evaluate student responses and deliver accurate assessments. This reduces the burden on educators while increasing the efficiency and precision of evaluations. It allows students to promptly understand their academic standing and areas for improvement, enabling them to adjust their study plans accordingly. Furthermore, teachers can gain a broader and more precise insight into student learning through the evaluation data provided by generative AI, facilitating targeted focus in future classroom interactions to foster holistic student development.

3. The challenges of classroom teaching interaction in the new era

3.1. The form of classroom interaction is relatively simple

Traditional college classroom instruction frequently focuses on the transmission of knowledge while overlooking the importance of student engagement as active participants in the teaching process. To fulfill the teaching objectives within a restricted timeframe, instructors often assume a dominant role, guiding students who passively absorb information. This dynamic restricts the potential for meaningful interaction during lessons^[3]. Moreover, with the widespread integration of internet technology into students' daily routines and studies, some learners find traditional question-and-answer interactions unengaging. If educators do not incorporate advanced tools like intelligent learning systems or online collaborative platforms, classroom exchanges may remain limited, resulting in low levels of student involvement. Additionally, certain experienced instructors tend to rely heavily on their established teaching practices and neglect acquiring skills related to interactive and smart classroom methodologies. Consequently, implementing varied interactive strategies to enhance and refine classroom instruction becomes challenging in practice.

3.2. Students' learning needs are increasingly personalized

As society continues to evolve, the demand for diverse talents across various industries has grown significantly. This diversity extends beyond professional skills to encompass critical thinking, innovation, teamwork, and numerous other competencies. Consequently, students today seek more than just traditional knowledge transfer in classrooms; they aspire to engage in a richer, more personalized learning experience that aligns with their future career aspirations ^[4]. Moreover, during classroom interactions, students desire individual attention from instructors, seeking tailored guidance and support to foster personal development. Additionally, the rapid advancement of information technology has introduced new possibilities for higher education. The integration of online teaching platforms, virtual labs, generative AI, and other technologies into classroom instruction allows students to access learning resources anytime and anywhere, promoting self-directed learning. However, this emphasis on student autonomy also presents new challenges for interactive teaching methods in the classroom.

3.3. Students have difficulty paying attention in class

In higher education, regardless of the specific course, college-level instruction tends to be more theoretical and abstract compared to high school. This increased complexity often makes it challenging for students to grasp the material, which can diminish their enthusiasm for learning and lead to a lack of focus during lectures ^[5]. Classroom interaction demands significant organizational skills from instructors. If teachers struggle to maintain effective classroom management or allow discipline to become lax, the quality of the learning environment suffers, ultimately reducing students' learning efficiency. Furthermore, the widespread use of social media platforms, particularly those featuring short-form content, has conditioned students to prefer fast-paced information delivery. As a result, even when class sessions last only a few dozen minutes, students may find it difficult to sustain their attention on interactive learning activities as required by the instructor. Additionally, some students possess weaker self-discipline and resilience. When faced with challenges in interactive classroom settings, they might hesitate to participate actively, fearing mistakes or poor performance. Consequently, their attention shifts elsewhere, further hindering their engagement in the learning process.

4. The application advantages of generative artificial intelligence in classroom teaching interaction

4.1. Assisting teachers to build high-quality interactive teaching classrooms

Leveraging the capabilities of generative artificial intelligence, such as intelligent algorithms and big data analysis, educators can effectively design classroom content, track student progress, and develop tailored learning plans. This technological integration significantly alleviates teachers' workload, allowing them more time and energy to concentrate on enhancing teaching quality and creating engaging, interactive classroom activities ^[6]. On one hand, generative AI can suggest teaching materials that align with students' learning preferences and skill levels by analyzing their historical learning behaviors. The availability of customized resources not only boosts students' interest in coursework but also encourages greater participation in classroom discussions. On the other hand, this technology can continuously monitor students' learning progress, promptly identify challenges they face, and relay insights to instructors. This empowers teachers to adapt their strategies dynamically, offering precise support to match the pace of diverse learners across various subjects. Consequently, students can actively engage in lively learning experiences, ensuring they comprehend and master the material through meaningful teacher-student interactions.

4.2. Promote students' active participation in classroom teaching interaction

The integration of generative AI into college education has introduced a fresh approach and technique for enhancing classroom interactions in higher education institutions, particularly in promoting student engagement. By leveraging generative AI technologies, instructors can develop more tailored learning strategies to cater to the diverse needs of students and motivate them to actively participate in classroom activities throughout their learning journey. For instance, building a robust English vocabulary has consistently been a critical challenge in college English instruction. To address the issue of insufficient vocabulary acquisition among students, educators can utilize generative AI software to supply students with word lists, enabling them to utilize the software for comprehension and memorization outside of class hours. Moreover, based on students' learning data, the software can suggest vocabulary practice materials and pacing that align with their learning capabilities and levels, ensuring that each student achieves optimal learning efficiency. Furthermore, generative AI can create virtual scenarios that mimic real-world environments, allowing students to study and explore within these simulated settings. Through this interactive method, students can experiment and correct errors in a stress-free atmosphere, thereby strengthening their understanding and practical application of the knowledge they have acquired.

4.3. Enhance the interaction and communication between teachers and students

By leveraging generative AI, educators can gain deeper insights into students' requirements during interactive lessons, adapt their teaching approaches, and enhance the overall learning experience for students. This AI-driven software can evaluate student feedback on interactive learning methods by considering their past academic performance and preferences, offering teachers recommendations on improving classroom engagement. For instance, by examining student participation levels, the system might advise which instructional techniques are most impactful or suggest optimal moments to introduce novel interaction styles to boost student motivation. In contrast to conventional classroom interactions, integrating generative AI can transcend temporal and spatial limitations. Educators can utilize technologies such as virtual reality (VR) and augmented reality (AR) to craft immersive educational settings, enabling students to engage with course materials and peers in a simulated context. Such interactions often encourage students to delve deeper into content through critical thinking and collaborative discussions. Furthermore, with the assistance of generative AI tools, teachers can develop game-based interactive learning activities that not only make classroom interactions more engaging but also foster students' collaborative skills and creative problem-solving abilities.

5. The application status of generative artificial intelligence in classroom teaching interaction

5.1. Personality tutoring and question answering

In university classroom interactions, instructors can leverage generative artificial intelligence to offer tailored tutoring and question-answering support based on each student's learning pace and comprehension skills. For instance, when students face uncertainties, they can consult the AI-powered teaching assistant for prompt and precise responses ^[7]. Moreover, generative AI can suggest suitable learning materials and practice exercises aligned with a student's progress and skill level. For example, it may provide foundational knowledge and problem-solving guidance for students who need reinforcement, while offering advanced and challenging content for those with higher proficiency. Additionally, generative AI possesses robust natural language processing capabilities, enabling it to swiftly interpret students' inquiries and deliver clear and accurate explanations. By

integrating contextual clues and logical reasoning, generative AI can provide deeper and more comprehensive analyses, thereby enhancing students' understanding of key concepts and fostering their analytical and critical-thinking skills.

5.2. Generation and integration of teaching resources

In university classroom instruction, educators can leverage generative artificial intelligence tools to create personalized classroom exercises, case studies, and experimental designs tailored to students' individual requirements based on the specific teaching content and their actual learning progress. This approach enhances the relevance and interactivity of classroom teaching. Generative AI possesses the capability to merge various data types, including text, images, audio, and video, enabling cross-format semantic analysis and transformation. This allows educators to convert dull textual material from textbooks into engaging resources such as images, videos, or even three-dimensional models, thereby making abstract theoretical concepts more tangible and interesting, which in turn boosts students' enthusiasm and engagement in classroom activities ^[8]. Furthermore, generative AI can effectively aggregate high-quality educational resources available on internet platforms, offering teachers and students a wide range of diverse teaching materials. By inputting keywords or describing the teaching content, instructors can swiftly access relevant micro-lesson videos or teaching cases, evaluate them, and integrate them into a resource library that aligns with the school's teaching objectives.

5.3. Classroom interaction and discussion

Generative AI can enhance classroom interaction through intelligent question answering, virtual assistants and other means. For instance, educators can incorporate interactive Q&A activities into their teaching plans, enabling students to engage with generative AI systems. This allows students to respond to questions posed by the AI or inquire further, fostering a relaxed and engaging learning environment. Moreover, generative AI can adapt the content and complexity of interactions based on students' learning pace and comprehension levels, encouraging broader participation in classroom discussions. Additionally, teachers can input the core themes of a lesson into the AI system to generate thought-provoking discussion topics, guiding students toward deeper analysis and collaborative group discussions. During these interactions, the AI can offer hints and recommendations to help clarify ideas, expand perspectives, and enhance both the depth and breadth of classroom discourse. Furthermore, as online education continues to grow, generative AI is becoming increasingly vital in supporting remote interactions and discussions ^[9]. By simulating face-to-face communication scenarios, AI systems can provide real-time voice, video, and text-based interaction capabilities. This enables meaningful engagement between students and teachers, even when they are not physically present in the same location.

5.4. Homework correction and evaluation

Generative AI offers a significant advancement over traditional methods of correcting computer-based homework, particularly for subjective tasks like English essays. Leveraging natural language processing (NLP) technology, this AI can swiftly and precisely detect grammatical mistakes, structural issues, and fluency concerns in students' essays, providing timely and accurate feedback ^[10]. This not only enhances the efficiency of grading but also lightens the teachers' workload, allowing them to allocate more time and resources to instructional planning and interactive teaching. Moreover, generative AI software supports multi-dimensional assessment of student assignments. For instance, when evaluating English compositions, it can analyze various aspects such as vocabulary usage, creative thinking, writing style, and emotional expression. This comprehensive evaluation

approach enables teachers to gain a deeper understanding of students' learning progress and areas needing improvement. Additionally, the software can offer personalized feedback and recommendations tailored to individual student needs. Students with moderate writing skills might receive focused guidance on grammar and syntax, while those with advanced abilities could get suggestions for enhancing content originality and depth.

5.5. Individualized learning path planning

Through the analysis and extraction of historical learning data, such as students' past academic performance, homework submission records, classroom participation, and online assessment results, generative AI is capable of identifying the unique learning traits and requirements of individual students. Leveraging deep learning algorithms, this technology can further design a customized learning trajectory for each student, taking into account their distinct characteristics and needs. In doing so, it respects students' personal learning preferences and styles while assisting them in discovering effective learning strategies^[11]. Moreover, throughout the learning journey, generative AI systems can continuously adapt the nature and complexity of learning materials based on real-time feedback from students' academic progress and evaluation outcomes. For instance, if a student struggles with a particular concept, the system will introduce supplementary practice exercises to reinforce understanding. Conversely, for high-achieving students, the AI will suggest advanced and more complex content to further challenge and inspire their intellectual growth.

6. Innovative practice strategies for interactive classroom teaching with generative AI

6.1. Introduce generative AI to optimize the design and organization of teaching interaction

Classroom interaction primarily occurs through teacher questioning and group discussions, where the design of questions and discussion topics plays a key role. Integrating generative artificial intelligence tools can help align these questions and topics more closely with students' learning requirements while also increasing their complexity and engagement.

When it comes to classroom questioning, educators typically pose targeted queries to students based on the curriculum and practical applications, aiming to enhance students' grasp of classroom knowledge and improve their core competencies. However, teachers' experience and perspectives have limitations. To devise more effective and innovative questions for students, educators can input relevant keywords into generative artificial intelligence (AI) tools. This allows the AI to create question scenarios that align with the teaching material and the students' learning context, along with a series of logically structured and rigorous questions. Through engaging with these scenario-based problems and interacting with teachers, students can achieve a deeper understanding and mastery of the lesson content^[12]. For instance, in a college English class aimed at enhancing students' understanding of Western cultural backgrounds, an educator could use generative AI to craft a short story about Christmas traditions. By analyzing the plot and dialogue within the story, students can gain insights into the relevant cultural context. In practice, to ensure that the generated content matches the learning level and cognitive abilities of college students, teachers should specify the learning objectives, course details, and thematic focus when providing prompts to the AI. This approach helps make the AI-generated stories more comprehensible and appropriate for the target audience. It is important to note that generative AI is not a one-size-fits-all solution. Teachers should engage in iterative dialogues with the AI, refining the storylines and adjusting the question designs to better meet the interactive needs of classroom instruction.

Regarding group discussion, teaching interaction typically occurs through teacher-student dialogue, group

discussions, and other components. Unlike traditional classroom questioning, group discussion focuses on themes or questions related to the teaching material posed by instructors. Students then analyze and discuss these in smaller groups. This process allows students to practice their communication and expression abilities, critical thinking, and teamwork skills through collaborative interaction. Additionally, through reflection and discussion, students can more effectively assimilate the knowledge they have acquired. For instance, in college English instruction, while covering oral communication topics, teachers could utilize generative artificial intelligence software like Wen Xiaoyan. By inputting the prompt “As a college instructor, please generate several topics appropriate for group discussion within the context of oral English teaching,” the software, powered by big data models, would provide the following suggestions: (1) Campus life and cultural exchange. Encourage students to share engaging stories from their campus experiences in English and explore how individuals from diverse cultural backgrounds interact and adapt to each other’s customs and values. (2) Professional development and language proficiency. Facilitate discussions among students about the significance of English skills in shaping future career paths and strategies for enhancing their English abilities to align with professional requirements. (3) Social media and relationship dynamics. Assist students in evaluating the influence of social media on personal connections and debating effective methods for establishing and sustaining positive relationships in digital environments. Allow students to select topics of interest for group deliberation, culminating in a collective presentation. Each group designates a spokesperson to deliver their findings. During this activity, teachers may incorporate the most popular topics chosen by students into generative AI tools for further exploration. By comparing the insights generated by the software with those of the students, educators can identify discrepancies, address gaps, and enrich the direction of student discussions.

6.2. Use generative artificial intelligence to innovate students’ interactive classroom teaching activities

The application of generative artificial intelligence in innovating interactive classroom activities among students can be primarily seen in two phases: pre-class and in-class. Teachers can use generative artificial intelligence software to generate personalized preview questions according to students’ learning level and interests. For example, when teaching grammar content, teachers can generate targeted grammar exercises for students with relatively weak English grammar foundation, and more challenging reading comprehension questions for students with a good vocabulary. With the help of personalized learning materials, we can meet the learning needs of different students and improve learning efficiency. At the same time, teachers can also use generative artificial intelligence software to directly design interactive gamified classroom activities by inputting corresponding prompt words. For example, under the instruction of the teacher, the generative AI software can design a word solitaire game for students that meets the learning level of college students^[13]. Students use the online teaching platform to complete the game interaction. The software will randomly give a word related to the teaching content of the unit as a starting point, and students need to take turns to say the next word starting with the last letter of the word. The artificial intelligence assistant can immediately judge whether the word given by the students is correct and give the next word. Such preview activities can not only stimulate students’ vocabulary memory and association ability, but also help to increase the interest and interaction of preview before class. This kind of interactive design not only reduces the technical difficulty of teachers’ self-created preview tasks, but also improves the efficiency of using information-based teaching tools, so that students can complete the preliminary understanding of the learning content in the preview task of teaching through fun.

6.3. With the help of generative artificial intelligence, strengthen the interaction between students and learning content

With the extensive integration of information technology into education, generative artificial intelligence offers robust technical assistance for enhancing interactions between students and learning materials. It significantly contributes to students' development in English reading comprehension, English composition writing, and the enhancement of digital learning skills.

First, English reading comprehension serves as an important method for students to enhance their English skills. In conventional classroom settings, teachers typically guide students in translating passages and locating answers within the reading material by addressing specific questions. Despite numerous interactions between teachers and students during these activities, they often lack variety, and student engagement remains low. To address this, educators can incorporate generative artificial intelligence tools to create more engaging and creative English reading exercises. For instance, students could begin by thoroughly reading the text, identifying key details, and responding to questions posed by either the textbook or the teacher. Next, the text can be uploaded to generative AI software, which will independently answer the same questions based on the provided content. Students can then compare and evaluate the similarities and differences between their responses and those generated by the software. Should any uncertainties arise, students have the option to provide additional instructions or pose follow-up questions to the AI for further clarification. This approach not only strengthens students' critical thinking skills but also fosters their digital literacy.

Secondly, traditional English composition correction relied heavily on manual efforts from teachers. Given the large number of students, it was challenging for teachers to provide individualized feedback and guidance. However, generative artificial intelligence can address this issue to some extent. For instance, by establishing a set of procedures, teachers can train generative AI systems to develop basic skills in correcting and commenting on English essays, enabling direct interaction with students. Once students finish their English assignments, they upload them to the AI software. The software then performs personalized corrections and provides comments based on the teacher's predefined instructions. This not only helps in swiftly detecting spelling and grammar mistakes but also offers optimization suggestions regarding the overall structure and emotional expression of the compositions, thereby offering students more effective writing support. It is important to note that teachers should emphasize that generative AI tools are merely auxiliary learning aids. Students should not rely on these tools to directly generate compositions by inputting prompts. Additionally, students should not blindly accept all suggestions provided by the AI and should consult their teachers whenever they encounter uncertainties.

To enhance classroom interaction with students, teachers often prepare engaging visual, audio, and video teaching materials and presentations. Certain grammatical concepts can be challenging for students to grasp when explained solely through text. To address this, teachers can utilize software like Gatekeeperz to create instructional videos. This software can automatically generate a roughly 2-minute video based on the teacher's input, transforming abstract grammar rules into more tangible and understandable content, thereby aiding students in comprehension and mastery^[14]. Additionally, generative AI tools can suggest practical application videos of grammar points according to the teacher's guidance, such as demonstrating fixed phrases in American TV shows. This allows students to better understand grammar usage through real-world contexts. Furthermore, students can independently explore how to apply generative AI in their English learning, turning it into an effective tool for mastering the language.

6.4. Improve the interactive feedback mechanism of classroom teaching through generative AI

Beyond helping teachers and students improve interaction and communication before and during class, generative AI can also perform detailed analyses of classroom interaction videos post-class. This assists teachers in efficiently completing their teaching tasks and identifying ways to enhance future teaching interactions. For instance, teachers can install cameras in suitable classroom locations to fully document teaching activities. Subsequently, AI tools like 360AI can be utilized to segment and evaluate different parts of the lesson, providing deeper insights into each segment's interactive dynamics. Additionally, teachers can leverage the software to produce automatic transcripts, using color coding or font distinctions to differentiate between teacher and student contributions. These materials can then serve as valuable resources for later teaching analysis and research.

To enhance the interactive feedback mechanism in classroom teaching, educators should leverage generative AI tools to comprehensively gather students' performance data. For instance, videos of classroom sessions can be uploaded to AI platforms with specific instructions to extract details about student participation, such as the frequency of contributions, the number of questions asked, and the duration of interactions. This information serves as a foundation for evaluating student engagement during lessons. Additionally, other learning metrics like homework completion rates, exam results, and resource usage logs can be integrated to create a holistic view of the learning journey. Subsequently, AI technologies can be employed to conduct in-depth analyses of this data, pinpoint gaps in students' knowledge frameworks, and forecast their learning trajectories. These insights enable teachers to offer tailored instructional recommendations, helping students identify their unique learning approaches while facilitating more effective teacher-student interactions. Moreover, generative AI systems can produce individualized learning reports for each student, allowing both learners and educators to gain insights into academic progress, grade distributions, and mastery of key concepts through data-driven analysis. Teachers can then adapt their teaching strategies and methodologies based on these reports to provide personalized learning support for every student.

Scientific and effective teaching feedback plays a crucial role in enhancing the quality of interactive classroom instruction. Educators should leverage generative artificial intelligence tools to promptly evaluate and provide comments on students' assignments and exams, thereby maximizing the impact of personalized feedback. AI not only swiftly grades student work but also identifies errors, offering detailed explanations and recommendations for improvement. Teachers can utilize these results to deliver targeted guidance and clarification to students. In traditional classrooms, tests often require teachers to grade or students to peer-review, consuming valuable class time. By employing artificial intelligence, educators can instantly analyze student responses and deliver individualized feedback and suggestions. Students, in turn, can adapt their learning approaches based on AI feedback to enhance their academic performance^[15]. Furthermore, leveraging interactive classroom videos uploaded by educators and student learning data, generative AI can create customized learning paths for students. These paths assist students in defining their learning objectives, content, and pace. It is important to note that teachers should review the AI-generated plans, refine any impractical elements, and subsequently offer enhanced guidance and support to students. As students advance, instructors can direct the AI to periodically update the learning plans dynamically, ensuring students consistently meet their goals according to their individualized schedules. Throughout this process, teachers should configure the AI to provide timely incentives and encouragement based on student performance and progress, thereby boosting students' confidence and motivation. Additionally, teachers should engage in timely communication with students as prompted, offering emotional support and psychological counseling when necessary.

7. Conclusion

In conclusion, as an increasing number of educators incorporate generative artificial intelligence into their teaching practices, this technology has emerged as a crucial tool for facilitating classroom activities among college instructors. It offers substantial and varied support for educational processes. Nevertheless, practical implementation presents certain challenges. Educators must align with real-world learning scenarios, continuously enhance their digital teaching competencies, and effectively leverage generative AI to provide students with more diverse interactive experiences, thereby improving both the quality of instruction and student learning outcomes. In practice, teachers can utilize generative AI to refine the design and organization of interactions, introduce innovative peer-to-peer classroom activities, reinforce engagement between learners and content, and enhance feedback mechanisms within classroom dynamics. These strategies aim to fully harness the potential of generative AI to elevate teaching interactions. Additionally, when employing generative AI in education, instructors should ensure that the generated material possesses adequate depth and undergoes optimization and refinement to uncover further creative applications of this technology in interactive teaching contexts.

In the coming years, it is reasonable to anticipate that as artificial intelligence technology continues to advance and refine, generative AI will assume a more significant role within higher education. It will contribute more substantially to the development of interactive classrooms that are both more efficient and tailored to individual needs. Furthermore, this advancement will aid in nurturing college students who possess well-rounded qualities and are capable of thriving in the new era.

Funding

USTB Excellent Teaching Demo Course Construction with ideological and political characteristics (Project No.: KC2023SZ41); Academic Affairs Office of Beijing University of Science and Technology USTB 14th Five Year Plan textbook (Project No.: JC2022YB037); USTB Massive Open Online Course Project, “Appreciating English Works on the Screen” (Project No.: KC2021ZXKF21)

Disclosure statement

The author declares no conflict of interest.

References

- [1] Yang H, 2024, Analysis on the Teaching Model of Generative Artificial Intelligence Integrated into College English Writing Classroom. *College English*, 2024(21): 3–5.
- [2] Dong X, 2024, Exploring the Path of Enabling College English with Generative Artificial Intelligence. *Zhang Jiang Science and Technology Review*, 2024(4): 141–143.
- [3] Yu G, Li F, Teng W, 2024, AI+ Education: The Upgrading and Transformation of Teaching Model in the Era of Artificial Intelligence. *Ningxia Social Sciences*, 2024(2): 191–198.
- [4] Yang J, 2024, Deep Integration of Generative Artificial Intelligence and Higher Education: Scenarios, Risks and Suggestions. *China Higher Education*, 2024(5): 52–56.
- [5] Li J, 2024, Classroom Teaching Innovation in the Era of Generative Artificial Intelligence. *Information Technology*

- Education for Primary and Secondary Schools, 2024(Z1): 6–10.
- [6] Kong L, 2024, The Application of Generative Artificial Intelligence in the Teaching of Foreign Language Majors: A Case Study of College Critical English Course – Intensive Reading. *Frontiers in Foreign Language Education Research*, 7(1): 11–18 + 90.
 - [7] Li S, Zheng L, 2019, Challenges and Responses of Generative Artificial Intelligence to Classroom Teaching. *Curriculum. Materials. Teaching Methods*, 44(1): 39–46.
 - [8] Lu Y, Li M, 2023, How Can Generative AI Empower Education? *China Education Network*, 2023(12): 79–80.
 - [9] Wang S, Wang Y, 2023, Design and Implementation of Classroom Learning Community Based on ChatGPT-Like Artificial Intelligence: From the Perspective of Dialogue Teaching Theory. *Chinese Medical Education Technology*, 37(4): 375–382.
 - [10] Li Y, Jin H, 2023, The Opportunities and Challenges Brought by the New Generation of Artificial Intelligence to Classroom Teaching in Universities. *Education International Exchange*, 2023(6): 26–29.
 - [11] Zhang S, Ma Z, Dong Y, et al., 2023, Why Is Personalized Learning in Large-Scale Classroom Enabled by Artificial Intelligence Possible? – Based on the Application Research of AI in Classroom Teaching in the Past Decade. *Open Learning Research*, 28(5): 42–50.
 - [12] Qu Y, Fei J, 2023, Reform of College Classroom Teaching Under the Background of Artificial Intelligence. *China Adult Education*, 2023(10): 47–49.
 - [13] Gan Q, Yu Q, Wang C, et al., 2023, Analysis, Research and Practice of Classroom Teaching Based on Artificial Intelligence. *Software Guide*, 22(1): 88–93.
 - [14] Liu B, 2022, The Core Value of AI Empowering Classroom Transformation: Intelligent Generation and Mode Innovation. *Open Education Research*, 28(4): 42–49.
 - [15] Wang L, 2022, Case Analysis of Interactive Teaching Innovation Model Based on Artificial Intelligence. *Electronic Technology*, 51(12): 46–48.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

A Study on the Current Situation and Strategy of College Students' Career Planning Education

Luhong Chen*, Yize Dong

Faculty of Education Sichuan Normal University, Chengdu 610066, Sichuan, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: High-quality career planning education is an important starting point for improving the quality and efficiency of undergraduate education. This study discusses the necessity and challenges of college students' career guidance and puts forward feasible strategies for colleges and universities to guide college students' career planning.

Keywords: Career planning education; College students

Online publication: April 28, 2025

1. Introduction

With the deepening of economic globalization and the rapid upgrading of the science and technology industry, the high unemployment rate and competitive pressure in the segmented job market have increased significantly, and the career paths of job seekers have become increasingly uncertain. Especially in the rapidly changing technological field, the emergence of new professions and the transformation of traditional industries have made the job market full of variables ^[1]. In this context, job seekers not only need to have professional knowledge and skills, but also the ability to cope with complex workplace environments. Especially for undergraduate graduates, they face more severe challenges in the job market due to the lack of sufficient practical experience. Many graduates focus more on academic courses while in school and neglect the demands of the workplace and the accumulation of practical experience, which often results in them lacking sufficient competitiveness when looking for jobs ^[2]. Therefore, career planning education is particularly important. As a systematic educational practice, career planning education helps students clarify their career direction, enhance their self-awareness, and improve their career decision-making ability through planned learning experiences ^[3]. Through this process, career planning education not only helps students clarify their career goals but also enables them to adjust their development paths according to changes in the future job market, laying a solid foundation for their future work and life ^[4].

Career planning education is not only a tool for improving individual professional qualities, but also the key to enhancing students' competitiveness in dealing with complex employment environments ^[5]. It helps students

realize the deep connection between personal values and career development by cultivating their comprehensive abilities, and thus enables them to make more scientific and reasonable decisions when facing employment competition. In a globalized economy and an ever-changing job market, career planning education can help students not only see the employment opportunities in front of them but also examine their career development from a long-term perspective and improve their ability to achieve long-term goals. Therefore, career planning education should be integrated into the entire education process as early as possible, especially in college, when students' career awareness and abilities are still in the initial stage of formation. The early intervention of career planning education can help students recognize themselves more clearly, to plan their future career paths more effectively, unleash their potential and smoothly adapt to the ever-changing career environment.

The university stage is not only the core period for academic knowledge learning, but also the key moment for students to gradually awaken their career awareness^[6]. However, the lack of career planning education often makes many students face a series of problems of insufficient career preparation before entering the workplace. Not only does it affect students' job-seeking preparation, but it may also lead to a lack of clear direction for their career development. When students enter the workplace after graduation, they often face confusion in career goal selection and challenges in workplace adaptation due to the lack of necessary career planning and practical experience, and may even encounter bottlenecks in the early stages of their careers. As educational institutions responsible for cultivating high-quality talents, colleges and universities should attach great importance to career planning education, incorporate it into the higher education system, and make it an integral and interactive component of education^[7].

Although many universities have opened courses related to career planning and provided career counseling services, there is still a big gap in the actual effect. How to optimize the existing career planning education system and improve its pertinence and effectiveness has become a major challenge facing universities^[8]. Therefore, this study aims to explore the importance of career planning education in universities, analyze the challenges currently facing career planning education, and propose improvement strategies to promote the better implementation of career planning education in universities to help college students better cope with the challenges of career development and promote their realization of career goals and life values.

2. Importance

In the context of the current modernization of education and the improvement of talent training quality, colleges and universities are responsible for cultivating graduates with comprehensive qualities and social competitiveness. With the development of society, college students should not only master professional skills and theoretical knowledge but also have professional ethics, a forward-looking career outlook, and cross-cultural adaptability. The requirements of modern society for talents have gone beyond professional knowledge and include innovation, problem-solving, communication, and collaboration. Career planning education in colleges and universities provides students with a platform to cultivate these abilities, helping them to recognize their interests and strengths, cope with employment challenges, and achieve a smooth career transition. Career planning education runs through all stages of students' growth, from self-cognition, career decision-making, to action plan formulation and adjustment, helping students clarify their goals, optimize decision-making, enhance their sense of self-efficacy, stimulate their learning motivation, and ensure their continuous progress in their career development^[9].

Career planning education plays an overall leading role in the cultivation of college students' core literacy. According to the 4Cs framework of P21, critical thinking, creativity, communication and collaboration are the

key competencies that talents in the 21st century must possess ^[10]. These competencies are highly consistent with the concept of “promoting lifelong development and adapting to social development” in China’s core educational literacy, and can lay a solid foundation for college students’ future careers and social adaptability. Career planning education can help students fully understand their tendencies and strengths in terms of interests, personality, abilities, values, etc., through complete and scientific self-exploration, clarify their career positioning, and find the most suitable life direction for themselves ^[11]. It enables them to make career plans based on their characteristics, thereby ensuring that the career path they choose can maximize their potential. Based on this, students can create landmark achievements around their advantages, establish professional expertise, and continuously improve their comprehensive abilities in practice to maximize their value. Through this series of precise career planning education, students can not only lay a solid career foundation for themselves, but also be able to cope with complex and severe employment environments, calmly respond to challenges, and steadily achieve their career goals, thereby laying a solid competitive foundation for their future career development.

3. Challenges

At present, the challenges faced by college students in the process of career planning education are not limited to curriculum design, but also involve multiple levels such as ideology, supporting systems, and top-level design. There are problems that need to be solved urgently in these areas ^[12].

College students generally lack awareness of career planning. Many students know little about the basic concepts and importance of career planning, and lack the understanding of the long-term and systematic nature of career development. Career planning is not just about choosing a career or position, but also a dynamic and long-term process that involves the constant changes in individual values, interests, abilities, and social environment. However, when faced with the challenges and uncertainties of career development, many students often lack coping strategies, tend to adopt a negative coping attitude, and even ignore career development planning. The fundamental reason for this phenomenon is that students have a superficial understanding of the limited time and uniqueness of life, fail to realize the preciousness of the time and opportunities they have, and lack thinking about the deep meaning of career and life.

The teaching staff of career planning education in colleges and universities urgently needs to be further improved. At present, career planning courses should be composed of two types of teachers: theoretical teachers with a solid theoretical foundation and practical teachers with practical experience, to ensure the effective integration of theory and practice ^[13]. However, although many colleges and universities have opened career guidance courses and equipped them with full-time teachers, most of the teachers who engage in career planning education are part-time teachers, which makes them lack the updating of course content and the depth of teaching, resulting in the lack of pertinence and effectiveness of the course. In addition, the implementation of career planning education in colleges and universities lacks overall planning and design, the course setting is unreasonable, the form is single, and the standardization is insufficient, and a systematic plan throughout the college career has not been formed ^[14].

4. Measures

4.1. Build a “career planning education” community to form a joint force for cultivation

Building a team of high-quality career planning education teachers is the core guarantee for improving the

quality of education. To ensure the effectiveness of career planning education, colleges and universities should set up a special curriculum construction team to combine advanced educational theories with the academic and employment situation of college students to carry out scientific and reasonable curriculum design. The course content should focus on students' interests, abilities, and career needs, and be closely integrated with social trends to ensure its timeliness and foresight. High-quality courses combined with a high-quality teaching team can help students improve their career planning ability and enhance their competitiveness in dealing with complex employment markets and career development. Administrative departments should increase support for career planning education, provide sufficient funds and policy guarantees, and strengthen the introduction and training of teachers. By establishing a professional training system, improving teachers' professional qualities and practical experience, and especially introducing high-level teachers with cross-disciplinary backgrounds, colleges and universities can provide strong teacher guarantees for career planning education, ensure the quality of education, and provide support for students' career development.

4.2. Implement a systematic teaching mode and smooth the whole process of career planning education

Career planning education courses should follow the organic integrity of progressive levels, always adhere to systematic thinking, carefully design course content according to students' learning conditions and confusions at different stages, and improve the timeliness and pertinence of teaching. Course design should be student-centered, combined with their learning needs and psychological characteristics, and flexibly adjusted to respond to current confusions. At the same time, it should be closely integrated with future career needs to help students make decisions that are in line with their development at different academic stages. The overall planning should start from top-level design, curriculum implementation, to post-effect tracking, formulate a scientific talent training plan, ensure that the course content is closely centered on the actual needs of career development, and incorporate career planning into the subject teaching system through interdisciplinary cooperation to promote education systematization. The course content should include multiple dimensions such as self-assessment, career goal setting, and employment skills training to help students improve their professional literacy at the theoretical and practical levels.

In addition, career planning courses should focus on cultivating students' core competitiveness and ensure that the courses are targeted and systematic at different stages of study. In the freshman year, students should focus on self-awareness and exploration of career interests. In the sophomore and junior years, students should be guided to position themselves and conduct industry analysis. In the senior year, students should emphasize practical content such as job-hunting skills, interview preparation, and professional ethics to ensure that students can smoothly transition into the workplace. Finally, colleges and universities should establish a long-term feedback mechanism, regularly collect and analyze student feedback, optimize course content and teaching methods, and ensure the continuous improvement of career planning education^[15]. Through long-term tracking and evaluation, problems can be discovered promptly and the curriculum system can be improved to form an integrated career development system, laying a solid foundation for students' careers and enabling career planning education to continue to have a far-reaching impact after graduation.

4.3. Build a multi-dimensional training system to cover the whole training process

The scientificity and integrity of the training system of career planning education are directly related to the realization of educational effectiveness. Therefore, a high-quality training system must be developed, covering

clear goals, approaches, priorities, channels, and effective evaluation mechanisms. In terms of goal setting, it should be clear that the ultimate goal of career planning education is to fully prepare students for their future study and life and cultivate their ability to adapt to complex social and professional environments. Goals should be formulated based on universality and the particularity of students in various majors. Specific sub-goals should be gradually formulated according to the various steps of career planning education to ensure that education is hierarchical, systematic and operational, helping students recognize their strengths and weaknesses at different stages and adjust their career plans.

In terms of path planning, five stages of gradual advancement should be designed progressively from shallow to deep according to students' academic conditions and learning rules. The first step is to help students establish a sense of career planning, clarify its necessity, and encourage students to attach importance to career planning in their minds. The second step is to establish a scientific mechanism and system, formulate relevant policies, organize career planning lectures and practical activities, and provide comprehensive support for students. The third step is to create a good campus environment, provide career information platforms, internship opportunities, alumni sharing, etc., to broaden students' career horizons. The fourth step is to summarize and improve promptly, and through regular evaluation and reflection, constantly adjust the content and methods of education to ensure continuous improvement. Finally, establish a post-effect mechanism to track and provide feedback to graduates who have entered the workplace, evaluate the actual effect of career planning education, and further optimize the training system based on feedback, provide valuable experience for subsequent students' career planning, and ensure the continued effectiveness of educational results.

Funding

Sichuan Provincial Department of Education and Training and Research Center for Ideological and Political Work Teams in Colleges and Universities (Southwest Jiaotong University), "Research Project on Ideological and Political Education (Special for College Counselors)" (Project No.: CJSFZ24-17)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Li L, 2020, Connotation Exploration, Realistic Difficulties and Path Choice for Keeping Employment Stable Under the Economic New Normal. *On Economic Problems*, 2020(11): 18–25.
- [2] Yu L, Jiang K, 2023, Student Development in Higher Education Institutions from the Perspective of Interaction Between Individuals and Environment: A Theoretical Analysis of Astin's Theory of Institutional Impact and Higher Education Assessment. *University Education Science*, 2023(1): 104–113.
- [3] Qi Z, E X, Guo X, 2024, Chinese-Style Education Modernization and the Coordinated Development of High-Quality Vocational and General Education. *Education Research Monthly*, 2024(8): 12–21 + 47.
- [4] Wei Y, Pan S, 2024, Research on the Path of College Counselors to Carry Out Career Development Education for College Students. *Studies in Ideological Education*, 2024(8): 134–138.
- [5] Liu Y, 2020, *Journal of Sichuan University of Science & Engineering (Social Sciences Edition)*. *Journal of Sichuan*

University of Science & Engineering (Social Sciences Edition), 35(1): 68–84.

- [6] Zeng T, 2024, The Era Implication and Cultivation Path of Professional Literacy Under the Strategy for Developing China's Strength in Education. *Tsinghua Journal of Education*, 45(1): 120–128.
- [7] Li L, Liu Z, Chen E, et al., 2023, A Panel Discussion on Promoting Long-Term Development of Higher Education in China. *Modern University Education*, 39(6): 41–59.
- [8] Wang Y, 2022, Preparing for the Future: The Practice and Value of American Career and Technical Education. *Global Education*, 51(12): 86–102.
- [9] Zhang Z, 2023, Classroom Teaching in Universities: Realistic Review and Path Selection Facing the Knowledge Society. *Higher Education Development and Evaluation*, 39(3): 85–99 + 123.
- [10] Liu C, Wang S, 2018, Analysis and Enlightenment of the Elements of the American 21st Century Core Literacy Framework. *Education Review*, 2018(9): 154–158.
- [11] Li L, Liang J, Xu Y, 2024, The Formation and Optimization Mechanism of College Students' Employment Value Orientation. *Research in Educational Development*, 44(7): 17–25.
- [12] Tian Y, Fu T, Liu Y, et al., 2022, Practical Exploration of Digital Transformation of Basic Education. *China Educational Technology*, 2022(8): 106–132.
- [13] Zhao S, Zhang Z, 2023, Career Education Reform in Colleges and Universities from the Perspective of Educational Evaluation. *Jiangsu Higher Education*, 2023(8): 44–51.
- [14] Xie X, Zhang H, 2022, How to Make Students Ambitious: An Empirical Study on the Influence of College Educational Supports on Undergraduates' Sense of Life Purpose. *China Higher Education Research*, 2022(1): 76–82.
- [15] Feng J, Guo W, 2024, Research on the Path of Undergraduate Talents Cultivation from the Perspective of Key Competencies. *Jiangsu Higher Education*, 2024(7): 82–87.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on Employment and Entrepreneurship Education of College Students from the Perspective of New Quality Productivity

Shijie Wu*

Wenzhou Medical University, Wenzhou 325000, Zhejiang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: New technologies such as artificial intelligence, big data and blockchain continue to emerge, which continue to empower new industries, spawn new business forms, accelerate the formation and development of new quality productivity, and bring profound impact on college students' employment and entrepreneurship opportunities and the environment. From the perspective of re-quality productivity, the reform of college students' employment and entrepreneurship education and the improvement of educational practicality and effectiveness have become an inevitable choice for college education to link up with social development. Therefore, on the basis of analyzing the connotation of the new quality productivity and its specific impact on the employment and entrepreneurship education of college students, this paper discusses the feasible path to carry out the employment and entrepreneurship education of college students from the perspective of the new quality productivity, aiming to offer suggestions for accelerating the training of compound talents and consolidating the talent base for the development of the new quality productivity.

Keywords: New quality productivity; College students; Employment and entrepreneurship education

Online publication: April 28, 2025

1. Introduction

In the era of accelerating development and evolution of new quality, innovative allocation of production factors is gradually realized, industrial transformation and upgrading is gradually realized, and revolutionary breakthroughs are gradually achieved in technology. The supply of human capital needs to improve "quality" and "quantity," and college students need to seize the opportunities of "reaching" and "broad" in employment and entrepreneurship. In the face of the new needs of development in various fields, college students' employment and entrepreneurship education need to pay attention to industrial upgrading and scientific and technological innovation, accelerate the transformation of talent training mode around new quality productivity, and increase talent reserve for the production and development of new quality productivity.

2. Connotation of new quality productive forces

The concept of new quality productivity is an innovative concept arising from the background of the new era. It is the development and inheritance of traditional productive forces. It is a new form of productive forces emphasizing the optimization of forms, the application of new technologies and the integration of new factors. In the process of the generation and development of the new quality productivity, scientific and technological innovation is at the core position and plays a leading role. Its theoretical framework includes the meaning, basic connotation, generation conditions, essential attributes and performance characteristics, etc., which can provide theoretical compliance for the high-quality development of the new quality productivity and the development of productivity^[1]. In essence, the new quality productivity belongs to the technology-driven production mode, with data as the key production factors, supported by the technology integration of different industries and fields and the concept of green and low-carbon development, intelligent technology as the starting point, exploration in frontier fields, and reshaping of the basic factors of productivity. To promote productivity to more advanced and more advanced quality evolution, talents continue to achieve comprehensive development. Its proposal reflects people's new requirements and new understanding of the development of productive forces in the globalization and information age, provides directional guidance for people to promote high-quality economic development by relying on innovation-driven and scientific and technological progress, and puts forward new requirements for college students' employment and entrepreneurship education^[2].

3. The impact of new quality productivity on college students' employment and entrepreneurship education

3.1. Demand the improvement of “quality” and “quantity” in the supply of human capital

The new quality productivity is guided by the new development concept. Compared with traditional productivity, the new quality productivity emphasizes the fundamental driving force of scientific and technological innovation. It has the characteristics of new fields and high technology content, and requires the supply of human capital to improve both quality and quantity^[3]. First of all, this is reflected in the demand for the quantity of innovative talents. From the perspective of new quality productivity, various fields need to accelerate the transformation of quality, efficiency and momentum to effectively solve the structural, cyclical and institutional problems formed in country's economic development and make it better adapt to the changing external environment. In this process, science and technology have developed rapidly, and many new industries have emerged. At the same time, there is strong demand for specialized and diversified talents. In order to adapt to the new situation and the new era, more innovative and applied talents need to be introduced in various fields, and corresponding adjustments are required in the training methods and methods of college students' employment and entrepreneurship education^[4]. Secondly, it is reflected in the quality requirements of talent training. In the process of accelerating the formation and development of new quality productivity, people need to regard scientific and technological innovation as a driving force and constantly increase investment in the field of scientific and technological innovation. Among them, talent is the key factor to determine scientific and technological innovation. In order to realize scientific and technological innovation, employers will pay more and more attention to the comprehensive abilities of employees, such as information processing, technology application and innovation ability. At the same time, in the process of the development of new models and new technologies, there will be more new entrepreneurial fields and vocational positions, which on the one hand will bring more possibilities and more choices for the future development of college students, and on the other hand, it is necessary to put forward higher requirements for skills and quality^[5].

3.2. College students need to seize the opportunities of “reaching” and “wide” in employment and entrepreneurship

In today’s era, the competition for global comprehensive national strength and economic strength is constantly focusing on scientific and technological innovation, and talents are the source of power to promote the process of scientific and technological innovation. Therefore, China should pay special attention to scientific and technological innovation, and take the lead in some aspects based on catching up ^[6]. The concept of new quality productive forces is innovative in the new era background, and it is an advanced concept combined with the actual needs of China’s science and technology innovation, which provides new requirements and theoretical compliance for industrial development and personnel training. From the perspective of new quality productivity, the industrial system continues to evolve to digital and intelligent, and college students’ employment channels and opportunities are more diversified, and the space for them to display their talents is broader. The continuous formation and development of new fields have brought more possibilities for them to find jobs and start businesses ^[7]. On the one hand, the new development concept is the core feature of the new quality productivity. In the process of accelerating the formation and development of the new quality productivity, people’s ideas have been continuously changed, more new occupations have been accepted and recognized by more people, and the employment pattern and environment of college students have been further changed. In this process, some ecological and green new occupations serving the development of the new era have gradually become a new platform for college students to display their talents and realize their ideal pursuit, such as drone pilots and new professional farmers. On the other hand, the wave of scientific and technological revolution has swept all fields, and digital technology continues to empower industrial development, making college students’ employment prospects broader and career development trends more diversified ^[8]. With strong coverage, penetration, and innovation, the digital economy has provided important support for industries to explore new development paths, accelerated the formation and development of new applications, new forms of business, and new technologies, and the whole chain and comprehensive upgrading and transformation of traditional industries.

4. Innovative path of college students’ employment and entrepreneurship education from the perspective of new quality productivity

4.1. Strengthen publicity and guidance to broaden the vision of employment and entrepreneurship

Compared with traditional productivity, the new quality productivity has the characteristics of new fields and high technology content, which puts forward new requirements for industrial development and talent training, provides theories to follow, and brings more new opportunities and ways for college students to find jobs and start businesses. Colleges and universities should strengthen publicity and education based on the new changes and opportunities brought by the formation and development of new quality productivity to college students’ employment and entrepreneurship, to broaden their vision of employment and entrepreneurship and promote them to find jobs through multiple channels and with high quality.

First, colleges and universities should publicize employment and entrepreneurship and typical cases in various ways to promote employment and entrepreneurship education ^[9]. For example, colleges and universities can organize innovation and entrepreneurship activities, employment and entrepreneurship competitions, and employment and entrepreneurship lectures to strengthen students’ understanding of employment and entrepreneurship, ignite their enthusiasm for employment and entrepreneurship, and enhance their attention and

awareness of employment and entrepreneurship. In related educational activities, we should avoid empty talk about theoretical knowledge, choose real and typical employment and entrepreneurship cases to integrate them, and invite entrepreneurs, entrepreneurs and outstanding alumni representatives to come to the campus to share successful entrepreneurial experience.

Second, colleges and universities should strengthen the guidance of college students' employment and entrepreneurship through career planning guidance to help them understand and adapt to the market environment in advance. "New" plays a crucial role in the connotation of new quality productivity. It includes new driving forces, new industries and new models, which can give new meaning and vitality to production and development, so that it can cut and divide the "cake" well while making it bigger and better. This determines that the employment and entrepreneurship of contemporary college students need to face a new environment, and the development of college students' employment and entrepreneurship abilities needs to meet new requirements. Colleges and universities can promote career planning guidance from the admission stage, and run it through the whole process of students' learning. Based on understanding employment and entrepreneurship and their environment, students can be guided to make career planning in combination with their interests and ability advantages, and improve their ability to actively adapt to the development trend of the industry and market demand ^[10].

4.2. Strengthen investment and create a good atmosphere for employment and entrepreneurship

With the support of "new industries", the new quality productivity has made it possible for the "cake" to be made better in various fields, and provided college students with more choices and greater space for employment and entrepreneurship. In order to improve the employment quality of college students, colleges and universities should strengthen the investment in employment and entrepreneurship education based on the new quality productivity, and create a good atmosphere for employment and entrepreneurship.

First of all, strengthening employment and entrepreneurship education is reflected in improving the construction of the tutor team. Colleges and universities need to appropriately increase the constructive input of practice-based courses and teachers, build a professional team of employment and entrepreneurship tutors with high innovation ability and rich practical experience, and provide high-quality tracking and guidance services for students' employment and entrepreneurship ^[11].

Secondly, strengthening employment and entrepreneurship education is also reflected in the introduction of external resources. Colleges and universities should attach importance to the construction of multi-party cooperation mechanisms, constantly deepen cooperation with social organizations, industries and enterprises, and create better conditions for students to carry out employment and entrepreneurship activities. For example, colleges and universities can jointly develop projects and build business incubation bases with enterprises, and provide employment and entrepreneurship environment and platform for students through some off-campus practice bases and laboratories that are closer to the market. They can work with social organizations to carry out employment and entrepreneurship education for college students, and help students in employment and entrepreneurship training, project docking, information consultation, and other aspects, to encourage them to further understand the external environment and market demand in employment and entrepreneurship activities ^[12].

4.3. Restructure the curriculum system to improve the quality and effectiveness of employment and entrepreneurship education

Under the multiplication, superposition and amplification of digital technology's ability to upgrade and transform

industries, new economic growth points will continue to be generated, which gives college students broader prospects for employment and entrepreneurship, and also puts forward more new requirements for the construction of an employment and entrepreneurship education curriculum system. In order to meet the new requirements of the formation and development of new quality productivity, the curriculum system of employment and entrepreneurship education for college students should be restructured to improve the quality and effectiveness of employment and entrepreneurship education and strengthen the supply of compound talents^[13].

First of all, college students' employment and entrepreneurship education needs to accelerate the cultivation of students' innovative spirit and innovative ability based on a full understanding of market demand. For example, innovative and practical employment and entrepreneurship courses should be designed and incorporated into the curriculum system as elective courses to expand extracurricular education and teaching and help students to improve their entrepreneurial ability and comprehensive quality in practical activities. To strengthen the understanding of market demand^[14].

Secondly, it is necessary to accelerate interdisciplinary integration according to the needs of students' personality development and practical ability training. Compared with the traditional productive forces, the new quality productive forces have undergone significant changes in terms of concept, industrial layout and fields involved, giving the industrial development interdisciplinary characteristics. This means that it puts forward higher and updated requirements for the development of talents' innovation and entrepreneurship ability. In order to meet the actual needs of industrial development, the employment and entrepreneurship education of college students needs to be integrated across disciplines. For example, through the development of international exchange and cooperation programs, students are encouraged to exercise their cross-cultural communication ability and the ability to comprehensively use knowledge of different disciplines, and to carry out interdisciplinary learning and application.

4.4. Strengthen policy support and deepen cooperation between enterprises, universities and research institutes

In order to accelerate the formation of new quality productive forces, we must make clear the historical orientation of the new development stage, take the new development concept as the guiding ideology, and build a new pattern of harmony and unity between the new quality productive forces and the new development pattern. In this process, industry-university-research cooperation can provide important intellectual support. Relevant departments and universities should guide students to participate in the cooperation through different measures such as strengthening policy support and providing guidance on employment and entrepreneurship. Based on the needs of the development of new quality productivity, relevant departments can propose a series of policies for college students' employment and entrepreneurship, such as loan support, tax incentives, entrepreneurship subsidies, etc., to reduce the risk and threshold of their employment and entrepreneurship activities and promote the deep integration of industry, university and research. Colleges and universities can cooperate with enterprises and social organizations to build entrepreneurship incubation platforms to provide targeted help and guidance for students in employment and entrepreneurship activities. Relying on the business incubation platform, as well as the support of tutors, venues and funds, students can better plan their career development path and business plan, better understand the employment environment, and thus improve the success rate of employment and business^[15].

5. Conclusion

To sum up, the accelerated development and evolution of new quality put forward new requirements on the supply of human capital from the level of “quality” and “quantity,” and brought far-reaching impact on the employment and entrepreneurship opportunities of college students and the environment. It requires that the employment and entrepreneurship education of college students pay attention to industrial upgrading and scientific and technological innovation, constantly accelerate the reform of talent training methods, and increase the reserve of compound talents. College students’ employment and entrepreneurship education should keep up with the pace of the era and conform to the tide of social development. Focusing on the new quality productivity, different measures should be taken to strengthen publicity, guidance and input, restructure the curriculum system, and promote cooperation between industry, university and research to promote the all-round development of college students, help them adapt to industrial upgrading and scientific and technological innovation, and grow into new people of the era.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Lei Y, 2019, An Effective Way to Improve College Students’ Employability From the Perspective of Innovation and Entrepreneurship Education. *Education and Teaching Summit Forum*, 10(1): 72–75.
- [2] Li Y, 2024, Research on the Influence of Integration of Innovation and Entrepreneurship Education and Professional Education on College Students’ Employability Under the Background of “Double High”. *China Eyewear Science and Technology Journal*, 2024(10): 102–106.
- [3] Zhou J, 2024, Analysis on the Improvement of College Students’ Employability From the Perspective of Innovation and Entrepreneurship Education. *Industrial Innovation Research*, 2024(18): 196–198.
- [4] Qian S, 2024, Discussion on the Integration of College Students’ Employment Guidance and Innovation and Entrepreneurship Education From the Collaborative Perspective. *Society and Public Welfare*, 2024(9): 105–107.
- [5] Zeng X, Zeng Z, Peng Q, 2019, A Path Study on the Impact of Innovation and Entrepreneurship Education on College Students’ Employment and Entrepreneurship Intention Under Employment Priority Policy: An Empirical Survey Based on 170,764 National Data. *Journal of Guangzhou City Vocational College*, 18(3): 24–31.
- [6] Zhang Y, Qiu S, 2024, Discussion on College Students’ Employment, Entrepreneurship and Innovation Strategies Based on School–Enterprise Cooperation Model. *Business News*, 2024(17): 191–194.
- [7] Wu Y, 2024, A Probe Into the Integration of Ideological and Political Education and Quality Education for Employment and Entrepreneurship of College Students in the New Era. *Road to Success*, 2024(24): 125–128.
- [8] Duan C, Jing Q, Duan X, et al., 2024, A Study on the Impact of Innovation and Entrepreneurship Education Reform on Promoting Employment and Entrepreneurship of College Students. *Intelligence*, 2024(21): 137–140.
- [9] Duan C, Jing Q, Duan X, et al., 2024, Research on the Impact of Innovation and Entrepreneurship Education Reform on Promoting Employment and Entrepreneurship among College Students. *Intelligence*, 2024(21): 137–140.
- [10] Wei Q, 2024, Research on Teaching Reform of College Students’ Employment and Entrepreneurship Courses Under the Background of Chinese Modernization. *Henan Education (Higher Education)*, 2024(5): 57–58.

- [11] Zhong X, Zeng J, Li C, 2024, An Analysis on the Construction Path of College Students' Employment and Entrepreneurship Platform From the Perspective of "Trinity" of Education and Technology Talents. *China College Student Employment*, 2024(5): 65–72.
- [12] Yu X, Wang S, Ge J, et al., 2024, Research and Practice on Employment and Entrepreneurship Teaching System of College Students in Engineering Background – A Case Study of College of Life Science and Technology of Beijing University of Chemical Technology. *Theoretical Research and Practice of Innovation and Entrepreneurship*, 7(9): 39–42.
- [13] Wu Y, 2024, Cultivation of College Students' Employment Innovation Ability: Based on the Impact of Innovation and Entrepreneurship Education on College Students' Ability. *Journal of Science and Education*, 2024(8): 36–39.
- [14] Gao X, 2019, The Synergistic Effect of Entrepreneurship Education Quality and Employment Quality of College Students: A Case Study of 37 Universities in Beijing. *Innovation and Entrepreneurship Education*, 15(2): 59–67.
- [15] Yan J, 2024, Study on Returning Employment and Entrepreneurship of Higher Vocational College Students in Guizhou Under the Background of Rural Revitalization Strategy. *China Collective Economy*, 2024(11): 181–184.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Analysis and Countermeasure Research of College Students Participating in Voluntary Service

Yu Xia, Kaiwei Huang, Tianmei Hao*

Wenzhou Medical University, Wenzhou 325035, Zhejiang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Volunteer service is not only an important way to help college students grow up, but also an important part of harmonious society. As the master of the future society, college students should actively participate in the volunteer service, which can promote its more comprehensive and long-term development, and greatly promote the growth of college students. In view of this, this article will analyze college students' participation in volunteer service, and put forward some strategies for your reference only.

Keywords: College students; Volunteer service; Analysis; Research

Online publication: April 29, 2025

1. Ways for college students to participate in volunteer service

1.1. The voluntary organization of college associations

Voluntary associations are generally voluntary service groups set up by college students. Colleges and universities should provide support to these voluntary organizations so that they can carry out more beneficial activities and provide more quality voluntary services for society^[1]. At present, college students' associations are important organizations for college students to expand the scope of making friends, improve their knowledge level and enrich their inner world. College students will have a strong cohesion in the associations. At the same time, college student associations have strong freedom and can attract more college students to participate in them. Volunteer service associations usually lead college students to carry out some short-term community volunteer service interactions. These activities can greatly enrich college students' campus life, let them try in different fields, and enable them to learn new knowledge and skills in practice.

1.2. Directly organized by the college Youth League Committee

College students' participation in volunteer service can also be directly organized by college Youth League committees. In daily life, college Youth League committees will also organize students to participate in some

voluntary services, such as scientific and technological innovation services, voluntary teaching services, services to respect the elderly and help the disabled, etc. These services can greatly deepen the social participation of colleges and universities, but also help students learn more knowledge and skills, help them form better emotions and improve their ideological level ^[2]. In addition, some Youth League committees will also use holidays to organize students to participate in some social practice activities, and guide them to use their spare time to go to the mountains, rural areas and other grass-roots volunteer services, so that students can better understand the national conditions, enhance their sense of social responsibility, but also to further develop students' problem-solving ability.

1.3. Cooperation and participation with social organizations

College students can also cooperate with social organizations to participate in volunteer service activities, which can also provide effective ways for college students to volunteer service activities. At present, there are more than 180,000 social volunteer service organizations in China, many of which have accumulated rich experience in volunteer service. College students can cooperate with these voluntary service organizations to take the initiative and actively participate in volunteer service ^[3]. At the same time, by cooperating with college students, these social volunteer service organizations can effectively solve their problem of manpower shortage, thus greatly improving their service effect. By cooperating with these social volunteer service organizations, college students can make more effective use of social resources, accumulate more volunteer service experience, and help them form stronger problem-solving abilities, which will greatly promote their long-term development.

1.4. Participation through online platforms

When college students participate in volunteer service, they can participate with the guidance of the network platform, which can help them find more content of volunteer service to broaden the efficiency and depth of college students' participation in volunteer service. Volunteer service platform can try to combine Internet technology to build a volunteer service platform to deepen and comprehensively narrow the relationship between service subjects and audiences ^[4]. College students can learn about the content and objectives of volunteer service by combining with the network platform, and choose whether to participate in volunteer service according to their actual situation. Volunteer service organizers can also select suitable participants based on college students' registration materials, majors, specialties and other contents, which can greatly improve the effect of volunteer service.

1.5. Participate in government-led games

College students can also participate in some government-led competitions, through which they can show their style, thus laying a solid foundation for participating in voluntary service later. For college students, activities organized by the government have more participants and more formal content, which allows them to better show themselves ^[5]. In addition, college students participating in the volunteer service of the games organized by the government can get in touch with talents from different regions and backgrounds, which can expand the scope of students' communication to a certain extent, enhance their understanding of the society, and greatly promote their participation in volunteer service in the future.

1.6. Special action plans

At present, China has held many special action plans at all levels, which provide effective platforms for college

students to participate in voluntary service. For example, the Western Plan, the Red Special Practice, etc., these plans have clear service content, service location and service duration, and the government provides funding, technology and policy support. College students can receive pre-job training before participating in volunteer service, which can help them master more professional knowledge and skills, and greatly promote their participation in volunteer service ^[6]. Through participating in volunteer service, college students can better understand the development needs of society and the country, which is of great significance for them to form a stronger spirit of risk and social responsibility. Moreover, by participating in special activities, college students can gain a lot of valuable experience, which is of great significance for them to better plan their career development later.

2. Problems of college students' participation in volunteer service

2.1. Insufficient publicity and promotion

At this stage, although many governments and universities have attached importance to college students' participation in voluntary service, there are still many deficiencies in the actual publicity activities, which will have a great impact on the effect of college students' participation in voluntary service. In actual work, many colleges and universities do not promote college students' participation in volunteer services enough. They pay more attention to students' knowledge exploration and skills mastery, and lack of cognition of students' participation in volunteer services, which will lead to limited publicity efforts ^[7]. In addition, some local volunteer service groups pay more attention to the publicity at the social level while ignoring the publicity at the university level, which will also have a negative impact on the initiative of college students to participate in volunteer service.

2.2. Lack of innovation in organizing activities

China's Communist Youth League has organized college students to participate in volunteer service for many years, and each organization has gradually formed a certain scale and habit, and even some organizations have created their own brand of volunteer service, such as the Western Plan and Care Action. However, the awareness of innovation in these organizations is relatively weak, which leads to a limited innovation level of college students' participation in volunteer service. In the actual work, the content of volunteer services that students participate in is much the same, and there is a great homogeneity ^[8]. For example, during the summer vacation, many colleges and universities will organize students to participate in volunteer teaching projects, and some universities will even send hundreds of volunteer service teams during the summer vacation. However, in the context of social development, the content of volunteer service should be more extensive, and colleges and universities should attach importance to the exploration of volunteer service content.

2.3. Lack of guidance in college and university associations

The main way for college students to participate in volunteer service is through the guidance of the student union or the association, and then helps students understand the activity information. However, many college students do not spend enough time in volunteer service, which indicates that volunteer service organized by associations is hardly attractive to students. This also shows that there are still certain deficiencies in the organization of volunteer service in colleges and universities ^[9]. Due to the lack of guiding power of colleges and universities, students rarely have a deeper understanding of volunteer service, which leads to the situation that students participate in volunteer service too freely and loosely, which will greatly hinder the follow-up work.

3. Countermeasures and suggestions for college students to participate in volunteer service

3.1. Do a good job of top-level design and introduce advanced ideas

In order to further improve the level and quality of college students' participation in voluntary service activities, colleges and universities must start with top-level design to ensure that advanced ideas and concepts can provide adequate guidance and support for students. Such an approach will lay a solid foundation for the smooth progress of the follow-up work ^[10]. Therefore, universities need to strengthen the leading role of the Party committee, especially in the field of education, to ensure that its value is fully reflected and played. Relevant departments of colleges and universities should also pay enough attention to volunteer service and make clear its important value to students' personal development to motivate and attract more students to actively participate in volunteer service activities. In addition, at the level of policies and systems, colleges and universities should provide necessary guarantees and support for college students, and carefully design and plan according to relevant documents and requirements to ensure that more high-quality concepts and thoughts are integrated into college students' volunteer service activities. This can not only significantly improve college students' comprehensive ability in volunteer service, but also help them cultivate stronger practical operation ability and social responsibility, thus laying a solid foundation for their long-term development ^[11]. By organizing and guiding students to actively participate in volunteer service, colleges and universities can effectively promote them to form a more comprehensive ability, including stronger practical ability, a deeper sense of social responsibility, and a more comprehensive personal quality, and provide strong support and help for their future development.

3.2. Do a good job of resource integration to form characteristics and brands

When organizing college students to participate in volunteer service, colleges and universities should do a good job in resource integration, especially in cooperation with government agencies such as financial departments and civil affairs departments, to provide a good material foundation for students to participate in social volunteer service. This includes not only financial support, but also necessary facilities and equipment. At the same time, the government can also provide venues and quality products for some voluntary service events and conferences, to attract more students to participate in the events and conferences. In this way, the initiative and enthusiasm of college students can be stimulated ^[12]. In addition, we should attach importance to the integration and utilization of social resources. Colleges and universities can cooperate with some caring enterprises to provide social resources to those in need through college students, which can greatly improve the effect of college students' volunteer service and make resources be used more rationally. Colleges and universities can provide a talent resource pool for students, provide knowledge and theoretical guidance for students' volunteer service, enhance the depth of students' participation, and help them form better quality. In addition, colleges and universities should combine the actual situation to create local brand characteristics, so that students' participation in volunteer services can become a landscape and have a greater influence on other students. Through such efforts, students' understanding of society and sense of responsibility can be promoted, while at the same time enhancing the connotation and influence of campus culture.

3.3. Strengthen publicity and incentives to enhance the influence of volunteer service

In order to inspire and encourage more students to actively participate in volunteer service, colleges and universities can take a series of publicity and incentive measures. Colleges and universities should widely disseminate information about volunteer services to students through various channels and means, such as

publicity boards, posters, micro-blogs, WeChat public accounts, etc., so that students can fully understand the content and significance of these activities. Through such publicity, colleges and universities can not only increase students' participation but also significantly enhance their sense of accomplishment and social responsibility. After participating in volunteering activities, students can share their experiences and gains with more people by writing their thoughts and sharing the results, thus creating a positive and energetic volunteering atmosphere on campus^[13].

In addition, colleges and universities can also hold regular commendation conferences to commend and reward students who have outstanding performance in volunteer service, to establish and promote a good spirit of volunteer service. By organizing cultural performances and social practice activities, colleges and universities can further guide students to form correct concepts and behavior patterns of volunteer service. At the same time, universities should work out a set of sound incentive mechanisms according to the actual situation to continuously enhance the appeal and influence of volunteer service among college students^[14]. For those students who actively participate in volunteer services and perform well, universities may consider giving them special privileges, such as giving them priority to join party organizations, or providing certain policy support and preferential conditions for their future employment and entrepreneurship. Through these measures, universities can attract more students to volunteer services, help them better realize their self-worth in the process, and cultivate more outstanding young people with social responsibility and dedication to society^[15].

4. Conclusion:

To sum up, in order to further improve the effectiveness of college students' participation in voluntary service activities, government departments and universities can do a good job in top-level design and introduce advanced ideas; Do a good job in resource integration to form characteristics and brands; Strengthen publicity and incentives to enhance the influence of volunteer services; Innovate the form and content of activities, explore activities that meet the characteristics of The Times and other aspects of analysis to virtually promote the quality of college students' participation in volunteer service to a new height.

Funding

2024 Annual Pre-Approved Research Projects of Wenzhou Youth Development Research Center, "Research on the Sustainable Mechanism of Volunteer Services for Large-scale Events and Conferences: A Case Study of the World Young Scientist Summit" (Project No.: 24QN01T)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Zhang W, 2019, Volunteer Service Field of College Students and Its Educating Function. *Journal of Universities of Chinese Academy of Social Sciences*, 44(10): 5–22 + 160 + 165.
- [2] Zhang Y, 2019, Research on the Construction and Innovation Path of Practical Education System Under the Model

- of College Students' Volunteer Service. *Industry and Technology Forum*, 23(24): 268–270.
- [3] Li M, 2024, Volunteer Service: The “Mobile Classroom” of College Students' Patriotic Education. *Journal of Hunan University of Finance and Economics*, 40(6): 110–117.
 - [4] Zheng J, 2024, Research on the Branding Strategy of College Students' Community Volunteer Service in the New Era. *Society and Public Welfare*, (12): 74–76.
 - [5] Wang Y, Zhu L, 2024, Exploration on the Construction of Normalization Path for College Students' Volunteer Service. *Journal of Taiyuan City Vocational and Technical College*, 2024(11): 113–115.
 - [6] Ma X, Wu Y, 2024, The Status Quo of College Students' Voluntary Service Spirit Education and Its Improvement Path. *Scientific Consultation (Science and Technology · Management)*, 2024(11): 88–91.
 - [7] Guo P, Yu J, 2024, Innovation and Improvement of College Students' Voluntary Service System in the New Era. *Industry and Science and Technology Forum*, 23(21): 270–272.
 - [8] Yan H, 2024, Research on Problems and Countermeasures of College Students' Voluntary Service From the Perspective of “Five Education”. *Beijing Education (Moral Education)*, 2024(10): 63–65.
 - [9] Li Z, Xu K, 2019, Analysis on Marketing Initiatives of University Students' Volunteer Service. *Market Weekly*, 37(30): 111–114.
 - [10] Zhou Q, Liu X, Zhou X, 2024, A Study on College Students' Volunteer Service Activities and Their Identification and Shaping of Socialist Core Values. *Anhui Science and Technology Journal*, 2024-10-18(15).
 - [11] Chen S, Qiu Z, 2019, Research on College Students' Community Correction Volunteer Service – Based on the Practice of “Blue Sun” Community Correction Volunteer Service Team. *Guangxi Youth Development Research*, 34(5): 51–57.
 - [12] Chen J, Luo G, Wen B, et al., 2024, Exploration on Interaction Mechanism Between Volunteer Service and Medical Ethics Education of College Students of Traditional Chinese Medicine. *Hunan Journal of Traditional Chinese Medicine*, 40(9): 107–110.
 - [13] Fang M, Hu S, 2019, Analysis of Influencing Factors of Sichuan College Students' Participation in Rural Tourism Volunteer Service Under the Background of Rural Revitalization. *Journal of Leshan Normal University*, 39(8): 66–74 + 123.
 - [14] Liang X, 2024, Research on the Principle and Path of Integrating the Spirit of Volunteer Service Into the Ideological and Political Education of College Students in the New Period. *Economist*, 2024(8): 179–180.
 - [15] Zhou Y, Fan Y, Cai R, 2024, A Practical Study on the Deep Integration of College Students' Volunteer Service and Labor Education. *Reform and Opening Up*, 2024(14): 39–45.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on Employment Problems and Countermeasures of College Graduates from the Perspective of High-quality Economic Development

Li Zhang*

Wenzhou Medical University, Wenzhou 32500, Zhejiang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the continuous improvement of China's economic strength, the employment problem of college graduates is gradually highlighted. At present, the adjustment of industrial structure and the change in the demand for talent in the market cause college graduates to face severe employment pressure and seriously impact their future career development. In this regard, this paper first briefly analyzes the employment of college graduates from the perspective of high-quality economic development and then puts forward effective countermeasures for related problems to promote the smooth employment of college graduates and lay a solid foundation for their future development ^[1].

Keywords: High-quality economic development; Employment problem; Innovation strategy

Online publication: April 28, 2025

1. Analysis of the current economic development situation

At present, China's economic development has entered a new stage, from high-speed development to high-quality development direction, which is not only reflected in the slowdown of economic growth, but also reflected in China's industrial transformation and economic structure optimization. In the report of the 19th National Congress of the Communist Party of China, it was pointed out that "China's economy has shifted from the stage of high-speed growth to the stage of high-quality development." At the China Development Forum held by the Development Research Center of the State Council in 2018, it was also stressed that "China has made corresponding plans for high-quality economic development." The report to the 20th National Congress of the Communist Party of China also emphasized once again: "Accelerate the construction of a new pattern of economic development, and strive to promote high-quality economic development." In this context, China's economic development reflects a strong resilience and vitality, although the economic growth rate has gradually slowed down, but the driving force of economic development has gradually changed, from the traditional

resource-driven to the direction of innovation-driven change, scientific and technological innovation has gradually become an important force to promote economic development ^[2]. This change not only continues to promote industrial transformation and economic structure optimization, but also brings new challenges to the employment of college graduates. With the continuous development of emerging industries, such as the artificial intelligence industry and the clean energy industry, there is an urgent need for a large number of innovative and high-quality talents. As an important position of personnel training in China, universities should keep up with the trend of the era, actively respond to the call of the Party and the government, and optimize the mode of personnel training. Guided by the talent market and industrial development, while imparting students with professional knowledge and skills, they should focus on cultivating their innovative ability, practical ability, and problem-solving abilities. In this way, the employment problem of college graduates can be effectively alleviated, and a large number of high-quality talents can be provided for the development of society and industry. At the same time, governments at all levels and social institutions should also increase their support for graduates, provide more opportunities for college graduates to choose jobs and find employment through policy guidance and resource tilt so as to alleviate the problem of talent supply effectively and lay the foundation for college graduates to achieve employment successfully ^[3].

2. Analysis of employment problems of college graduates in the context of high-quality economic development

2.1. The slowdown in economic growth has led to increased employment pressure

With the gradual slowdown of China's economic growth, enterprises' demand for labor force is gradually decreasing; the number of jobs provided is also decreasing progressively and the talent market shows a state of supply is less than demand, resulting in the current employment situation being gradually grim. At the same time, with the advancement of China's education reform, the number of college graduates has increased year by year. According to Xinhua News Agency, the number of college graduates in China has increased year by year since 2000. In 2000, the number of college graduates was about 950,000. In 2010, the number of college graduates was about 7 million. In 2022, the number of college graduates in China has exceeded 10 million. There will be more than 12.22 million college graduates in China ^[4]. A large number of college graduates pour into the talent market, which seriously affects the balance of supply and demand in the talent market, resulting in the frequent occurrence of the phenomenon of unemployment after graduation. This not only has a specific impact on the future employment and development of graduates, but also brings severe challenges to the stable development of society. In addition, with the continuous development and broad application of modern technology, some traditional jobs based on human operation are being replaced by advanced technologies such as automation technology, robots, and artificial intelligence, further intensifying the competitive pressure in the market ^[5].

2.2. The transformation of industrial structure has led to changes in the demand for talent

In the context of high-quality economic development, industrial transformation and technological upgrading have gradually become important driving forces to promote social and economic development. At the same time, this has led to a gradual change in the demand for talent. With industrial transformation and technological upgrading, the automation level of traditional industries continues to improve, and the demand for talent is gradually decreasing, while some emerging industries, such as the artificial intelligence industry and the new energy industry, are in a stage of vigorous development and need a large number of high-quality talents. This has

also put greater pressure on the employment of college graduates in traditional majors. At the same time, due to the lack of timely and effective connections between the professional settings of colleges and universities and the development of industries, some students cannot find suitable jobs smoothly, resulting in structural employment problems ^[6].

2.3. The lack of college students' abilities leads to employment difficulty

In the current social background, college students generally lack the spirit of struggle and the concept of innovation. Many students lack a clear future development goal and a clear academic plan. At the same time, the desire to learn is not strong, which leads them to be at a disadvantage in the fierce competition in the talent market, thus affecting their employment ^[7]. To be specific, some college students have significant deficiencies in professional skills, communication skills, teamwork skills, etc., which makes them unable to meet the employment standards of enterprises and difficult to adapt to the complex environment of the workplace. In addition, some college students have certain problems with employment concepts. They are not willing to work hard and sweat, but also hope to get a high salary and treatment. Such contradictory employment concepts lead to various problems in career selection and employment, which, if not handled in time, will have a serious impact on their future employment and development. At the same time, it also has hidden dangers for the stability and development of society ^[8].

2.4. Uncertainty brought about by the development of new forms of employment

With the wide application of modern technology and the vigorous development of the digital industry, new employment forms, such as telecommuting, sharing economy, and freelance work, are constantly springing up, providing more opportunities and platforms for college students to find employment. However, there are many uncertainties in the development of these new employment forms. For example, unstable income, lack of social security, lack of adequate supervision, and so on, these uncertainties have also brought great challenges to the employment of college graduates. At the same time, the legal guarantee system of new employment forms is not perfect, which also increases the risk of college graduates' employment ^[9].

3. Strategies for promoting employment innovation of college graduates under the background of high-quality economic development

3.1. Policy guidance and employment support

In order to effectively promote the employment of college graduates, the government should give full play to its role, do a good job in macro-control work according to the current employment situation, formulate and introduce a series of targeted and time-effective employment assistance policies, through this way to alleviate the current significant employment problems ^[10]. First of all, the relevant government departments should strengthen the support for the employment of college graduates, and, according to the actual situation, take a variety of ways and means, such as providing venture capital, formulating tax relief policies, implementation of the "rural talent plan," through this way, stimulate the graduates' interest in innovation, for them to participate in entrepreneurial activities to lay the foundation. At the same time, in the context of the implementation of the rural revitalization strategy, actively guide college graduates to go to the rural grass-roots level to achieve rural employment, which can not only effectively alleviate the huge employment pressure in the city, but also inject new talent vitality into the development of rural economy. In addition, the relevant government departments

should strengthen the supervision of the talent market, ensure that the recruitment behavior of enterprises is legal and compliant, actively crack down on unfair competition and employment discrimination, and create a fair and transparent employment environment to promote the smooth employment of college graduates. In addition, the government should also give full play to coordination work, promote in-depth cooperation between universities and enterprises, promote information and resource sharing between universities and enterprises, enhance the core competitiveness of graduates, and lay a solid foundation for their smooth employment. Finally, the government should give full play to advanced technologies such as AI and big data, and further give full play to the role of employment assistance platforms such as the 24365 National College Student Employment Service Platform, to carry out career guidance and employment consultation services for graduates, help them understand the current employment trend and strengthen their job-hunting skills. In short, the government has laid a solid foundation for the smooth employment of college graduates by taking a variety of measures ^[11].

3.2. Education reform and personnel training

In the current employment situation, colleges and universities should keep up with the development trend of the era, advance employment work, and timely carry out career planning and employment guidance education for college students, so that they can have a deep understanding of the current employment situation, professional employment trend and industry development needs, so as to formulate effective career development plans for them. According to the actual situation of college students seeking jobs, precise employment guidance courses can be set up to pursue higher education, public examination, employment and other employment goals, and will be incorporated into the curriculum system, so that it will run through the entire study stage of students, so that they have a clear and definite understanding of the future employment direction and future development situation of the major. At the same time, various practical activities can also be held regularly, such as job-hunting lectures, simulated job fairs, career planning competitions, etc., in order to cultivate students' job-hunting skills ^[12].

In terms of professional settings, colleges and universities should conduct in-depth research on the current emerging industries, in-depth analysis of their future development trends, and adjust and optimize the professional settings according to their actual conditions to cultivate high-quality talents who are more in line with the needs of society and industry development. For example, according to the current development trend of emerging industries, colleges and universities can appropriately add majors or courses related to frontier industries such as artificial intelligence, big data and deep learning to better solve the current employment problem and meet the urgent demand for high-end talents in emerging industries. At the same time, colleges and universities should also pay attention to the cultivation of students' practical abilities and innovative abilities. They can help students apply what they have learned to solve practical problems through project cooperation and practical training, so as to strengthen their innovative ability and practical operation ability. In addition, colleges and universities should further carry out innovation and entrepreneurship education by offering innovation and entrepreneurship courses, specialized innovation integration and other ways to stimulate students' interest in entrepreneurship, cultivate their entrepreneurial ability, and cultivate more high-quality talents for society ^[13].

3.3. University-enterprise cooperation and integration of production, learning and research

Colleges and universities should carry out in-depth cooperation with relevant enterprises, build a stable cooperative relationship, coordinate the resources of both universities and enterprises, and build a collaborative education mechanism, to more effectively improve the quality of talent training and lay a solid foundation for

the smooth employment of college graduates. Colleges and universities can organize counselors and students to participate in activities such as visiting enterprises to expand jobs, to broaden students' horizons and strengthen their cognition. At the same time, colleges and universities can further cooperate with enterprises to form a group composed of professional teachers, education majors and outstanding personnel from enterprises to jointly participate in the compilation of professional textbooks, innovation of course content, construction of practice bases, and cooperation in scientific research projects, to realize the deep integration of professional teaching, research and industry. This kind of school-enterprise cooperation mode can not only effectively cultivate students' practical ability, innovation ability and problem-solving ability, but also select outstanding talents for enterprises in advance, effectively alleviate their recruitment problems, and lay a solid foundation for promoting local economic development. For example, colleges and universities can cooperate in-depth with pharmaceutical enterprises. Under the framework of collaborative education, both schools and enterprises can jointly participate in the construction of a pharmaceutical curriculum system, design and develop loose-leaf, digital and workbook-type professional textbooks, and flexibly integrate real cases of enterprises into them, to improve the pertinence and effectiveness of course teaching. At the same time, outstanding talents in enterprises regularly go to colleges and universities to give special lectures and share their valuable work experience with students, to strengthen students' cognition and improve their practical ability more effectively. At the same time, both schools and enterprises can also carry out practical project research activities, such as pharmaceutical companies to recruit marketing talents; both schools and enterprises can set up special marketing talent training camps, and guide students to participate in it, through this way, not only can effectively improve the professional quality of students, but also lay a solid foundation for enterprises to select and employ ^[14].

3.4. Strengthen employment psychological counseling and ideological and political education

In the current social background, college graduates often face various problems and challenges in the process of job hunting, and they may have psychological barriers such as anxiety, confusion, and frustration. To slow down the employment pressure on them and eliminate their psychological barriers, colleges and universities should strengthen employment psychological counseling and ideological and political education, so that they can treat various challenges in the employment process with a correct and healthy attitude, and establish correct ideas and value cognition, to provide help for their future employment and development.

4. Conclusion

In conclusion, in the context of current times, college graduates are facing severe employment situations. In this regard, colleges and universities, the government and relevant social organizations should take various ways and means to help them better cope with various challenges and lay a solid foundation for their smooth realization of employment ^[15].

Disclosure statement

The author declares no conflict of interest.

References

- [1] Yan Y, 2024, Research on Employment Problems and Countermeasures of College Graduates Under the Background of High-Quality Economic Development. *Hebei Economic Daily*, 2024-11-06(009).
- [2] Wang Y, 2024, Research on High-Quality Employment of College Graduates From the Perspective of Chinese Modernization. *Journal of Qiqihar University (Philosophy and Social Sciences Edition)*, 2024(10): 150–153.
- [3] Jiang T, Tao W, 2024, A Study on the Employment of Graduates From the Three Southwest Provinces in Mainland Colleges and Universities – A Case Study of Y-City Universities in Jiangsu Province. *China Employment*, 2024(10): 74–75.
- [4] Li F, 2024, Research on Employment Problems and Countermeasures of Art Graduates With Hearing Impairment – A Case Study of an Art University in Xi'an. *China Employment*, 2024(9): 113–115.
- [5] Luo Z, 2024, An Innovative Work That Effectively Guides the Employment View of College Graduates: A Review of Zhong Qiuming's New Book "A Study on the Employment View of College Graduates." *Journal of University Education Science*, 2024(5): 2.
- [6] Zhang J, 2024, Research on Innovation of College Graduates' Employment Platform From the Perspective of "Internet +". *International Public Relations*, 2024(16): 185–187.
- [7] Qiu S, 2024, Analysis of the Current Situation of College Graduates' Employment Under New Formats and Application of Countermeasures. *Employment and Security*, 2024(8): 163–165.
- [8] Hu W, 2024, A Study on Alleviating Employment Anxiety of Local College Graduates. *Employment and Security*, 2024(8): 172–174.
- [9] Wang Z, Song J, Bi Y, 2024, Research on the Influencing Factors of Employment Location Selection for College Graduates. *China College Student Employment*, 2024(8): 73–87.
- [10] Shang Z, 2019, Research on the "Two-Way" Approach to Solving the Employment Problem Faced by College Graduates. *Market Weekly*, 37(23): 164–167.
- [11] Liu H, Gu Y, 2024, Research on Employment of College Business Graduates From the Perspective of Career Planning. *Journal of Huaibei Vocational and Technical College*, 23(3): 52–55.
- [12] He S, 2024, Employment Psychology of College Graduates and Its Coping Strategies. *China Employment*, 2024(6): 66–68.
- [13] Zhou Y, 2024, Research on Employment Strategies of College Graduates Under the New Situation. *Public Relations World*, 2024(10): 74–76.
- [14] Peng J, 2024, Research on Employment Service Supply of College Graduates in G Province Based on RSEC Model, thesis, Jilin University.
- [15] Cao H, 2024, Research on the Choice of Employment Policy Tools for College Graduates in China, thesis, Northwest Normal University.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

An Analysis on The Cultivation Path of Application-oriented Undergraduate Talents in Higher Education under the Background of Education Digitization

Kai Wang*, Liying Guo, Liyan Wang, Rongrong Zheng, Haiyue Wang, Yaoyao Bai, Xueying Yu

School of Petrochemical Engineering, Shenyang University of Technology, Liaoyang 111003, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Under the background of digitization, the digitization of higher education is an important breakthrough to build a digital education powerhouse. Through the comprehensive application of digital technology, the quality of higher education can be significantly improved, education equity can be further promoted, and the high-quality training of applied undergraduate talents can be realized. Therefore, to promote the sustainable development and innovation of applied undergraduate talents training of higher education, this paper expounds the necessity of digitization of applied undergraduate education of higher education through deeply analyzing the connotation of digitization of higher education, and puts forward a path for the cultivation of applied undergraduate talents of higher education.

Keywords: Digital education; Application-oriented undergraduate; Talent cultivation; Training path

Online publication: April 28, 2025

1. Introduction

In today's world, human society has moved from industrialization to digitization and intelligent, and the educational revolution led by digital transformation has officially arrived. Promoting the digital transformation of education has become the core issue of educational revolution and development. Having seized the opportunity of the era, countries around the world actively promoted the deep integration of digital technology and education. They innovated education and teaching with digital technology and explored new educational models. The European Union released the "European Digital Competence Framework for Citizens" in 2013 and updated it in 2022. The updated framework divides digital skills into five categories: information and data, communication and cooperation, digital content creation, security and problem solving^[1]. In 2018, creating a broadly applicable framework for digital competency development, UNESCO published the Digital Literacy Global Framework, which guided countries around the world to develop and assess digital competencies^[2,3]. Launching the "Digital

Literacy Accelerator” program in 2021, the Office of Educational Technology of the US Department of Education cultivated students’ digital literacy to promote the development of digital talents, to enhance international competitiveness in the digital age ^[4]. In 2023, the United Kingdom’s Joint Information Systems Committee (JISC) issued the “Digital Transformation Framework for Higher Education,” in which the vision of the digital transformation of British higher education was defined and the goal of digital transformation was put forward around “united and efficient learning” ^[5]. With the vigorous development of the digital information technology industry, the digital development of higher education in some countries has begun to move towards a deeper, more scientific, and more efficient direction while successfully transforming.

At present, China is at a critical stage of building an education powerhouse in the new era, and higher education has entered a stage of popularization. Digital transformation is related to whether it can meet the personal needs of lifelong learning talent cultivation. In 2012, China issued the “Guiding Opinions on Advancing the Construction of New Education Infrastructure to Build a High-quality Education Support System” and “Digital Economy Development Plan for the 14th Five-Year Plan Period,” both of which emphasized the importance of promoting education digitization ^[6]. These policies served as an important foundation for the digital transformation of China’s higher education. Accelerating the digital transformation of higher education is of great practical significance for China to establish and improve a high-quality education system and build a learning-oriented society and a learning-oriented country with lifelong learning for all. Education digitization is a basic requirement for the innovation and development of application-oriented undergraduate education in China’s higher education, as well as an important support for the implementation of education intelligence and the promotion of education modernization. Therefore, promoting the digital transformation and development of higher education and innovating the development path of talent cultivation are of great significance for promoting the long-term development of application-oriented undergraduate colleges and universities.

2. Connotation of the digitization of higher education

With the help of the cross-field and cross-industry characteristics of digital technology, digitization of higher education, which assists the whole process and link each segment of higher education to realize resource integration and joint innovation, promotes the coupling of higher education and digitization under the guidance of technology and digital transformation, to form a new educational ecology oriented by comprehensive integration and empowerment of all elements ^[7,8]. The core task of digitization of higher education is to cultivate innovative talents with digital literacy and innovation ability, to meet the urgent demand for digital skills in future work scenarios. Digitization of higher education is a comprehensive process that not only involves the transformation and optimization of educational models, contents, tools, and methods through digital technology but also strives to comprehensively improve the quality and efficiency of education. The core elements of digitization of higher education include the digital presentation of teaching content, the sharing and communication of educational resources, the innovation of teaching methods, the personalized shaping of the learning process, and the diversified implementation of evaluation methods ^[9,10]. In addition, making education more accurate and efficient digitization of higher education can also use big data analysis technology to gain in-depth insight into students’ learning behaviors and customize personalized learning paths for each student.

3. Necessity of digitization of application-oriented undergraduate education in higher education

As an open system, application-oriented undergraduate colleges and universities mainly include different functional elements such as education, teaching and management, and each element is interrelated. The purpose of digitally applied undergraduate education is to use digital technology to promote the upgrading and transformation of undergraduate education, optimize the allocation of resources, reorganize education units in fine detail, and reshape the education supply model according to the characteristics of digital-driven work. Promoting the digital construction of application-oriented undergraduate colleges and universities not only will help educators to accurately grasp the development direction and vision of the digital transformation of application-oriented undergraduate education, it will also promote the deep embedding of digital technology in all aspects of higher education. These transformations realize new education and operation models, and change the business model, strategic direction, and value proposition of higher education institutions.

First of all, education digitization optimizes the allocation of educational resources. Through the digital platform, high-quality educational resources can be more widely disseminated, which breaks the geographical and time constraints, so that more students can enjoy high-quality education. This will not only help improve educational equity, but also improve the overall level of education. At the same time, education digitization also has a positive impact on the student experience, with digital tools providing students with more opportunities to interact, collaborate, and make learning more social. By collecting and analyzing students' learning data in real time, the digital platform can help students better understand their learning status and formulate more effective learning plans. Moreover, it can realize real-time interaction and feedback, strengthen communication and cooperation between teachers and students, promote teaching and learning, and help improve the scientific research level and innovation ability of the school.

At the same time, the digitization of education has greatly expanded the diversity of educational methods. Traditional face-to-face teaching is no longer the only option. Online learning, blended learning, and the application of advanced technologies such as virtual reality and artificial intelligence make teaching more vivid and flexible. Students can learn at their own pace according to individual needs, while teachers can use digital tools to better assess students' learning progress and effectiveness.

Moreover, education digitization has influenced the working mode of teachers. Teachers are no longer limited to the traditional ways of preparing and teaching lessons, but can also use digital tools for more efficient teaching design, student management, and data analysis. This not only reduces the work burden of teachers, but also provides more possibilities to improve the teaching effect. Finally, the aim of promoting the innovation and reform of the talent cultivation model will be realized, the quality of talent cultivation in undergraduate education will be improved, and the level of service to society will be improved.

Last but not least, the education digitization helps to improve the governance level and operational efficiency of colleges and universities. Colleges and universities improve the scientificity and effectiveness of decision-making by applying digital concepts to realize information and intelligent management. At the same time, resources in the main body of undergraduate education should be fully pooled, the internal and external management mechanism of undergraduate education should be straightened out, the whole process of internal and external work system should be improved, and the value of undergraduate education in promoting local development and serving society should be continuously enhanced.

4. Cultivation paths for application-oriented undergraduate talents in higher education under the digitization background.

4.1. Clarify the digital concept and anchor the original mission of “the people-centered education”

Education digitization is driven by digital technology and fully integrates all data elements to promote high-quality development of education. Based on this, it anchors the original mission of “the people-centered education”, establishes the correct concept of digital education, and clarifies the goal of educating people to realize the comprehensive development of application-oriented undergraduate talents in higher education.

Firstly, the correct digital concept should be established. Colleges and universities should pay attention to the humanistic value of digital technology while absorbing its instrumental value. New industries and models, which emerge endlessly, have greatly changed the occupational structure and promoted the improvement of the knowledge and skill structure of talents in the digital era. The society has higher and higher standards for professional talents, so it is necessary to vigorously improve the digital literacy and skills of teachers and students in colleges and universities to meet the demand for talents in industrial transformation and upgrading. With the help of advanced digital technology and scientific evaluation concepts, more accurate and comprehensive evaluations of teachers' teaching effects and students' learning outcomes should be carried out to promote the high-quality development of higher education.

Secondly, the goal of digital education should be clarified. In the current period of digital transformation of education, digital technology is undoubtedly the most powerful driving force for the development of higher education. Only by clarifying the goal of digital education can we fully promote the wide application of digital technology to meet the needs of society for digital talents. Focusing on students' subjective consciousness and experience, colleges and universities should take moral education as the fundamental task, create a good digital education environment, and realize the transmission of scientific knowledge, the imparting of technical skills, and the cultivation of noble morality in the digital technology-enabled teaching context.

4.2. Establish the concept of digital construction sharing and build a digital platform

A high-level and all-domain infrastructure is the prerequisite for digital education in higher education. Institutions of higher learning should increase human and material input to achieve full coverage of the Internet, upgrade the digital and intelligent level of teaching facilities, and improve the intelligent equipment configuration level of teaching buildings, laboratories, practice bases and other places^[11].

Firstly, institutions of higher learning should strengthen the construction of digital teaching resources. Focusing on building digital resource platforms, including digital course resources, digital libraries and smart classrooms, they should provide course resources and teaching services that meet students' individual needs by relying on big data, artificial intelligence, cloud computing and other technologies, and increase the popularity of mobile terminal platforms. At the same time, the construction of digital management platform should be done well, also the teaching work, financial management, employment guidance, logistics services and other work should be unified management to provide references for all departments of colleges and universities to make accurate and scientific decisions through the integration and analysis of various data.

Secondly, colleges and universities should establish a teaching resource base according to the concept of digital construction. Efforts should be made to build the resource base of teaching and teaching, such as the resource base of enterprise post responsibilities, the resource base of teachers' code of conduct, the resource base of cooperative enterprises in practice and training, the resource base of professional skills competition activities,

and the resource base of professional curriculum education practice. We should actively develop digital teaching materials, courseware, videos, and other teaching resources, introduce digital technologies such as hologram, digital twin, virtual reality and virtual digital human, and rely on them to present students with various real learning situations, strengthen students' learning experience and improve learning quality. Various resources, such as online teaching videos, online tutoring videos, online exercise data, and course learning notes, are utilized to promote communication among relevant subjects of application-oriented talent cultivation and improve the utilization efficiency of teaching resources.

4.3. Improve teachers' digital skills training system and enhance digital teaching ability

Teachers are the key force in the cultivation of application-oriented undergraduate talents in higher education. The key to promoting the digital transformation of higher education is to establish and improve the regular digital skills training system for teachers, optimize the online learning platform for teachers, enrich the content of digital skills training, and constantly improve teachers' digital literacy, digital teaching ability, and digital management ability.

Firstly, to meet the individual needs of different teachers, institutions of higher learning should establish a multi-level and multi-form teacher information technology training system. Training plans should be formulated according to teachers' information technology application level and actual needs to ensure the pertinency and practicality of training content.

Secondly, to provide teachers with flexible and diverse learning paths, a combination of online and offline training and centralized and decentralized training should be adopted. Thirdly, a professional training team is the key to ensuring the quality of training. A training team composed of educational technical experts, educational psychologists, instructional designers, enterprise engineers, and other professionals can be considered to provide teachers with high-quality and high-level training services.

Finally, the combination of information technology training and teaching practice is an effective way to improve the training effect. Teachers should be encouraged to apply the knowledge and skills they have learned in actual teaching so as to achieve the goal of teaching and learning ^[12].

4.4. Innovate the concept of application-oriented talent Cultivation and establish a personalized digital education teaching model

Education digitization has promoted the talent cultivation objectives of application-oriented undergraduate education to be more diversified and complex. In this process, we must always adhere to the student-centered education concept, take improving the quality of education as the core goal, and ensure that the education digitization can be deeply implemented and achieve tangible results.

First of all, based on the digital application technology teachers can write the teaching syllabus more efficiently, design the teaching form reasonably, and constantly explore the digital training mode that meets the needs of students' professional development and career growth. By collecting the data of the whole learning process of students, teachers can understand the knowledge framework, cognitive structure, attitude tendency, learning emotion, learning effect and other main contents of students so that they can accurately grasp the problems in the learning process of students according to the "targeted thinking." So, they can adjust the teaching design in a targeted way so as to facilitate the teaching in accordance with their aptitude in the later period, and finally put forward the guidance ideas for course learning. Through analyzing consultation analyzing and sorting out basic information such as students' comprehensive quality and career development tendency, teachers can

effectively match students' needs, timely push learning resources to relevant students, and truly realize the "private customization" of course learning.

Secondly, teachers should grasp the development opportunities of online and offline hybrid teaching in the new era, take the initiative to carry out teaching innovation, and reform the education and teaching mode. On the one hand, they should optimize teaching methods. At present, most colleges and universities have actively introduced smart teaching platforms covering live broadcast, micro-lessons, tests, homework, communication and other functions such as Rainy Classroom, Chaoxing Learning, etc. To improve the scientific and adaptive teaching methods, teachers should take this as a basis to optimize teaching methods combined with students' actual conditions and subject characteristics. For example, to truly realize "learning," teachers can rely on the smart teaching platform to actively apply the flipped classroom, blended teaching and other teaching modes so that they can reasonably plan the online teaching and offline teaching time, explore the new teaching mode of man-machine collaboration, and increase the time of independent learning and extracurricular learning. On the other hand, the teaching process should be reconstructed. With the help of an intelligent teaching platform, intelligent teaching management can be realized by creating a new pattern, which records the whole teaching process and analyzes comprehensive educational data, so that teachers can teach at any time and students can learn at any time. We should build a community and link diverse learning groups to form a three-dimensional learning scene, promote intelligent, safe and effective education and teaching, and finally realize common learning and resource sharing^[13].

4.5. Take students as the center to improve students' digital learning literacy

Education digitization will not only reshape the model of talent cultivation, but also pay more attention to the comprehensive improvement of students' digital literacy and abilities. It can help students understand and apply digital technology, improve information literacy and innovation ability, and adapt to the rapidly changing digital environment. It can also help students efficiently evaluate and screen information in the huge and complex information resources. Students should break the traditional teacher-led thinking mode to cultivate digital thinking and habits, and cultivate the interdisciplinary integration ability, communication and collaboration spirit, critical thinking, and the ability to solve complex problems required in the digital era. At the same time, they should pay attention to the cultivation of teamwork consciousness, creativity and innovation, environmental protection, and sustainable development consciousness.

With the integration of educational information and resources, the issue of digital security has become increasingly prominent. Although the embedding of intelligent terminal devices makes it possible to capture personalized data in all directions throughout the whole cycle, it is necessary to be wary of the new clothes of digital "Machine Behaviorism" and avoid the mistake of behaviorism's oversimplification of learning. Therefore, to avoid negative consequences, it is necessary to cultivate students' cognition and ability to deal with digital security. At the same time, the importance of digital ethics should be emphasized to guide students to use digital information in a correct attitude and establish a good new ecology of digital education.

4.6. Make full use of data processing technology to carry out in-depth digital teaching evaluation

The form of evaluation of learning has an important impact on the way teaching and learning. Through establishing a digital evaluation system, making full use of digital technology to reform and innovate the evaluation methods of the education system, emphasizing the diversity and comprehensiveness of evaluation,

and build a scientific education evaluation system including knowledge evaluation and the evaluation of non-cognitive factors such as skills, attitudes, participation and so on. Through the introduction of a comprehensive evaluation mechanism, which brings together the evaluation of teachers, students, industry experts, and the public, the comprehensive performance and professional ability of students will be comprehensively measured [14,15].

The evaluation of digital education and teaching has the characteristics of individual, real-time, and comprehensive. And it is mainly reflected in the following three aspects. In the first aspect, application-oriented undergraduate colleges and universities can make use of their advantages in running schools to sign stable cooperation agreements with enterprises so that they can develop big data application platforms for talent cultivation and digital academic evaluation platforms together. The application of a digital academic evaluation platform is processed by digital technology to organize, calculate, and analyze each student's learning situation and final learning effect promptly. In combination with students' daily learning habits, teachers carry out targeted learning guidance and put forward learning suggestions and learning methods. In the second aspect, by building a professional theoretical experience model of teaching effect experience, teachers can obtain effective evaluation feedback. Therefore, teachers can adjust the teaching method in real time according to the teaching process and teaching effect, and finally establish a scientific and effective talent cultivation quality evaluation feedback system. In the third aspect, by taking the employment needs of enterprises as the leading and the employee code as the standard, a targeted and practical teaching and education evaluation feedback mechanism is established, and suggestions and criticisms from enterprises are constantly collected. After optimizing and adjusting the evaluation system constantly, its effectiveness and credibility can be improved.

5. Conclusion

In conclusion, under the background of education digitization, digitization is the basic requirement for the innovation and development of application-oriented undergraduate education in Chinese colleges and universities, and it is also an important support for the implementation of higher education intelligence and the promotion of education modernization. It is of great significance for the long-term development of application-oriented undergraduate institutions of higher education to explore the training path of digitalized application-oriented undergraduate talents in higher education that is in line with China's national conditions, and build a networked, digital, personalized and lifelong education and teaching system by continuously promoting the reform and innovation of higher education with digitization as the starting point.

Funding

2023 Key Research Project of Undergraduate Teaching Reform of Shenyang University of Technology (Project No.: 202431)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Liu JL, Tang Q, 2021, Case Study and Enlightenment of the Application of the Digital Competency Framework for EU Citizens. *Library Journal*, 40(4): 28–36.
- [2] Zhang EM, Shang QL, 2019, Nurturing Learners' Digital Literacy: Interpretation and Implications of UNESCO's Global Digital Literacy Framework and Its Evaluation Recommendations. *Open Education Research*, 25(6): 58–65.
- [3] Audrin C, Audrin B, 2022, Key Factors in Digital Literacy in Learning and Education: A Systematic Literature Review Using Text Mining. *Educ Inf Technol*, 27(6): 7395–7419.
- [4] Yang YH, Ma JJ, 2023, The Policy and Practice Evolution of Information Technology-enabled Education in United States. *Basic Education Reference*, 2023(5): 61–70.
- [5] Wang Y, Cui P, 2023, Predicament, Directions, and Insights of UK Higher Education in the Context of Digital Transformation. *China Educational Informationization*, 29(12): 49–58.
- [6] Chen DM, 2024, An Exploration of the Digital Transformation in Higher Education. *Journal of Jiamusi Vocational College*, 40(1): 133–135.
- [7] Li J, Wang WB, 2024, Research on the Reform of Talent Training Mode for Industry-Education Integration in Applied Undergraduate Education under the Background of Educational Digitalization. *Theory and Practice of Innovation and Entrepreneurship*, 7(14): 92–94.
- [8] Yang ZK, 2023, The Development of Digitalization in Higher Education: Connotation, Stages, and Implementation Paths. *China Higher Education*, 2023(2): 16–20.
- [9] Liu K, Liu XQ, Li Y, 2023, New Engineering Education Teaching Resources under Educational Digitalization: Logical Connotation, Element Characteristics, and Construction Paths. *Research in Higher Education of Engineering*, 2023(4): 22–26.
- [10] Chen L, 2023, Construction and Practice of Digital Teaching Systems in Applied Universities. *Digital Technology and Application*, 41(9): 25–27.
- [11] Wan LY, Xiong RX, 2023, Empowering the Construction of High-Quality Education Systems through Digital Transformation: Underlying Logic, Implementation Mechanisms, and Key Paths. *Modern Distance Education*, 2023(4): 34–40.
- [12] Hu YB, 2024, The Logic and Approach of Digital Transformation Empowering High-Quality Development of Regional Teachers. *Teaching and Management*, 2024(10): 32–35.
- [13] Li Y, 2024, Promoting the Integration of Digital Transformation into the Entire Process of Higher Education Curriculum Teaching. *Learning Weekly*, 2024(7): 113–116.
- [14] Liu YH, 2023, Practice and Exploration of Educational Digital Transformation Empowering Teaching Quality Evaluation in Local Applied Undergraduate Institutions. *Journal of Huainan Normal University*, 25(5): 114–118.
- [15] Yang FF, 2024, Practical Exploration of Digital Transformation in Higher Education Teaching. *Journal of Yantai Vocational College*, 19(3): 59–65.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Analysis of “Exploring Teacher Beliefs and Classroom Practices through Reflective Practice: A Case Study”

Danqing Zhang*

Xi'an Eurasia University, Xi'an 710065, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: This paper analyses a case study which employs qualitative research methods, utilizing a case study strategy, to delve into the relationship between the beliefs and classroom practices of a second language teacher, Dantes. The study integrates semi-structured interviews and classroom observations to explore the teacher's beliefs and gather data on classroom practices. The interviews not only reveal the teacher's initial beliefs but also uncover deeper convictions through final interviews, such as the unconscious belief in using a step-by-step teaching method. Six one-hour classroom observations enhance the validity of the observational data and provide an assessment that goes beyond the teacher's self-interpretations of behavior. However, the observation design may be influenced by the researcher's subjectivity, and the use of a single observer may increase the personal subjectivity affecting the outcomes. The study also employs data triangulation, combining data from interviews, journal writing, and final interview reflections, to strengthen the validity of the research findings. Additionally, member checks further validate the results through Dantes' feedback and reflections on the research outcomes.

Keywords: Qualitative research; Teacher beliefs; Classroom practices; Reflective practices

Online publication: April 28, 2025

1. Introduction

The journal article named “Exploring teacher beliefs and classroom practices through reflective practices: A case study” adopts qualitative research through case study as a research strategy to analyze the relationship between a second language teacher's (Dantes') beliefs and classroom practices^[1]. According to Stake, case study as a way to find the specific person's relationship between the beliefs and practices is suitable and effective^[2]. This is because a case study focuses on the uniqueness of an individual case and in-depth understanding of the particular case and is “strong in reality”^[3]. Moreover, a case study also entails the detailed and intensive analysis of a single case^[4], which is coherent with the research aim of this journal article. While Yin criticizes the validity of case study is especially problematic because “the frequent failure of case study is that researchers fail to develop a

sufficiently operational set of measures and because ‘subjective’ judgments are used to collect data”^[5]. The essay is going to analyze the strengths and weaknesses of research methods used to collect statistics, the data analysis strategies, and then discuss the literature review used to develop arguments.

2. The analysis of data collection methods

The overall data collection design is comprehensive because the researchers use several semi-structured interviews to explore teachers’ beliefs and six classroom observations to collect data of classroom practices. These intensive and repetitive data collection methods could help the researchers to improve the validity of the final data resources to answer the first two research questions ^[6].

2.1. Interview as a method to explore beliefs

The journal article uses several well-structured semi-structured interviews as a way to explore the beliefs of teachers, which is suitable and effective for collecting the teachers’ beliefs. First, it is because Rubin ^[7] and Thomas ^[8] suggest that interviews could help researchers to explore the experiences, motives, and opinions of others in detail and in-depth. For example, in the journal article, the researchers use “initial interview to gain insights on Dantes’ beliefs used as the starting point for making later comparison” . Then, the final interview that adds new questions to dig out further beliefs, such as the unconscious beliefs of using step-by-step teaching method because “semi-structured interview allows for probing of views and opinions where respondents should expand on their answers and find the new unexpected data, helping to meet the research objectives” ^[9]. For example, Dantes admits “he did not realize that he had the step-by-step belief until the researchers asked Dantes directly” . Last, we can also see from the journal article that all the interviews are recorded and transcribed, which could also provide a more accurate rendition of the interview .

2.2. Observation as a method to collect classroom practices data

2.2.1. The strength of observation

The overall design of using “six one-hour classroom observations” as a way to explore the teacher practices could provide first-hand statistics on practice. Since the research aim is to analyze the overt behavior and particular kinds of behavior, the structured interview is certainly an accurate and effective way . Besides, the six one-hour classroom observations also increase the validity of the observational data resources. As Thomas ^[10] has suggested that a repeated observation can be considered a validity check. Additionally, “observation provides an opportunity to get beyond people’s opinions and self-interpretations of their attitudes and behaviors, towards an evaluation of their actions in practice” . So, the researcher could check the consistency of self-interpretation of his beliefs and his practices through observation. For example, researchers have observed that some of Dantes professed beliefs from the interviews couldn’t be found in consistent classroom practices from the observations. Additionally, the classroom observations are recorded and transcribed , which enables researchers to check the observation evidence instead of rushing to a possibly snap decision about what is being observed to increase the data validity.

2.2.2. The weakness of observation

Some of the observation designs may affect the validity of the final results of the classroom practices. First, observation results may be influenced by the researcher’s subjective constructs (including their values,

motivations, prejudices, and emotions) that affect the validity of classroom practices data collection . For example, the researchers find that in the language teaching part, the teacher holds the belief of helping students develop skills necessary for their learning purpose, while there is no consistent classroom practice during the observation . However, does that mean all of Dantes' teaching practices do not provide students necessary skills for learning purpose or is it because the observer subjectively thinks Dante does not provide? The skill necessary for their learning purpose is a quite ambiguous concept, and different people may hold different opinions towards what is necessary. Who is eligible to decide what the necessary skills for students' learning are is not clearly stated in the journal article. So, the findings of the divergence between the beliefs and practices may be caused by the observer's values. Besides, in the journal article, there is only one observer in the whole observation process, which might also increase the personal subjective influence on the validity of the observational results, and if there were more observers, the effects may be reduced. Because Yin has suggested that if observation could have more than one observer, it would enable the research to generate more reliable observational evidence. Last, it should also be noticed that there is a concern about the observer's influence on the participant's behavior as "the researcher's presence is always an intervention in some way" ^[11], although the observer used non-participant observation, sitting at the back of the classroom and trying to minimize the influence of the class. In addition, there is also a concern that the participants adjust their behaviors because they know they are being observed . Consequently, it would be hard to say the observational results reflect what has happened in reality .

In general, the observations have explored most of Dantes' classroom practices to answer the second research question, even though it could be better if the problems discussed above could be solved properly during the observation process.

2.3. The analysis of data analysis strategies

2.3.1. Data triangulation

(1) The strength of data triangulation

The data triangulation could help researchers to evaluate the data resources collected from different research methods by reducing the risk of conclusions that show the biases of using only a specific method to increase the validity of findings ^[12]. The data triangulation allows the researchers to gain a more secure understanding of the research questions . For example, the researchers use post-observation interviews to check "what has happened in that class" to confirm the classroom practices using the data collected from the observation . This may be because additional data resources missed in observation could be provided through interviews, and also could be used to check the accuracy of the observations. Moreover, these data of Dantes' beliefs collected through the interview, journal writing, and final interview reflection offer comprehensive data, which could allow a better assessment of the teacher's classroom practices.

(2) The weakness of data triangulation

However, the data triangulation cannot minimize the misconception and misunderstanding to increase the data validity because several data sources may have the same biases . One of Fielding's key points is that it is not true that triangulation automatically increases validity because "the methods that are triangulated may have the same biases and sources of invalidity, and thus provide only a false sense of security . For example, in terms of the beliefs of choosing the topic that the students find interesting, Dantes admits he does not know what practices are interesting for students, and the researcher does not find the interesting part in Dantes' teaching practices. Both Dantes' interview description and the

researchers' observation do not notice any interesting behavior. Therefore, the researchers have made a conclusion that there is no interesting classroom practice in Dante's teaching behavior. However, they may find the interesting classroom practices if they add the students' interviews to explore some students' attitudes towards the classroom activities, because the students are the direct audience of the classroom practices. However, the students' feedbacks about the classroom practices are not included in the whole research project.

3. Member checks

Various member checks are also included in the data analysis, which could also increase the respondent validation through the feedback from Dantes and his reflections and comments on the findings . As Maxwell suggests that member checks could increase the validity through "the systematic soliciting of feedback about the final findings." Besides, the researchers add the comments and reflections on the findings from the member checks, which could further validate the results, for instance, in the journal article, through follow-up interview, the fact that Dantes has reflected upon the reasons why he has adopted step-by-step method in his teaching practice is because of his previous learning experience that formed this belief . However, even though Dantes' feedback is no more inherently valid than his interview responses, both should be taken as evidence in terms of the validity of final results .

4. Analysis of the arguments in the findings

The first two findings as answers to the first two research questions have been analyzed in the previous section. In this section, the author of the present essay will mainly focus on the research aim of finding the relationship between Dantes' beliefs and practices.

In the whole essay, to some extent, it fails to state clearly why the relationship between the teacher's beliefs and classroom practices is interactive, which affects "the internal validity" of the conclusion . First, there is an assumption that if these beliefs are aligned with the classroom practices, it is because the beliefs influence the classroom behaviors. However, the convergence between the beliefs and practices could not fully prove that it is beliefs that influence the classroom practices. That Dantes has these practices may be because the curriculum or the course syllabus requires Dantes to do so, or it may be because his peers, such as other experienced teachers' classroom practices, influence him. Therefore, it is hard to say which affects which according to researchers' analysis of data, even though the researchers have cited Breen *et al.* ^[13] at the beginning to prove that beliefs influence the classroom organization and Senior in the third research question to say that "beliefs as insights from teaching situation" ^[14]. The researchers, again, made another assumption that beliefs and practices may interact because it is hard to define whether it is beliefs that influence the practice or it is classroom practices that reshape the beliefs. However, in the journal article, the researchers fail again to give us the statistical proof that those two concepts are interactive, but just cite a report of Breen *et al.* ^[15] to prove the argument.

5. Conclusion

This essay describes the general research methodology used to resolve the research question and then analyze different research methods used to collect the data. Besides, the essay also focuses on the data analysis strategies

used to analyze the statistics so as to increase the validity of the final data results. In the end, the internal validity of the findings is evaluated through analyzing the arguments and the literature review. It is recommended that the research may analyze more language teachers' cases in other countries to enrich the database so as to be more feasible to generalize the conclusion in to all language teachers.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Fielding N, 2022, *Researching Social Life* (5th ed.), SAGE Publications, Thousand Oaks.
- [2] Thomas G, 2022, *How to Do Your Case Study* (2nd ed.), SAGE Publications, Thousand Oaks.
- [3] Bryman A, 2020, *Social Research Methods* (6th ed.), Oxford University Press, Oxford.
- [4] Becker H, 2021, *Telling About Society*, University of Chicago Press, Chicago.
- [5] Rubin H, Rubin I, 2022, *Qualitative Interviewing* (3rd ed.), SAGE Publications, Thousand Oaks.
- [6] Gray D, 2023, *Doing Research in the Real World* (4th ed.), SAGE Publications, Thousand Oaks, 386.
- [7] Senior R, 2022, *The Experience of Language Teaching* (2nd ed.), Cambridge University Press, Cambridge.
- [8] Yin R, 2023, *Case Study Research* (7th ed.), SAGE Publications, Thousand Oaks.
- [9] Hammersley M, Atkinson P, 2022, *Ethnography: Principles in Practice* (4th ed.), Routledge, London
- [10] Yin R, 2023, *Case Study Research* (7th ed.), SAGE Publications, Thousand Oaks
- [11] Nunan D, 2021, *Research Methods in Language Learning* (2nd ed.), Cambridge University Press, Cambridge, 80.
- [12] Maxwell J, 2023, *Qualitative Research Design* (3rd ed.), SAGE Publications, Thousand Oaks, 128.
- [13] Farrell T, 2022, *Reflective Practice in Language Teaching: A Guide for Teachers*, Springer, Berlin.
- [14] Stake R, 2022, *The Art of Case Study Research* (2nd ed.), SAGE Publications, Thousand Oaks.
- [15] Thomas G, 2022, *How to Do Your Case Study* (2nd ed.), SAGE Publications, Thousand Oaks.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Logical Starting Point, Realistic Dilemma and Path Selection of Digital Literacy Improvement of Rural Teachers in Primary and Secondary Schools

Xiaoqing Lan, Zhongyuan Liao*

Fuzhou University of International Studies and Trade, Fuzhou 350202, Fujian, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the swift advancement in information technology, digital literacy has emerged as a cornerstone of teachers' pedagogical capabilities, yet it remains underappreciated. Presently, most individuals' understanding of digital literacy is confined to the operational use of electronic devices, which hinders addressing challenges that impede the enhancement of teachers' digital literacy. These challenges include systemic educational barriers, inadequate campus infrastructure, limited teacher proficiency in digital tools, and the urban-rural digital divide. This paper centers on enhancing the digital literacy of rural primary and secondary school teachers. It provides a concise analysis from three perspectives: theoretical foundation, practical obstacles, and strategic approaches. To address these issues, the paper suggests several measures to refine policies and infrastructure, boost teachers' digital application skills, and narrow the urban-rural digital gap. By leveraging policy frameworks for guidance, ensuring adequate school support and resources, and fostering teacher awareness, the goal is to elevate the digital literacy of rural educators. This will better align with the demands of modern education and contribute significantly to the revitalization of rural education.

Keywords: Rural teachers; Digital literacy; Digital divide

Online publication: April 28, 2025

1. Introduction

The report to the 20th CPC National Congress underscores the importance of continuously accelerating the development of a high-quality education system and implementing the strategy of revitalizing the nation through science and education. Notably, for the first time, the report includes "promoting the digitalization of education," which further clarifies and outlines the future trajectory of educational digitalization. As key drivers of this reform, the digital literacy of primary and secondary school teachers is crucial soft power for advancing the digital transformation of education. It serves as vital support for building a high-quality education system and

cultivating top-tier talent ^[1]. To enhance the digital literacy of rural primary and secondary school teachers, it is essential to expedite research, development, and promotion of digital learning tools, facilitate teachers' digital transformation, and provide fresh momentum for the advancement of rural education ^[2].

2. Logical starting point

2.1. Correct guidance of policies and regulations: building the rule of law foundation for education reform

The concept of "Teacher Digital Literacy" delineates the precise meaning of digital literacy for educators and outlines evaluation standards across various dimensions. It comprehensively explains key concepts such as digital awareness and application, providing a clear framework and strategic blueprint to enhance the digital literacy of rural teachers ^[3]. The incentive structures established by diverse policies motivate teachers to independently improve their digital skills, fostering enthusiasm and cultivating a positive learning environment.

Policies and regulations play a crucial role in enhancing the digital literacy of rural teachers. They serve not only as a guide but also as a means to reinforce supervision and assessment. By referring to a scientific and well-structured evaluation framework, regular assessments should be conducted to identify issues promptly and implement appropriate strategies for improvement. This establishes the legal groundwork for educational reform, fosters a supportive environment for boosting rural teachers' digital capabilities, and acts as a strong catalyst for the advancement of rural education in the digital age ^[4].

2.2. School support and input: laying the material foundation for educational innovation

The study reveals that schools, serving as the central hub for rural teacher development, offer a range of resources that can shape the perspectives and attitudes of rural teachers, thereby enhancing their digital literacy ^[5]. As a key component of the "systematic process of learning and teaching interaction," the educational environment underscores the significance of infrastructure in fostering the joint growth of teachers and students. Stable internet connectivity, modern multimedia classrooms, and intelligent teaching tools form the foundation, providing robust support for rural teachers to access resources, engage in diverse student interactions, and collaborate with peers. When schools possess adequate physical resources and advanced digital technology, they can implement relevant digital education programs, significantly bridging the gap between rural teachers and digital advancements. Throughout this process, rural teachers who initially exhibited resistance or lacked enthusiasm toward digital technology are likely to change their views upon witnessing the superior teaching outcomes and positive classroom dynamics facilitated by these technologies.

2.3. The awakening of teachers' individual consciousness: the inner motivation to stimulate educational change

The enhancement of individual awareness among teachers pertains to rural educators' proactive recognition and intrinsic motivation to elevate their digital literacy. This represents a psychological condition wherein rural teachers acknowledge the significance of digital literacy for their professional growth and strive to enhance their digital competencies and knowledge. By fostering this mindset, rural teachers can more effectively leverage digital resources, boost their teaching proficiency, and develop a stronger sense of efficacy in information-based instruction, thereby creating a positive feedback loop ^[6]. For instance, AI algorithms can be utilized to analyze student learning data, assess classroom progress, identify knowledge gaps, and implement targeted instruction.

Such innovations not only augment teachers' instructional capabilities but also facilitate greater academic advancement for students while promoting the digital literacy of rural educators.

3. Realistic dilemma

3.1. Obstacles to development: Obstacles in the educational mechanism inhibit the development of rural education

At present, China's education mechanism conforms to the national conditions and meets the needs of social and economic development and socialist construction, but there is still room for improvement in the education system, among which the fairness and balanced development of educational resources is the most prominent issue. The research shows that there is an imbalance in the allocation of educational resources, and most of them tend to be in the economically developed areas. First-tier cities, with their strong economic strength and sound development foundation, attract a large number of high-quality education resources. In contrast, rural areas with weak productivity face problems such as a lack of funds and equipment, and generally poor network conditions.

In the face of unevenly distributed educational resources, rural teachers struggle to enhance their digital literacy awareness. This challenge not only restricts their access to new educational technologies and methodologies but also diminishes their enthusiasm for professional development. Survey findings reveal that rural teachers participate in digital education technology training far less frequently compared to their urban counterparts, with many continuing to rely on conventional teaching approaches. Consequently, this limits their capacity for innovation and practical application in the classroom. Over time, such circumstances not only impede teachers' professional growth but also reduce the likelihood of students receiving high-quality education. This highlights that systemic barriers are significantly hindering the advancement of rural education, thereby restraining its overall development.

3.2. Weak foundation: Campus infrastructure shortcomings restrict the construction of digital education

With the advancement of information technology, digital education has emerged as a novel educational paradigm and has seen rapid promotion and application. Nonetheless, inadequate campus infrastructure, particularly the deficiencies in critical infrastructure, has significantly hindered the progress of digital education and the enhancement of rural teachers' digital literacy. Given the relatively lower economic conditions in most rural regions, there is insufficient funding to acquire advanced information technology equipment for schools. Additionally, the outdated equipment on campus cannot be replaced or upgraded promptly, resulting in a suboptimal information infrastructure.

In this scenario, rural teachers have long faced the challenge of insufficient digital resources, which manifests in two primary issues. First, many teachers lack the inclination to utilize smart devices and have not adopted the educational philosophy that emphasizes effectively integrating digital technology into their teaching practices. Second, while some teachers are proficient in information technology, inadequate school infrastructure prevents them from achieving a deeper integration of technology with their teaching, despite their willingness. These challenges highlight how underdeveloped campus infrastructure has become a significant barrier hindering the enhancement of rural teachers' digital literacy and the advancement of digital education in rural areas.

3.3. Lack of ability: Lack of teachers' application ability hinders the improvement of digital literacy

Digital application involves teachers' proficiency in utilizing digital technology resources to conduct educational activities, encompassing the entire process of teaching design, implementation, academic assessment, and collaborative education ^[7]. This aspect is not only a central reflection of teachers' digital literacy but also a crucial component in achieving effective digital education ^[8]. Given their significant role as key participants and facilitators in teaching, enhancing teachers' digital literacy plays a vital role in improving overall education quality.

The insufficient digital application skills among teachers have emerged as a significant barrier to enhancing their digital literacy. While 99.8% of the nation's 309,000 compulsory education schools now meet basic requirements, the utilization of technological resources remains inconsistent ^[9]. Despite the widespread adoption of modern educational technologies like the Xiwo whiteboard system and online learning platforms, rural teachers often struggle to maximize the educational benefits of these intelligent tools and boost teaching efficiency and quality. This is primarily due to a lack of professional technical guidance and training resources. Consequently, rural teachers are less inclined to use smart equipment in their teaching, which diminishes their motivation and capacity to optimize and innovate in the classroom. Ultimately, this hinders the development and promotion of their digital literacy.

4. Path selection

4.1. Promoting development: Integrating educational resources and optimizing their allocation and application

The challenges posed by educational mechanism barriers hinder the enhancement of digital literacy among rural teachers, yet these obstacles are not insurmountable. According to the Opinions on Deepening the Reform of the Education System and Mechanism, education should hold a strategic priority for development, with comprehensive reforms across the education sector being emphasized. In the era following poverty alleviation, boosting the digital literacy of rural teachers has emerged as crucial for revitalizing rural education. It also represents a significant approach to reducing both the digital divide and the disparity between urban and rural education ^[10–11]. Given the uneven allocation of educational resources, a dual-track strategy—combining online and offline efforts—is necessary to dismantle these institutional barriers.

First, there should be the establishment of an online platform dedicated to sharing educational resources. Leveraging information technology to distribute high-quality educational materials to other regions and implementing a blended “online-offline dual-teacher teaching” model represents an efficient approach to address the deficiencies in basic education within remote areas ^[12]. This platform disseminates top-tier resources to primary and secondary schools nationwide, facilitates the cross-regional sharing of educational resources via digital libraries, enables teachers to access diverse instructional materials and professional growth resources, and compensates for the imbalanced distribution of educational assets. Second, the offline implementation of the “school cluster operation model” is recommended. Regional collaboration in education serves as a practical strategy to enhance the integration of educational resources and foster educational equity ^[13]. The successful experience of Shiliyihai Primary School in Hubei Province demonstrates the viability of this framework. This model capitalizes on the exemplary and guiding influence of prestigious schools, utilizing their radiating impact to drive surrounding campuses, thereby achieving close collaboration between well-established and under-resourced schools.

4.2. Compaction foundation: The construction of information facilities, the construction of the digital campus

As a critical component of the nation's new infrastructure, the development of modern educational infrastructure serves as the primary catalyst for advancing educational reform and also forms a crucial foundation for enhancing the digital literacy of rural teachers. Considering the two scenarios among rural teachers, namely, "choosing not to use available resources" and "willing to use but lacking access," two corresponding strategies can be adopted to address these issues effectively.

To address the challenge of "inability to use under certain conditions," it is crucial to prioritize teacher training. Initiatives such as "digital salons" and exchange-sharing sessions should be implemented to enhance teachers' digital literacy and ignite their enthusiasm for learning. Importantly, the objective of these training programs should focus on equipping teachers with the ability to effectively apply digital tools, teaching them not just the basics but also how to adapt and innovate with technology in real-world teaching scenarios. This approach ensures that teachers can proficiently integrate digital methods into their lessons, thereby improving overall educational outcomes, rather than merely going through the motions of training. The government bears the crucial role of boosting capital investment, refining the allocation of educational resources, and establishing and executing pertinent policies to ensure robust support and safeguards for the sustainable advancement of education. As the primary entities responsible for educational implementation, schools should promptly adhere to these policies, enhance their campus infrastructure, develop a "digital campus" framework, and offer an excellent digital ecosystem for educators.

4.3. Building capacity: upgrading teachers' skills and deepening digital literacy

The report to the 19th CPC National Congress highlighted the significance of online education and established higher requirements for teachers' digital literacy. As leaders in the classroom, teachers must align with the rapid advancements of the digital age and continuously enhance their proficiency in digital tools, guided by progressive educational philosophies. This can be achieved through several key approaches:

To enhance teachers' digital literacy, a multi-faceted approach should be adopted. Firstly, establishing a comprehensive incentive system with multiple indicators can positively motivate teachers to embrace the role of "digital educators" and promote the collaborative creation and sharing of high-quality digital resources.

Secondly, leveraging opportunities such as professional and curriculum development, various forms of digital literacy training can be provided for teachers through national and provincial programs, fostering a positive environment for digital teaching^[14]. This will enable rural teachers to experience the tangible benefits of digital classrooms, accept digital teaching methods, and cultivate a passion for digital education. Some regions have initiated activities that integrate digital literacy education and teaching for primary and junior middle school teachers. These activities encourage mutual observation, learning, and exchange, creating an interdisciplinary and cross-sectional learning platform for educators across all school levels^[15]. In this process, primary school teachers can gain insights into more advanced teaching methods from their junior middle school counterparts, while junior middle school teachers can adopt innovative teaching ideas from primary school educators. Through mutual observation, teachers can better understand the diverse needs of students, refine their teaching strategies, and learn from one another. Furthermore, it is essential to strengthen classroom instruction and digital media application skills to foster continuous professional development and embody the principle of "lifelong learning."

5. Summary

With the emergence of artificial intelligence such as ChatGPT and Sora, improving the digital literacy of rural teachers is not only the key to promoting their development and improving the quality of rural education, but also an important measure to build a digital China and a powerful education country. With the help of artificial intelligence, rural teachers can break the regional barrier, gain dividends for themselves and their students in the digital age, and improve their digital literacy and teaching level. At the same time, with the help of digital education, we can promote educational equity and bridge the digital gap between urban and rural areas. “Practice is the only criterion for testing truth.” Rural teachers should embrace digital technology with a proactive attitude and continue to innovate teaching methods to add momentum to the vigorous development of rural education.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Hao X, Chen M, 2024, A Practical Exploration on the Digital Transformation of Rural School Education. *Information Technology Education for Primary and Secondary Schools*, 2024(1): 36–37.
- [2] Li Y, 2024, Teachers’ Digital Literacy Is the Key Soft Power of Education Digitalization. *Chinese Education for Ethnic Minorities*, 2024(2): 18.
- [3] Feng J, Wang Y, 2019, Research on the Mechanism of School “Digital Support” to Improve Teachers’ Digital Literacy. *Teacher Education Research*, 36(2): 45–52.
- [4] Liu F, Gao J, Wang X, 2023, The Realistic Dilemma and Construction Direction of Rural Teachers’ Digital Literacy Cultivation. *Principal of Primary and Secondary Schools*, 2023(7): 33–37.
- [5] He W, Yan J, Liu H, et al., 2019, A Study on Rural Teachers’ Willingness to Continue Using the National Smart Education Platform in Primary and Secondary Schools from the Perspective of Digital Transformation. *Modern Educational Technology*, 34(8): 59–68.
- [6] Liu Z, 2015, Teacher Informatization Teaching Efficacy: Connotation, Current Situation and Countermeasures. *China Educational Informatization*, 2015(13): 22–26.
- [7] Liu Y, Huang X, 2024, The Realistic Dilemma and Practical Path of Digital Literacy Cultivation for Rural Primary and Secondary School Teachers. *Yunnan Education (Vision)*, 2024(7): 27–28.
- [8] Wu D, Chen M, 2023, Teacher Digital Literacy: The Focus of Teacher Development under the Background of Education Digital Transformation. *China Information Technology Education*, 404(5): 4–7.
- [9] Xiao J, Zhao J, 2019, Value Implication and Practice Approach of Rural Teachers’ Digital Literacy Improvement under the Background of Digital Transformation. *Journal of Chongqing Second Normal University*, 36(5): 108–113.
- [10] Huang X, Shen X, 2022, Research on the Strategies of Professional Development of Rural Teachers under the Background of Digital Transformation Education. *Journal of Guizhou Normal University*, 38(9): 70–76.
- [11] Lin J, 2024, Value Purport, Practical Dilemma and Way to Improve the Development of Rural Teachers’ Digital Literacy in the Digital Era. *Life Education*, 2024(8): 32–38.
- [12] Han X, Gao X, 2024, Intelligent Platform Enables “Dual Teacher Teaching” to Help Rural Education Quality and Balance. *Education and Equipment Research*, 40(6): 11–14.
- [13] Wang J, Luo J, 2022, Analysis on the Intention of Rural Teachers to Use Teaching Resources in the Process of

Digital Transformation. China Audio-Visual Education, 2022(4): 9.

- [14] Jin T, Liu X, Guo G, 2023, Improving Teachers' Digital Literacy and Accelerating Education Digital Transformation. Science and Technology Daily, 2023-03-02(006).
- [15] Zou W, 2024, Description and Optimization Strategy of Rural Teachers' Digital Literacy. Education Guide, 2024(8): 66–74.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Study on Tune C-E Translation from the Perspective of Translation Aesthetics: Taking Ascendant Peace in the Four Seas, A Religious Play in Zhejiang and Anhui Province as an Example

Wenjun Li^{1*}, Xiuzhong Yang²

¹School of Art, Zhejiang International Studies University, Hangzhou, China

²Teaching Affairs, Zhejiang International Studies University, Hangzhou, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Translation aesthetics provides a new approach to translation studies on Opera. From the perspective of translation aesthetics, this paper studies the translation strategies in the process of C-E translation taking as an example the eight tunes in manuscripts of Ascendant Peace in the Four Seas, a well-known religious play of Kun Opera of Zhejiang and Anhui province, maintaining that tunes translation mainly adopts foreignization, supplemented by domestication.

Keywords: Translation aesthetics; Religious play of “Ascendant Peace in the Four Seas”; Tune; Domestication and foreignization

Online publication: April 28, 2025

1. Introduction

Translation is a mysterious but elegant cross-cultural activity, as once it begins, the translator must ponder how to achieve the transformation between the source language and the target language ^[1]. In 1735, the Father of Aesthetics, Alexander Gottlieb Baumgarten, proposed the concept of aesthetics while the Chinese translation of aesthetics was recorded long before AD 2100. Whether in the West or the East, the integration of translation and aesthetics has its strengths and complements each other. As a gem of traditional Chinese culture, the opera must first be “translated out” to “go global” ^[2]. With the efforts of scholars, relevant translations and study outcomes have been reviewed. Domestic scholars Yang Xianyi and Gladys Yang have made fruitful translations of Chinese operas such as “The Peony Pavilion”. Cao has explored the concept and practice of opera translation ^[3]. Foreign scholars have also made significant achievements, such as American scholar Birch, who proposed a scheme for

the English translation of Chinese opera performance texts ^[4]. British scholar Susan Bassnett proposed a cultural translation perspective ^[5]. However, despite the achievements in the study of opera translation, little attention has been paid to the study of opera translation. It is not known that tune, like the titles of novels, can greatly affect readers' interest and appreciation through the precision of their translation. Therefore, strengthening the study of tune translation is beneficial and necessary.

2. Exploration on eight tunes of Ascendant Peace in the Four Seas

The Kunqu opera performed for the gods in the Zhejiang-Anhui region is a folk social activity aimed at welcoming blessings and seeking auspiciousness, representing a shared enjoyment between humans and deities, and possessing practical utility. The Huizhou manuscript of the opera performed for the gods “Ascendant Peace in the Four Seas” was one of the must-perform plays in the Ming and Qing dynasties’ courts and among the public ^[6] (Figure 1).

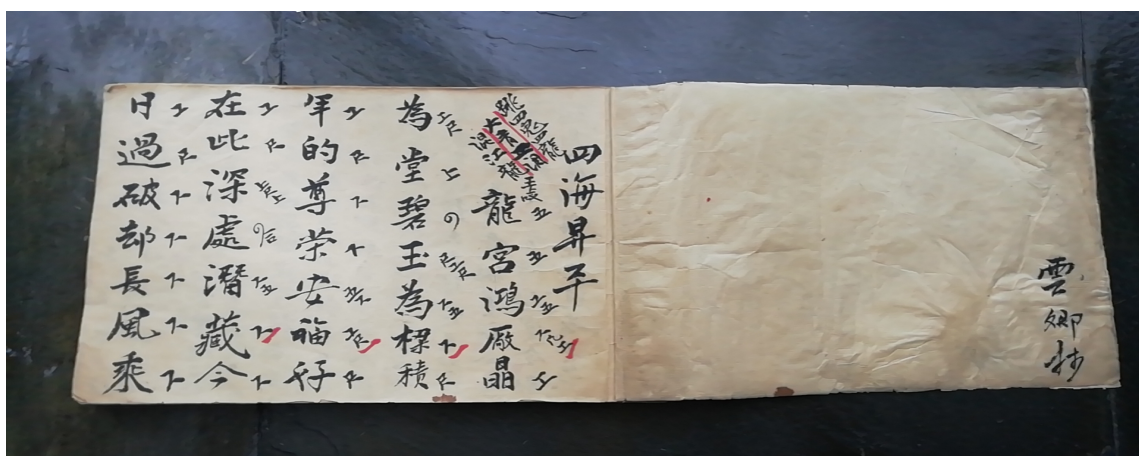


Figure 1. The manuscript “Ascendant Peace in the Four Seas.”

Tune, a structural unit formed by the combination of textual (prosody and set) and musical (temperament, rhythm, mode, and string, wind and percussion) elements in traditional Chinese opera, represents a stylized expression of the creative thinking in traditional Chinese operatic music ^[7]. Eight tunes of Ascendant Peace in the Four Sea are as follows:

(1) 混江龙

It belongs to the Xian Lu Gong (a tune name) of Beiqu (Northern Opera). In terms of its fixed patterns of words and sentences, the “Grand Anthology of Musical Notation for Southern and Northern Tunes in Nine Modes” is categorized into two styles: the original and the modern style. The original style consists of ten lines arranged in the pattern of four, seven, four, four, seven, seven, three, three, four, and four. The modern style features the seventh and eighth sentences as seven-character phrases, with the first four characters representing the upper half and the last three characters representing the lower half. From the sixth sentence onwards, the use of four or six-character sentence is flexible, with no restrictions on their length, and may be freely augmented or reduced, but generally, two sentences constitute a couplet.

(2) 天下乐

Both Nanqu and Beiqu (Northern and Southern Operas) are included, all belonging to the Xian Lu Gong. The word count of Beiqu is fixed at seven, two, three, eight, three, four, five (seven sentences), with the second

sentence being able to include the two “Chen Zi” (word inserted in a line of verse for balance or euphony), namely “ye bu” or “ye me.” These are used in tune set, specifically in the Northern Xian Lu Gong set, following the “You Hulu” and preceding the “Nezha Ling.” The Nanqu is also known as “Harmony in Society,” with the word count fixed at four, seven, seven, six, seven, five, five, five, three, four, five (eleven sentences), used as “Guoqu” (the main part of the opera).

(3) 哪吒令

A significant musical accompaniment utilized in traditional operas. Performed on the suona horn, it exudes a majestic grandeur. It may be employed for the attracting audiences (see opening gongs and drums), as dance accompaniment, or for formations, processions, banquets, welcoming guests, and other occasions.

(4) 踏鹊枝

Both the Northern Opera Xianlu Temple and the Southern Opera Shangdiao have same tune with differing word counts from the poetic tunes. The Northern Opera is commonly employed following the “Nezha Order” tune in divertimento settings. The Southern Opera, also known as “Manyuanchun,” is utilized as a transitional tune.

(5) 寄生草

A title in the Northern tune, it belongs to the Xianlu Temple and is also incorporated into the Shang Tune. It consists of seven lines with five rhymes, structured as three, three, seven, seven, seven, seven, seven. The first, second, and sixth lines are antithetical, while the third, fourth, and fifth lines form a tripartite parallel structure. This style is used in both sets and short lyrics, with examples of sets following “Magpie on the Branch.”

(6) 粉蝶儿

Both Northern and Southern Operas are categorized under the Zhonglu Temple, with the former frequently employing it as the opening piece of the Zhonglu suite. In genres like Peking Opera, it is predominantly used in martial scenes. Along with “Dianjiangchun,” it belongs to the Sanban tune, serving as an introduction for character entrances, though its usage is not particularly widespread. It can be sung solo or in duets, similar to the contemporary “Dianjiangchun.” The melody is majestic and impassioned, accompanied by the suona horn or flute.

(7) 石榴花

Both Northern and Southern Operas are associated with the Zhonglu Temple. Within Southern Opera, this tune is categorized into two types: one is the delicate tune with additional boards, and the other is the robust tune sung by the clown with a one-board, one-eye rhythm. This tune is frequently employed in Northern Opera. The standard pattern consists of nine lines in the order of seven, five, seven, four, four, seven, seven, seven, and five. In dramatic Opera, this pattern is often used in quiet scenes, with a three-eye board, predominantly utilizing the Xiaogong or Chi tunes.

(8) 尾声

The final section in the Northern Opera suite signifies the culmination and conclusion of the narrative.

3. Analysis of eight tunes C-E translation of Ascendant Peace In The Four Seas

Translation involves the transformation of at least two languages and the fusion of two cultures. In the practical process, translators bear the responsibility of conveying both the “content” and the “flavor” of the original work ^[8]. Currently, the primary methods for dealing with cultural differences in translation are foreignization and domestication, a concept initially proposed by the American translator Lawrence Venuti ^[9].

Generally speaking, foreignization focuses on the foreignness of the source language, primarily employed in the translation at the “cultural level,” which can endow the translated text with a greater sense of “exoticism.” Domestication, on the other hand, focuses on the normativity of the target language, primarily utilized in the translation at the “pure linguistic level,” serving as a “compromise” method to address linguistic barriers. When it comes to the translation of traditional Chinese opera tunes, the author suggests adopting a translation strategy that primarily utilizes foreignization, with domestication as a supplement. An analysis of eight tunes from *Ascendant Peace in the Four Seas* is now provided as an illustrative example.

3.1. 踏鹊枝 Tune: Magpie on the Branch

Traditional Chinese opera utilizes song and dance to narrate stories. Consequently, a high-quality translation of an opera should possess readability, singability, and appreciability. As a component of opera, the tune, due to its complex origins, sometimes defies translation based solely on literal comprehension. Translators must trace their sources or meanings to produce a translation that is both culturally authentic and evocative. That is to say, when the tune carries special historical origins and background, translators need to adopt a method that combines foreignization with other translation techniques.

For instance, in translating “踏鹊枝,” Xu Yuanchong prefixed the term ‘Tune’ to ‘Magpie on the Branch.’ The English noun “tune” denotes “melody, harmony, or musical cadence.” Evidently, Xu Yuanchong employed “Tune” as an annotation for the target language readers, indicating that “Magpie on the Branch” is a type of melody in ancient Chinese music, and subsequently translated the connotation of “踏鹊枝” as “Magpie on the Branch.” This approach precisely positions a cultural reference for the target readers, namely “a melody known as Magpie on the Branch.”

3.2. 石榴花 Tune: Pomegranate Flower, 混江龙 Tune: Underwater Dragon and 天下乐 Tune: Harmony in Society

Similarly, when dealing with “石榴花,” the author suggests referring to the method employed by Xu Yuanchong, translating it as “Tune: Pomegranate Flowers” or “Tune: Pomegranate Flowers for Fortune Turns.” For “混江龙,” translating it as “Underwater Dragon” might lead foreign readers to mistakenly believe that the tune represents a living dragon, thereby causing confusion. The author proposes combining foreignization and amplification techniques, translating it as “Tune: Underwater Dragon”, which maximizes the preservation of the exotic nature of the translation while also ensuring readability and appreciability. “Tune: Harmony in Society” is suggested for “天下乐,” conveying the meaning of “social well-being” in English. Such an approach effectively communicates the literal meaning of “天下乐” to readers, particularly when translating the character “乐,” the word “Harmony” in English, which implies “harmony and peace,” accentuates the poetic atmosphere of joy and tranquility. It is evident that the advantage of foreignization lies in the translator’s profound rhetorical competence in both Chinese and English, conveying the poetic essence of Chinese language to readers to the greatest extent possible.

3.3. 哪吒令 Nezha Order and 粉蝶儿 Fendie’er

In the process of translation, numerous opera tunes are unique and cannot find corresponding terms in English. Given the insurmountable cultural divide, it is advisable to employ the domestication method.

For instance, we translate the tune names “哪吒令” and “粉蝶儿” into Nezha Order and Fendie’er respectively. Such translations retain the original sounds of the Chinese names “哪吒令” and “粉蝶儿,” but

they also present a significant drawback. There are two major difficulties that arise for foreign readers of the text: Firstly, foreign readers cannot understand the significance of Nezha Order and Fendie'er. Even if the tune names may not align with the main meaning of the piece, readers cannot interpret the functional significance of these tune names within the context of the entire piece based on these translations. Secondly, the purpose of translating with Nezha Order and Fendie'er is to convey to readers that the aforementioned tune names are typically a stylistic convention, rather than serving any practical purpose.

3.4. 尾声 Concluding Strophe

In other words, when there are semantic differences between the source language of the traditional opera and the target language, and when translating the text, grammar, and semantics of the original text proves challenging, the adoption of the domestication can be employed, which renders the translated text more fluent and in line with the linguistic conventions of the target language. For instance, the tune name “尾声,” which essentially means the ending of an opera, can be directly translated as Concluding Strophe, a succinct and clear term that facilitates understanding for readers of the target language.

3.5. 寄生草 Tune: Grass for Reposing Feelings (Feeling: passionate)

Tune names dictate the melodic patterns of the tunes, and later generations compose lyrics following the prescribed tonal patterns outlined in the tune names. Zhou Deqing, in his work “Zhongyuan Yinyun,” wrote: “The Xianlu Tune is fresh and intangible, the Nanlu Gong is characterized by sighs and sorrow, the Zhonglu Gong is rolling and flickering, and the Huangzhong Gong is associated with wealth and lingering emotions...”^[10]. Although his summary of the “sound and emotion” of the Gong Tunes is not exhaustive, it can at least provide a framework for translating tune names. This involves annotating the emotions expressed in the tune based on the content of the tune, thereby facilitating understanding of the tune's message by readers of the target language. This translation strategy is conducive to the translator's subjectivity but demands a high level of proficiency. The translator must first have an understanding of the emotions expressed in the tune to accurately capture its sentiment with appropriate terminology.

In addressing the translation of the term “寄生草,” the author consulted various materials and discovered that it is commonly translated as “Parasitic Grass.” However, when this translation is applied to the context of traditional opera, it can be perplexing for foreign readers, failing to convey the intended message of the opera. In *Ascendant Peace in the Four Seas*, a religious play in Zhejiang and Anhui province, the chapter of the tune “寄生草” primarily serves to express aspirations through objects. Therefore, in alignment with the thematic and content requirements of the opera, the author proposes a modified translation: “Tune: Grass for Reposing Feelings (Feeling: passionate),” which means “a tune representing grass used to embody emotions.” This approach, which combines domestication with foreignization, maintains the integrity and ethnic characteristics of traditional opera while providing the readers of the target language with a more direct understanding of the tune's rhythmic patterns and the ideological and emotional messages conveyed. Consequently, it enables the appreciation of its rich cultural connotations and aesthetic beauty.

In summary, the translation of traditional operas possesses three fundamental characteristics: perceptual immediacy, pursuing feature, and performative quality. The success of translation hinges on whether the reader can resonate with it, provoke deep reflection, and accurately reproduce the storyline and cultural elements of the original opera^[11]. When translating opera tune names, from the perspective of translation aesthetics, employing both foreignization and domestication methods not only enhances the aesthetic appeal of the translation but also

allows those unfamiliar with foreign languages to understand another culture through reading the translation, thereby promoting cultural exchange.

4. Conclusion

Translation of traditional operas represents a comprehensive art pertaining to aesthetics, necessitating translators with solid bilingual proficiency and extensive knowledge of traditional operas. In the process, translators must maintain the integrity and ethnic characteristics of the opera itself, while considering the appreciation level and comprehension of the readers, and also take into account the overall effect of the performance, thereby ensuring that the translation is acceptable to the audience. Regarding the manuscript of *Ascendant Peace in the Four Seas*, a religious play in Zhejiang and Anhui province, from an aesthetic perspective and considering the purpose of translation, the translation of its tune names differs from text translation. It should strive for simplicity, clarity, and comprehensibility while balancing literary and musical qualities^[12]. Therefore, in translating traditional opera tune names, a translation strategy primarily focused on foreignization, with domestication as a supplement, can be employed to convey the imagery, form, and rhythm of the opera, restoring the original appearance, setting, and sentiment of the piece, enhancing the understanding for readers of the target language, generating humanistic resonance, and thereby improving the quality and effectiveness of the external dissemination of traditional Chinese opera. At the same time, we must deeply reflect on and strengthen the cultivation of professional talents in traditional opera translation, promoting the deepening of the “going global” strategy of Chinese culture.

Funding

Philosophy and Social Sciences Planning Project of Zhejiang Province, “Compilation and Research of Folk Gongchi Score Manuscripts for Kunqu Opera in the Late Qing Dynasty in Zhejiang and Anhui Province” (Project No.: 23NDJC242YB)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Feng Q, 2002, *Practical Translation Tutorial*. Shanghai Foreign Language Education Press, Shanghai, 3.
- [2] Zhu L, 2019, The Current Situation, Problems, and Countermeasures of English Translation of Chinese Kunqu Opera. *Foreign Language Teaching*, 2019(5): 88.
- [3] Cao G, 2011, *Research and Translation of Traditional Chinese Drama in the English-Speaking World*. Guangdong Higher Education Press, Guangzhou, 449–474.
- [4] Birch C, 1970, Translating and Transmuting Yuan and Ming Plays: Problems and Possibilities. *Literature East & West*, 14(4): 491–509.
- [5] Bassnett S, 1985, *Ways Through the Labyrinth: Strategies and Methods for Translating Theatre Texts*. The Manipulation of Literature: Studies in Literary Translation, Croom Helm Ltd, New York, 85.
- [6] Li W, 2015, *A Biography of Existing Kunqu Opera Tribute to the Gods in Zhejiang Anhui (Southern) Region*.

Chinese Musicology, 2015(3): 83–89.

- [7] Feng G, 2004, The Carrier of Traditional Chinese Music Dissemination and Unique Music Creation Thinking in Tune. *Journal of Xinghai Conservatory of Music*, 2004(1): 1.
- [8] Katan D, 2004, *Translating Cultures*. Shanghai Foreign Language Education Press, Shanghai, 125.
- [9] Venuti L, 1995, *The Translator's Invisibility: A History of Translation*, Routledge, London/New York, 19–20.
- [10] Tu Z, 2000, *Outline of Poetry, Prose, and Rhythm*, Tianjin People's Publishing House, Tianjin, 153.
- [11] Chen G, Li G, 2008, Reconstructing Gestalt Imagery: Aesthetic Dimensions of Drama Translation. *Journal of Zhejiang University (Humanities and Social Sciences Edition)*, 2008(1): 184–191.
- [12] Su F, 2016, Translation and Introduction of Opera Texts: The Convergence of Eastern and Western Cultures. *Journal of China Academy of Chinese Opera*, 2016(3): 97–98.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Exploration of PLC Application Technology Course Practical Training Teaching Design

Lele Qi*

Tangshan Maritime Institute, Tangshan 063200, Hebei, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: This article in-depth analysis of the current “PLC practical training” teaching in the existing problems and importance, and put forward targeted reform strategies, aimed at solving the current “PLC practical training” teaching in the existing problems, improve the quality and effect of teaching, for the overall development of students and the future career to lay a solid foundation.

Keywords: PLC application technology; Course practical training; Teaching design

Online publication: April 28, 2025

1. Introduction

With the rapid development of information technology today, the field of industrial automation is also undergoing great changes. At present, whether it is the automatic control system of independent research and development, or the introduction of the automatic production line from overseas, PLC control technology is widely used as its core control component^[1]. PLC control and the traditional electrical control have a lot of advantages; therefore, incorporating “PLC training” course into a variety of automation professionals, making it a comprehensive and practical combination of courses, to promote students to become the country’s pillars of talent.

2. The importance of PLC application technology course practical training teaching design exploration

2.1. Improve students’ practical operation ability

Students can deepen their understanding of PLC working principles and programming methods in the process of PLC programming and debugging, and improve students’ hands-on ability and problem-solving ability. In this process, middle school students will also face a lot of practical problems, which will make them think independently, through the way of consulting information and other students to discuss, gradually learn how to analyze and solve these problems, cultivate students’ patience in the face of problems, and the ability to use the knowledge to solve practical problems.

2.2. Promote the combination of theory and practice

In the teaching of theory, the teacher mainly tells the basic concept of PLC, working principle and programming method and other theoretical knowledge. However, society needs talents, is the need to combine theory and practice and apply to the actual operation to understand the application of PLC in the actual industrial production, so that they deepen the grasp and understanding of theoretical knowledge, but also the future career work needs.

2.3. Cultivate innovative thinking and teamwork ability

In the process of practical training, students will try different programming methods to solve problems, which can improve students' innovative thinking and cultivate their innovative consciousness and ability ^[5]. Teachers will also let students work in groups to divide the division of labor and complete tasks together, so that students can learn how to play their role in a team, communicate effectively with others and reach a consensus to promote students to better complete the practical training tasks and provide valuable experience for their future career development.

3. PLC application technology course practical training teaching design exploration of existing problems

3.1. Problems in PLC teaching

Most of the teachers who serve as PLC application technology courses are graduate students or above, and the characteristics of such teachers are in the process of studying for a high degree, probably most of the center is put on the knowledge, rarely on the educational methods and educational practice and other aspects of learning, which leads to some just in the teaching position of the teacher education theory may have some deficiencies ^[2]. There are also some teachers who do not work in the enterprise environment, do not have enough understanding of the latest developments in technology, and it is difficult to cultivate these abilities for students in teaching. The traditional teaching content may be more focused on a single module, and the practical content is all about the configuration of experimental equipment, as shown in **Figure 1**. Although this modular design is easy to operate, high reuse rate and low equipment loss, it is worth noting that the PLC equipment in the actual application of the enterprise is mostly independent entities, rather than pre-connected modules in the school laboratory. This can lead to a disconnect between practice and employment and hinder the development of students.

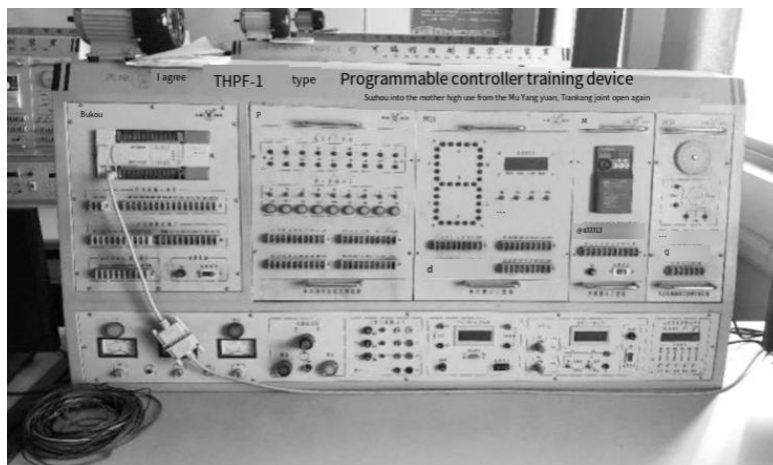


Figure 1. Traditional PLC practical training device.

3.2. The traditional teaching method of PLC leads to poor teaching effect

As for the traditional teaching content of PLC, such as software and hardware characteristics and instruction system, the teaching method adopted is relatively backward, because students need to refer to knowledge in the form of memory and understanding, and practice according to the practical training plan designed by the teacher. This will cause students to lose their subjective thinking consciousness like a robot, and only execute according to the operational instructions. Resulting in the overall teaching effect of the course is not ideal.

3.3. The PLC practical training evaluation is single, hindering the growth of students

In the “PLC practical training” practical training, the teacher always measures the standard of students’ learning progress according to the students’ experimental reports and final grades. As a result, it is difficult to pay attention to students’ practical achievements, which will also lead to low participation of students, so that students only pay attention to the results of the completion of the experiment report, but it does not mean that they will be interested in the practical content. This teaching evaluation method will hinder the progress of teaching and curb the growth of students.

4. PLC application technology course practical training teaching design exploration strategy

4.1. Change of teaching concept

Teachers should change their teaching concepts and use a more open and guiding way to stimulate students’ enthusiasm for learning, cultivate their practical ability and innovative thinking, and promote students’ all-round development ^[6]. In the practical training stage, teachers first let students understand the PLC programming logic, familiarize with the use of various sensors, actuators, and learn how to write an appropriate control system according to actual needs. Then the teacher can let the students design a simplified version of the automatic storage system model covering the basic processes of goods warehousing, storage and warehousing through PLC. This step can not only test the students’ learning results, but also enable the students to check the gaps. After students have completed the design, teachers can also encourage students to try to incorporate new technologies on top of it, such as: The students proposed to use the Internet of Things technology, through the installation of sensors and cameras to achieve remote monitoring, but also real-time access to the storage system’s operating status and cargo information, and these data are uploaded to the cloud server in real time, so that managers can remote management and decision-making; Can also put forward the use of big data analysis and machine learning technology, the data in the storage system for deep mining and analysis. Let students find out the bottlenecks and problems, and put forward the optimal plan to improve the sorting efficiency and optimize the placement of goods. After students put forward these problems, the teacher asked the students to think of ways to solve it. With the joint efforts of students and teachers, this task was completed.

If the management of higher vocational colleges wants to really improve the quality of PLC course practical training, they must train teachers and update their teaching concepts. Training is not only a supplement to the existing knowledge, but also the whole innovation and upgrade of teachers’ teaching concepts. Therefore, higher vocational colleges can invite professionals with rich practical experience and deep theoretical foundation in the field of PLC technology to walk onto the campus and give technical lectures by way of speeches to help teachers solve doubts and unfamiliar places in their hearts regarding the application of PLC technology. Teachers can ask questions in teaching, so as to constantly improve themselves in interactive communication ^[8]. It can also

allow teachers to go off campus to study in the enterprise, truly participate in the practical project, intuitively understand the actual application scenario of PLC technology, to find problems in practice and solve problems. This “from practice, to practice” way of learning, teachers can jump out of the traditional teaching shackles, with a more open and forward-looking perspective to examine the teaching content, for students to bring the latest industry dynamics and technology policies, to promote the development of high-quality students.

4.2. Innovation in teaching mode

At the beginning of the training, the teacher can let the students understand the appearance of the PLC host and the function of each part of the device. After the students know the name of each device, the teacher will explain the basic knowledge. To deepen students’ understanding, teachers can also build a PLC control system covering power supply, input/output modules, sensors and actuators and other hardware on the video platform, so that students will just talk about the knowledge on the platform for review, for don’t understand the place, you can directly ask the teacher questions ^[9]. After understanding this hardware, the teacher will teach the students the basic logic instructions (such as and or, not), let the students control the input of the sensor and the output of the actuator. In the students’ operation process, they can see how the PLC responds according to the input content, to learn more knowledge, to lay a solid foundation for the subsequent study of PLC programming and control system design.

In the practical training, the teacher can explain the typical cases in industrial production through the traditional single simulation experiment, so that students can learn the important role of PLC in the automatic production line and how to realize the automatic control function of the automatic production line. After the students have a preliminary understanding of the basic knowledge, the teacher can divide the students into different groups, each group is responsible for different topics. For example, some groups are responsible for the configuration of hardware, and some groups are responsible for the logic of programming. Let the students in their choice of the program shine, so that students in the process of completing the task not only understand the knowledge of many, but also guide the use of PLC technology, so that they better into the training, improve their participation.

In the PLC application technology course, comprehensive practical training occupies a pivotal position. And in the comprehensive practical training, the comprehensive practical training content has a very important position. Therefore, teachers should play the role of mentors and guides for students. Too simple practical training content may make students feel unchallenged, but too complicated practical training content will make students unable to start. Teachers should according to the actual situation of students to develop including the physical and mental development of students practical training teaching content, to better stimulate students’ interest in learning, improve students’ learning ability, so that students understand the significance of PLC.

4.3. Reform of teaching content

PLC course practical training teaching plays an important role in cultivating students’ practical ability and innovative thinking, so higher vocational colleges can extend the opening hours of the training room, but also equipped with advanced PLC equipment and professional software for the training room, to ensure that each student can have enough opportunities to practice. On this basis, the area of the training room can also be divided to adapt to the development of different levels. For beginners, it may only be necessary to consolidate the basic knowledge, so you can set the beginner area, indicating that the area is in the simulation of an industrial control scene, focusing on the learning of basic instructions and simple program writing. Let the students who choose this area master the basic operation of PLC. For students who have mastered the basic knowledge, they can

set up self-challenging areas for them to explore the advanced applications of PLC in the fields of automated production lines, intelligent building control and so on^[11]. In this way, the students in the basic area can also see the students with strong ability, so that the learning is more energetic, so that the students in the beginner area can ensure that the students master the basic knowledge, so that the excellent students can realize the need of advanced knowledge. Higher vocational colleges can also set up PLC technology application interest groups and scientific research and innovation teams, recruit teachers and students of the whole school, attract a large number of students who are enthusiastic about PLC technology to join, so that students here can not only participate in scientific research projects guided by professional teachers, but also participate in various competitions^[12]. For example: a team in the participation of industry professionals and enterprise representatives as a jury, teachers for guidance, to achieve a PLC-based automation control operating system outside the competition, through the simulation to solve a practical problem in production, to achieve excellent results. The students took the following efforts in the whole process: after announcing the competition requirements, students and other students used spare time to debug and optimize the control logic repeatedly in the training room. For the questions that they did not understand, they first asked their counterparts at home and abroad through the network platform, but for some practical operations that they did not understand, they asked the instructor. In the end, the team was highly praised for its novel proposal and easy implementation process, and won the award. Through stratified regional teaching and competition, vocational colleges have successfully built a student-centered PLC course practical training teaching system that focuses on practice and innovation, to improve students' teamwork ability and let students understand the real workplace environment.

4.4. Reset the evaluation system

In today's higher vocational education, higher vocational colleges should actively respond to the call of The Times, pay attention to practical teaching, effectively improve the teaching quality of PLC courses, and innovatively build a comprehensive "PLC practical training" evaluation and assessment system, enhance the core position of curriculum practical teaching, and realize the diversification and comprehensive teaching evaluation^[14]. Taking the PLC practical training course of electrical engineering as an example, at the beginning of the course, the teacher made it clear that the composition of the evaluation system is: attendance and homework account for 10% of the total score, which aims to urge students to maintain good learning habits and ensure that each student can participate in class learning and review after class on time; Group discussion and class performance account for 15% of the total score. Teachers can encourage students to actively participate in group cooperation through discussion and communication, deepen the understanding of PLC principle, and improve the ability of classroom expression and team cooperation; Question session also accounted for 15% of the total score, this part requires students to dare to classmates or teachers to ask questions or answer questions, active thinking, to stimulate their thirst for knowledge and the spirit of exploration; The stage test accounts for 10% of the total score. Teachers can check the learning results of students through regular quizzes, so that students can check the gaps and fill up the knowledge with better coherence. The final practical performance is set to account for 50% of the total score. At this time, students need to complete a comprehensive project design based on PLC control from all aspects, such as demand analysis, program design, program writing, hardware connection, to system debugging^[15]. Such teaching design can make students dare to put forward their ideas, dare to put forward systematic problems, actively participate in every practical training activity, pay attention to practical operation and skill improvement, stimulate students' learning interest and creativity, improve their professional skills, and cultivate talents who meet the market demand.

5. Conclusion

With the continuous progress of current social technology, programmable controller technology has been widely used in various fields, and continues to evolve in practical application, giving birth to many new theories, new processes, and new technologies. This means higher learning requirements for PLC students. Therefore, in the teaching practice, teachers should emphasize the value of PLC course practical teaching, especially for the practical teaching reform and its existing problems for in-depth analysis and research, aimed at improving students' practical ability, innovation ability and other comprehensive qualities, help students grow into meet the needs of modern society high-quality skilled talents.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Zhou Y, 2024, Research on the Application of Loose-Leaf Textbook in PLC Programming and Application Technology Training Course. *Paper Making Equipment and Materials*, 53(5): 216–218.
- [2] Liu G, 2023, Design of Siemens S7-1200PLC Assessment System Based on C#. *Journal of Hubei Polytechnic*, 36(4): 82–84.
- [3] Shi S, 2023, Research on Teaching Reform and Practice of Project-Based PLC Practical Training Course Under the Background of Curriculum Ideology and Politics. *Times Automobile*, 2023(12): 120–122.
- [4] Geng R, Zhao X, Yan X, et al., 2023, Application of Mini-CEX in the Practical Teaching of Optometry Technology Course Based on the Training Base of Integration of Production and Education. *China Modern Educational Equipment*, 2023(7): 172–174 + 177.
- [5] Meng J, 2023, Research on PLC Online Practical Training Teaching Based on Online Virtual Simulation Training Platform. *Journal of Baotou Vocational and Technical College*, 24(1): 58–61.
- [6] Wang Y, Li Z, Wang L, et al., 2023, Research on Reform and Practice of Engineering Practical Training Course for Automation Specialty – Taking Electrical Control and PLC Integrated Design and Practical Training Course as an Example. *Computer Knowledge and Technology*, 19(5): 166–168.
- [7] Liu B, 2023, Exploration on Practical Teaching Design of PLC Application Technology Course in Full Virtual Environment. *Journal of Tianjin Vocational Colleges*, 25(1): 71–76.
- [8] Fu R, Chen Q, 2022, Design of Comprehensive Practical Training Course of “PLC and Configuration Monitoring” Based on CDIO. *Journal of Electrical and Electronic Teaching*, 44(5): 187–190.
- [9] Liu W, Han Z, Zeng X, 2023, Reform and Practice of Ideological and Political Education in the Course of “PLC System Comprehensive Design and Practical Training”. *Journal of Shaoguan University*, 43(8): 96–100.
- [10] Wang Y, 2022, Research on Practical Training Device of Electrical Control and PLC Control Technology Course. *Agricultural Engineering and Equipment*, 49(3): 43–45.
- [11] Cao Z, 2022, Exploration and Practice of PLC Application Technology Comprehensive Practical Training Course Reform Under the Background of Integration of Industry and Education. *Science and Technology Vision*, 2022(14): 140–142.
- [12] Hu R, Zhang Q, Deng J, et al., 2022, Research on Online and Offline Hybrid Teaching Practice of PLC Precise Positioning Control. *Agricultural Machinery Use & Maintenance*, 2022(5): 145–147.

- [13] Shi X, 2022, Research on the Application of Blended Teaching in Secondary Vocational Training Courses, thesis, Tianjin Vocational and Technical Normal University.
- [14] Mou D, Yang Y, 2022, Construction and Practice of Online Open Course Teaching Resource Base – Taking PLC Advanced Programming Training as an Example. Journal of Kunming Metallurgical College, 38(1): 117–121.
- [15] Jin Q, 2021, Design and Application of PLC Virtual Training Platform. Science and Technology Wind, 2021(22): 1–2.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Study on the Key Points and Paths of the Collaborative Education of Ideological and Political Curriculum

Yong Wei^{1*}, Zheng Zhang¹, Xuefeng Liu¹, Qian Zhao¹, Fujian Yang¹, Dongmin Yin²

¹School of Urban Construction, Changzhou University, Changzhou 213164, Jiangsu, China

²Institute of Urban & Rural Mining, Changzhou University, Changzhou 213164, Jiangsu, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Under the education pattern of “big thinking and politics,” whether the collaborative education function of curriculum thinking and politics and ideological and political courses can be effectively played is related to whether the fundamental task of cultivating people can be really implemented. This paper analyzes the practical significance, existing problems, and characteristics of collaborative education, improves the degree of collaborative education, and puts forward the key points and implementation paths of collaborative education from the four aspects of the education system, teacher team, teaching means, and top-level design.

Keywords: Great ideology and politics; Moral cultivation of people; Ideological and political course; Collaborative education

Online publication: April 28, 2025

1. Introduction

The foundation of a university is to cultivate morality and cultivate people. To make good use of classroom teaching as the main channel, all other courses should maintain a certain channel and plant a good field of responsibility, so that all kinds of courses and ideological and political theory courses will work in the same direction and form a synergistic effect ^[1-2]. In the university curriculum system, the basic task of education is not only to impart knowledge and skills, but also to cultivate students' character and shape correct values ^[3]. Ideological and political teaching should adhere to the unity of explicit education and implicit education, excavate the ideological and political education resources contained in its curriculum and teaching methods, and realize the education of all students in the whole process ^[4]. As a recessive ideological and political education, “curriculum ideological and political education” is the need for the reform of educational ideas and the internal requirement of ideological and political education in colleges and universities ^[5-6].

2. The connotation of curriculum thought and politics

Ideological and political course refers to the curriculum system covering “four main courses + situation policy course + public elective course.” Curriculum Ideological and political course refers to a new educational concept and way with curriculum as the carrier, ideological and political education as the soul, education function and value orientation^[7]. In the “Guiding Outline of Ideological and Political Construction of Curriculum in Colleges and Universities” issued by the Ministry of Education in 2020, the importance of moral education is clearly emphasized, advocating that moral education should be infiltrated into professional education and even the entire teaching process^[8]. Curriculum ideological and political education needs to rely on the curriculum as the carrier, excavate the ideological and political education elements and related resources contained in professional courses, and intentionally lead the value in the teaching of professional knowledge, which is a kind of implicit ideological and political education^[9].

3. The practical significance of collaborative education

The educational resources of ideological and political curriculum and ideological and political curriculum have different emphasis and complement each other. The key point of the collaboration between ideological and political courses and curriculum ideological and political courses is to fully mobilize all course teachers in colleges and universities, strive to make every course and every discipline play a role in educating people, and promote colleges and universities to form full personnel, full courses and all-round education^[10]. Speed up the construction of a collaborative education teaching team composed of teachers from different disciplinary backgrounds with complementary advantages^[11]. Ideological and political teachers can rely on the advantages of “political theory” to help teachers of specialized courses to explore ideological and political elements, grasp the policies of the Party and the state, analyze the international and domestic situations, and do a good job in guiding the political direction of ideological and political courses. With the advantage of “professional quality,” teachers of professional courses can professionally interpret the ideological and political elements such as the craftsman spirit of a great country, the feelings of agriculture and farmers of a great country, the construction of ecological civilization, and the ability of national governance, and provide rich teaching cases for teachers of ideological and political courses with the help of the internal logic of curriculum ideological and political thinking^[12].

4. The current situation and problems of collaborative education

4.1. Current situation of ideological and political education in collaborative education in colleges and universities

In actual teaching, due to the different professional attributes, there is a lack of discussion and communication between teachers of professional courses and teachers of ideological and political courses on the understanding of ideological and political courses. In terms of curriculum, it is difficult to form a common “field of responsibility” between ideological and political courses, which makes it difficult for teachers of professional courses to freely use in the integration of ideological and political elements^[13]. The outstanding performance is in four aspects: (1) The work system of collaborative education is not perfect, the top-level design and overall planning are not enough, and the general pattern of collaborative education has not been established; (2) The teaching content of collaborative education is not optimized, and the curriculum ideology and politics and the curriculum do not really penetrate each other and complement each other; (3) The construction of the teachers’ team of collaborative

education is not in place, especially the teachers of ideological and political courses and teachers of specialized courses are not enough in the same frequency resonance and the same direction in teaching; (4) The assessment and evaluation system of collaborative education is not perfect, the incentive and restraint mechanism is not perfect, and the teachers' enthusiasm in implementing collaborative education is not high.

4.2. There are problems in collaborative education

4.2.1. There is lack of concept and consciousness of collaborative education between ideological and political teachers and non-ideological and political teachers

As for the ideological and political teachers, they do not realize the guiding role of the ideological and political courses in the collaborative education of students. For non-ideological and political teachers, on the one hand, they are relatively unfamiliar with the work of ideological and political education, and they do not know how to carry out, how to integrate and how to cooperate. On the other hand, they do not have a clear understanding of the nature of ideological and political education, and lack of political height. In the past, education and teaching, the emphasis on the professional training of talents often ignores the goal of ideological and political education for students, which leads to the loss of the ideological and political education function that professional courses and general courses should have ^[10].

4.2.2. The exploration of moral education resources in professional courses is not enough

Each professional course in colleges and universities belongs to different subject categories, with different subject backgrounds and characteristics, which makes different courses intangibly follow specific discipline rules in teaching activities, and there is also a narrow "discipline advantage theory" among all kinds of professional courses. Some professional teachers have been working in their professional fields for a long time. In the actual teaching process, they blindly emphasize the importance of the professional courses, emphasize "teaching" and light "education," focus on the teaching of the content of professional courses, and dilute or even ignore the value-leading elements contained in each professional course and the responsibility of educating students ^[4].

4.2.3. Curriculum ideological and political cooperation, ideological and political curriculum implementation measures lack of strength

Powerful measures include a sound system, an organizational system, an evaluation system, and so on. The effective measure guarantee is not only the specific action plan to promote the curriculum ideology and politics, but also the corresponding incentive, reward and punishment measures. As a focus of curriculum thought and politics in recent years, in many colleges and universities, whether at the management level or the teacher level, most of them are in the understanding stage. How to promote curriculum thought and politics and form a situation of collaborative education with ideological and political courses, there are still many gaps in the formulation and introduction of measures, and the mechanism of collaborative education has not been completely constructed ^[2,5].

5. The characteristics of collaborative education

Ideological and political curriculum belongs to the category of recessive education, while ideological and political curriculum belongs to the category of explicit education. The direction and function of ideological and political curriculum and ideological and political curriculum are the same in essence, both of them should adhere to the socialist direction of running a school and give play to the function of educating people. Therefore, to

carry out ideological and political education for college students, we should not only give full play to the core role of ideological and political theory courses, but also give full play to the educational function of professional courses, to combine explicit education with implicit education and realize the effect of creative transformation of ideological and political education from special personnel to all staff. At the same time, both of them are to serve the ideological and political education of college students -- to train the socialist builders and successors of the comprehensive development of morality, intelligence, physical fitness, the United States and labor ^[5].

6. The key points of collaborative education

Ideological and political education in colleges and universities should establish an educational mechanism in which explicit education in ideological and political classes and implicit education in other classes complement each other and complement each other: (1) Adhere to moral cultivation, integrate the cultivation and practice of socialist core values into the basic requirements of the whole process of teaching and educating people, transform discipline resources and academic resources into educational resources, and realize the organic unity of knowledge imparts, value guidance and ability training; (2) Give full play to the core position of ideological and political theory courses in value guidance, tell the Chinese story justly and confidently, and encourage students to consciously integrate their personal ideal pursuit into the cause of the country and the nation, and be pioneers in the forefront of the era; (3) Make all kinds of courses and ideological and political theory courses in the same direction, teachers and students to make good friends, make friends, make friends deeply, carry out the spring breeze to change the rain, moistening the silent education ^[14].

7. The implementation of path analysis

Under the pattern of “big ideology and politics,” to improve the degree of cooperation in education and to do a good job in the collaborative education of professional courses and ideological and political courses, we should start from four aspects: the curriculum education system, the teacher team, teaching means and top-level design.

7.1. Actively build a curriculum education system with the same direction and in the same line

7.1.1. Combine online and offline to build a cooperative education platform

Timely promotion of online course ideology and politics, on the one hand, can realize the organic combination of network and professional education, can timely access to high-quality resources, update educational content, enrich educational forms; On the other hand, it can also promote the connection between the subject and the object, improve the flexibility and immediacy of curriculum education, and realize the ideological education without dead corners, multi-angles and multi-fields, which is an important means to improve the teaching effect of professional courses under the new situation ^[4]. In addition, the exchange and cooperation between ideological and political theory courses and other specialized courses can also be realized through offline ways such as lectures, forums and practical activities related to ideological and political education ^[5].

7.1.2. The demonstration project of “curriculum ideology and politics” will be carried out

Curriculum thought and politics need to be explored, which can be gradually carried out by demonstration. First, to train the ability and skills of college teachers to carry out curriculum thought and politics; The second is to set

up teaching reform projects, build a number of high-quality curriculum ideological and political courses, carry out practical research and practical exploration of curriculum ideological and political cooperation curriculum, accumulate experience, and gradually spread out; The third is to choose a model, in the way of open classes and demonstration classes to play a demonstrative role in curriculum ideological and political effects of the course, and on this basis to promote the role of other courses in curriculum ideological and political. Shanghai and other places, as experimental areas of curriculum thought and politics, started early and accumulated a lot of good experience, which is worth learning from^[5] universities in other regions.

7.2. Build a team of teachers who can teach and educate people in a mutually reinforcing way

7.2.1. The cultivation of teachers is the key link to do a good job in the collaborative education of professional courses and ideological and political courses

Comprehensively promoting curriculum ideological and political construction, and doing a good job of collaborative education work, depends on teachers. It is necessary to strengthen teachers' awareness of education, identify the angle of education, improve the ability of education, and make the curriculum's ideological and political construction practical. To plant a good field of responsibility and create a new pattern of collaborative education, we should strengthen the construction of teachers' ethics, strengthen teachers' political accomplishment and professional accomplishment, gather a consensus on collaborative education, and improve teachers' awareness of initiative, responsibility and self-consciousness in educating students; It is necessary to improve the curriculum ideological and political ability and level of professional teachers by means of special seminars, curriculum ideological and political teaching salons, curriculum ideological and political teaching competitions, and inviting ideological and political experts to guide professional teachers in collective lesson preparation^[4].

7.2.2. Give full play to the main role of teachers and improve the political and professional quality of teachers of specialized courses

In the process of college teachers' collaborative education, teachers of ideological and political courses and other course teachers should take the concept of collaborative education as the premise and basis of education, clarify the relationship between ideological and political courses, curriculum ideological and political education, curriculum intellectual education and curriculum moral education, adhere to the ultimate mission of education and teaching, and run the concept of collaborative education through the whole process of curriculum construction and implementation. Moreover, in daily life and work, college teachers should pay attention to their comprehensive quality, especially the improvement of ideological and political quality, pay attention to the latest current events of the country, timely understand and master the relevant national policies and guidelines, and improve the enthusiasm and initiative learning^[10]. Only by constantly improving teachers' ethics can we realize the organic combination of teaching and education in the process of classroom teaching, and promote all kinds of courses to cooperate with education to play a practical role^[4].

7.3. Explore multi-dimensional teaching methods of collaborative education

7.3.1. Based on the second classroom, flexible professional practice

As an extension of classroom teaching, professional practice teaching can, on the one hand, effectively make up for the shortcomings of theoretical preaching in the traditional classroom, broaden the horizon of thinking, and enable students to deepen their understanding and mastery of important and difficult teaching issues in practical

operation. On the other hand, practical teaching can also better explore and make good use of the value-leading elements in life, so that the form of collaborative education between professional courses and ideological and political courses is more vivid, and the effect of collaborative education is further improved in the imperceptible practical teaching environment. Therefore, the curriculum ideological and political construction of professional courses should also be combined with the actual situation of the course, pay attention to the integration of learning and thinking, the integration of knowledge and action, give full play to the role of the second classroom in educating people, flexibly carry out practical teaching, and cultivate students' innovative spirit of climbing the scientific peak ^[4].

7.3.2. Cooperation in teaching design

For example, professional courses can hire ideological and political teachers to check and discuss the elements of “ideological and political” in the teaching design of the course. In the course preparation, ideological and political teachers can choose cases or materials related to students' majors for classroom explanation, and can build a teaching resource library with teachers of professional courses. Secondly, cooperation in the teaching process. Mainly, ideological and political teachers and professional teachers can listen to each other, teach each other, learn from each other, and jointly promote and improve. The third is to carry out teaching research or scientific research cooperation. With the help of the integration of disciplines, mutual participation in project research can be enhanced to enhance communication and cooperation. There is also cooperation in practical teaching. Through the construction of a normal work cooperation mechanism, enhance the communication between teachers of professional courses and ideological and political courses, penetrate the “ideological and political” elements into every link of teaching, thus expanding the connotation and channels of ideological and political education ^[2].

7.4. Establish a systematic and complete top-level design of collaborative education

7.4.1. Constantly improve the supervision system of “Curriculum Ideology and Politics” collaborative ideological and political courses

Curriculum ideological and political education is a systematic project, it is necessary to improve the supervision system, supervise the implementation effect of curriculum ideological and political education, and strive to build four supervision systems: (1) The system of leading lectures and evaluation; (2) School (department) secondary supervision system; (3) The peer evaluation system; (4) The information collection system of students' classroom teaching. In order to give full play to the collective wisdom of curriculum ideological and political construction, select a group of curriculum ideological and political teachers with high political quality and strong sense of responsibility, and grasp the teachers' performance of curriculum ideological and political responsibilities from various perspectives such as leadership, supervision, peers and students. It can effectively promote the continuous improvement of curriculum ideology and politics, and achieve a high degree of coordination between curriculum ideology and politics ^[5].

7.4.2. The realization of curriculum ideological and political cooperation curriculum, the establishment of a sound and perfect system mechanism is guaranteed

It is necessary to activate all elements of coordination and build a pattern of ideological and political work. Give full play to the leadership core role of the university party committees. Clarify the scope of management and responsibility at all levels, ensure the organizational guarantee for the promotion of the “curriculum ideological and political” education reform, and form an orderly operation mechanism for promotion. Colleges

and universities (departments) are the basic units for the specific organization and implementation of education and teaching reform, and the degree and effect of curriculum ideological and political promotion depend on the degree of attention and promotion intensity of the colleges (departments). It is possible to guide teachers to invest in the construction of curriculum ideology and politics through the key systems of school (department) performance distribution, teacher evaluation, teacher title promotion, etc., improve the system of promoting curriculum ideology and politics, promote the reform and innovation of curriculum ideology and politics, and form a good situation of curriculum ideology and politics in coordination with the curriculum. In this way, the overall pattern of top-level design, overall planning, synergistic linkage and joint operation can be effectively promoted ^[15].

Funding

2023 Industry-University Cooperative Education Project of the Ministry of Education (Project No.: 230803975185316); 2023 Ministry of Education Supply and Demand Matching Employment and Education Project (Project No.: 2023122876207); 2023 Education and Teaching Research Project of Changzhou University (Project No.: GJY2023002; GJY2023011; GJY2023012; GJY2023018); 2022 Changzhou University Curriculum Ideological and Political Demonstration Course; 2023 Jiangsu University Philosophy and Social Science Project Research Topic (Project No.: 2023SJSZ0686); Ideological and Political Work Research Society of Changzhou University 2023–2025 Project (Project No.: 23DJSZ08)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Ge C, Zhu Q, Zhang S, 2023, The Basic Requirements and Realization Path of Ideological and Political Curriculum Collaborative Education in Colleges and Universities. *School Party Building and Ideological Education*, 2023(10): 25–28.
- [2] Xiao X, 2017, A Collaborative Education Mechanism Should Be Established Between Ideological and Political Courses and Other Courses. *China Higher Education*, 2017(23): 14–15.
- [3] Feng X, Zhao Y, Cai W, et al., 2022, Exploration and Practice of the Collaborative Education Model of Integration of Industry and Education in Colleges and Universities. *Laboratory Research and Exploration*, 41(6): 241–243 + 275.
- [4] Wang H, 2021, Research on Collaborative Education Between Professional Courses and Ideological and Political Courses in Colleges and Universities Under the Pattern of “Great Ideology and Politics,” thesis, Hunan University.
- [5] Yuan W, 2020, Research on “Curriculum Thinking and Politics” and the Collaborative Education of Ideological and Political Courses in Colleges and Universities, thesis, Jishou University.
- [6] Xiao Y, 2022, A Study on Co-education of Ideological and Political Curriculum in Colleges and Universities, thesis, Fuyang Normal University.
- [7] Guo Y, 2021, Research on the Countermeasures of “Ideological and Political Curriculum” and “Curriculum Ideological and Political Curriculum” Collaborative Education, thesis, Zhengzhou University.

- [8] Wang Y, 2023, A Study on College Curriculum Ideological and Political Education and Its Collaborative Education, thesis, Northeast Agricultural University.
- [9] Zhang S, 2022, Research on Ideological and Political Curriculum Collaborative Education in Colleges and Universities, thesis, Mudanjiang Normal College.
- [10] Xu T, 2022, Research on the Collaborative Education Between Ideological and Political Curriculum and “Curriculum Ideological and Political” in Colleges and Universities, thesis, Shenyang Normal University.
- [11] Wang H, 2022, Research on the Mechanism of “Ideological and Political Curriculum” and “Curriculum Ideological and Political Curriculum” Collaborative Education, thesis, Wuhan University of Technology.
- [12] Yang X, 2021, Ideological and Political Education in Curriculum and Collaborative Education in Ideological and Political Courses: Premises, Approaches and Mechanisms. *Heilongjiang Higher Education Research*, 39(12): 87–91.
- [13] Pan B, 2022, Research on Collaborative Education Path of Ideological and Political Curriculum in Colleges and Universities, thesis, Hebei University of Science and Technology.
- [14] Gao X, 2017, Research on Ideological and Political Work Mode of University Curriculum Based on Collaborative Education – A Case Study of Shanghai University Reform Practice. *School Party Building and Ideological Education*, 2017(24): 16–18.
- [15] Shi W, 2018, On the Key Points and Effective Implementation of Collaborative Education Through “Curriculum Ideology and Politics”. *Academic Forum*, 41(4): 168–173.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Study on Home-school Cooperative Education Mechanism of College Students' Mental Health Under Precise Ideological and Political Thinking

Yin Peng*, Hongbo Li, Shunjuan Hu, Guiying Sun, Yanyan Zhu, Jun Du

Linyi University, Linyi 276000, Shandong, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In the new era, the “accurate thinking and politics” of adhering to accurate thinking, carrying out accurate service and realizing accurate education has become a new form of ideological and political education, and also marks a new direction for the in-depth cultivation of psychological education in colleges and universities. With the rapid economic and social development, the social environment is constantly changing, and the educational reform advocated cannot keep up with the rapid development of the era, leading to the increasing prominence of students’ mental health problems^[1]. The promotion of students’ physical and mental health has become a common concern of schools and parents. In this subject, the home-school cooperative education of college students’ mental health is based on the trend and gives policies in accordance with the time, and draws wisdom supply from the theory of “precise thinking and politics”, which is of great significance to meet the practical demand of college students’ mental health educators for school-school cooperative education mechanism^[2]. This paper aims to investigate and analyze the current status and existing problems of the home-school collaborative education mechanism for mental health of college students, and innovatively propose the “85421” home-school collaborative education mechanism, with the purpose of improving students’ comprehensive literacy and helping them establish a correct outlook on life and values to lay a solid foundation for their future development in society^[3].

Keywords: Precise ideological and political; Mental health; Collaborative education mechanism

Online publication: April 28, 2025

1. Introduction

The country is moving towards the construction of a modern socialist country, which needs the joint efforts of the whole people. The university period is a critical period of growth. With the popularization of higher education, the group of college students is huge. Their mental health is crucial to the development of potential and skills, but social changes, future uncertainty and other factors have a huge impact on their psychology, and psychological problems are increasing^[4]. This problem has become the focus of colleges and families. According to the 2022 “Mental Health Blue Book,” college students generally face study pressure, and freshmen, especially, feel

pressure and depression during the adjustment period. The family environment profoundly affects the behavior pattern and thinking of college students, and the role of parents is the key. Oliver James pointed out that character is influenced by the family's words and deeds, and changing the way of education is crucial to shaping the future of children. As the early psychological growth environment, the family deeply participates in the mental health education of colleges and universities, and the importance of improving the mental health level of college students is highlighted. As the main body of education, colleges and universities should establish a home-school cooperative education mechanism to promote the development of mental health education^[5].

2. Definition of core concepts

2.1. Connotation and characteristics of accurate thinking and politics

In December 2016, a series of important statements were put forward at the National Conference on Ideological and Political Work of Colleges and Universities, such as "Promoting the high integration of traditional advantages of ideological and political work with information technology" and "teaching according to local conditions, current conditions and aptitude." Accurate ideological and political education is to achieve organic integration and efficient development of ideological and political education through accurate analysis and scientific intervention, personalized, customized educational content and methods. The "precision" of accurate thinking and politics is mainly reflected in the "quantification" of big data on various educational elements and the accurate grasp of the "timing, efficiency and degree" of education^[6]. Accurate ideological and political education, as an important part of higher education in the new era, emphasizes the implementation of accurate and efficient ideological and political education that is student-centered and targeted at individual differences. In college students' mental health education, accurate thinking and politics play an irreplaceable role. It requires educators to deeply understand the psychological needs and characteristics of students, combined with the background of the era and social reality, to develop personalized mental health education programs to effectively improve the psychological quality of students and promote their comprehensive development. On the basis of the ideological and political implementation of moral education and cultivating people, accurate thinking and politics should not only follow general laws, but also use various big data platforms to turn students' education into a series of dynamic loops of teaching, monitoring and feedback, which is conducive to solving various problems and providing accurate educational services, management means and scientific guidance^[7]. Precise ideology and politics are produced in the background of the Internet era. Due to the quantifiable educational information, high timeliness of information acquisition, highly targeted content acquisition, and wide application scenarios, these characteristics make the accurate ideology and politics model can significant improvement in the feasibility and flexibility of ideological and political education, effectively solve various problems of students, and have a strong reality.

2.2. Standards and characteristics of college students' mental health

The traditional biomedical model regards health as the absence of physical abnormalities and disease as abnormal phenomena. In 1948, the World Health Organization (WHO) defined health as a state of complete physical, mental and social well-being. In 1989, WHO further expanded the concept of health to include physical, psychological, social adaptation and moral health. This shift reflects the rise of psychosocial medical models that emphasize the importance of mental health. College students are in the middle of their youth, and their psychology has both universality and particularity. Psychologists point out that college students' mental health covers eight major aspects: normal intelligence, perfect self-awareness, complete personality, sound will, healthy

emotions (stable and appropriate expression), harmonious interpersonal relations and psychological behavior in line with age characteristics. This constitutes a comprehensive and integrated concept that is essential for academic, life, interpersonal and professional development. Maintaining mental health helps people cope with challenges and realize their personal value ^[8].

2.3. Connotation and significance of family-school cooperative education mechanism

The report of the 20th National Congress of the Communist Party of China emphasizes the construction of the mechanism of family, school and community cooperation in educating people and guiding higher education. This mechanism promotes cooperation between families and schools, helps students develop comprehensively, strengthens the effect of education, and ensures healthy growth. The core lies in the combination of the purpose of “educating people” and the means of “coordination,” the integration of resources, the formation of a joint force, each has its characteristics, and constitutes a whole. The family is the first school, parents are the first teachers, and their words and deeds have a profound impact on students’ values. Although college students are adults, they are still deeply influenced by their families, and family relationships is very important to their psychology. The university is not only a knowledge and skills training base, to cultivate thinking, innovation and social responsibility, but also a miniature of society, interpersonal relations, social practice and other psychological impacts are significant. With the continuous progress of the society and the renewal of the educational concept, the home-school cooperative education mechanism is showing the following trends: (1) The deepening of the cooperation content, from a single focus on academic performance to a comprehensive physical and mental development; (2) The innovation of cooperation, the use of modern information technology means to achieve instant communication and information sharing between home and school; (3) The diversification of cooperation subjects, the introduction of social professional institutions and volunteer forces, and the joint construction of a comprehensive mental health education support system ^[9-10].

3. Time value of precise ideological and political empowerment of college students’ mental health, home-school collaborative education mechanism

Precise ideological and political policies inject impetus and practical value into the home-school coordination mechanism of college students’ mental health, significantly enhance the home-school synergy effect, improve the effectiveness and pertinence of education, and build a defense line for spiritual growth. Its core value is to dig deep and cultivate the soil of home-school cooperation, promote the unity of hearts and minds of both sides, and jointly promote the all-round development of students. This collaboration not only focuses on the timely intervention of students’ psychological problems, but also taps the growth potential and fully stimulates it. The core value of the mechanism is to practice the mission of “educating people for the Party and talents for the country,” and through sincere cooperation, cultivate high-quality talents with ideals, beliefs, patriotic feelings and professional skills, to provide talents support for the prosperity and rejuvenation of the country ^[11].

4. The current situation of college students’ mental health and the problems existing in the home-school cooperative education mechanism

The mental health of college students presents a diversified and complex situation. Influenced by the rapid development of society, intensified competition and the Internet, college students are faced with problems such

as study, employment, interpersonal pressure and Internet addiction. Although the home-school cooperative education mechanism is key, it faces challenges such as uneven resources, communication barriers, differences in educational concepts and a lack of professional guidance. At present, we mainly rely on online counselors to cooperate with parents, but due to limited resources and poor communication, the effect is limited. Resource distribution is uneven, mental health education resources in colleges and universities are scarce, and parents pay different attention to them. The lack of a communication mechanism affects information transmission and understanding. Differences in educational ideas lead to conflicts in education. In addition, the lack of professional mental health and counseling guidance further weakens the effectiveness of education ^[12].

5. Effective path for the development of home-school collaborative education mechanism for college students' mental health under precise ideological and political thinking

In the current era of rapid network development, online mental health education platforms have a wide variety of content, without a certain psychological basis cannot be correctly screened, and because most platforms need to pay, most parents and students have limited economic conditions, resulting in when students encounter trouble or trouble, it is difficult to talk to online mental health education platforms or help. Under the concept of precise ideology and politics, the school has mobilized the resources of teachers on campus, coordinated the data platform of various parties online, and relied on big data information technology to continuously improve the basic information of college freshmen from the beginning of enrollment until graduation, to make accurate identification of mental health “barometer,” and customize the dynamic table of psychological development of each student by eight identification ways. Construct a 5-level grid collaborative linkage management system, establish a 4-in-one online work system, a 2-level linkage of home-school cooperation, and a mental health education prevention system of the end ledger ^[13].

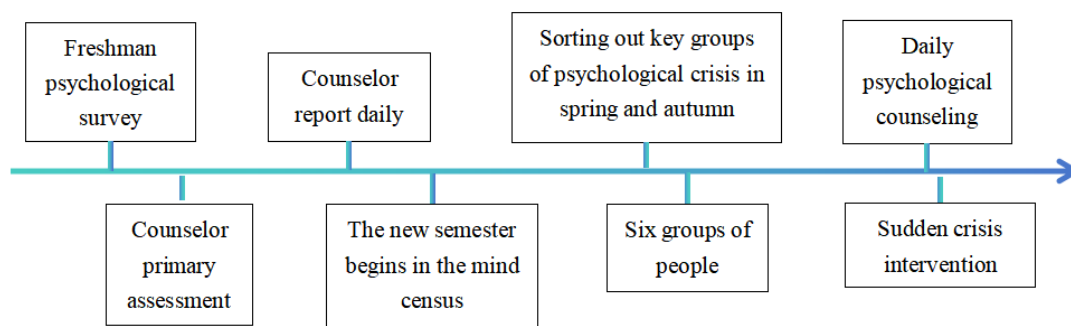


Figure 1. 8 ways for accurate identification. The dynamic table of psychological development of each student was customized using 8 identification approaches.

In order to accurately grasp the psychological development of students, we have designed eight identification ways and created a personalized psychological development table (**Figure 1**). This strategy covers the whole period from enrollment to school, pays attention to the details of students' daily life, and comprehensively promotes mental health. The psychological survey of freshmen laid a healthy foundation, screened problem students through scientific scales, conducted in-depth interviews to fully understand their psychological status, personality and stress coping ability, established a baseline health file, and provided scientific guidance for

follow-up education and counseling. The counselor primary assessment provides rapid professional insight as the first line of management, with an initial assessment completed within one month through files, dormitory observations and attendance records, with special attention to adjustment, emotions and potential psychological distress, providing immediate information for professional intervention.

Counselors report daily to ensure psychological tracking. Establish a mechanism to regularly submit student psychological reports, covering learning, interpersonal, emotional, etc., in order to detect and deal with psychological problems at an early stage. The psychological survey was conducted at the beginning of the new semester to assess the adaptation and provide psychological support. In spring and autumn, psychological surveys will be strengthened, paying special attention to high-risk groups, such as those with academic, family and emotional troubles, and providing intensive care. Focus on six key groups and formulate care plans, including counselling, assistance and support, to help them overcome difficulties. Set up a daily consultation room, equipped with professional teachers, to provide personalized services, covering learning, interpersonal, self-cognition, and emotional management. In emergencies, there are crisis intervention mechanisms to provide immediate assistance and reassurance. Comprehensive eight ways to support students' mental health and promote their all-around development and growth^[14].

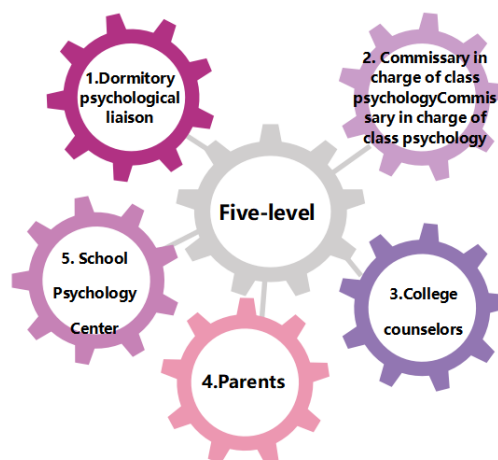


Figure 2. Level 5 grid, accurate customization. To construct a 5-level grid collaborative management mechanism for students' mental health.

We have established a five-level grid mental health management system to achieve accurate care (**Figure 2**). The system includes: (1) Dormitory psychological liaison: grassroots observers, monitoring students' psychological dynamics, recording and reporting abnormalities. (2) Commissars in charge of class psychology: provide initial support, receive feedback from liaison staff, communicate with the class, provide preliminary guidance, and report when necessary. (3) College psychological counselors: provide professional guidance, evaluate cases in depth, formulate counseling plans, organize educational activities, and communicate with parents. (4) Home-school cooperation: Receive feedback from the school, provide family support, and solve psychological problems with the school. (5) School psychological counseling centers: professional core to provide counseling services, respond to crises, and train mental health workers at all levels^[15].

Through five-level close cooperation, this mechanism ensures that students' psychological problems are dealt with in a timely manner, improves the effectiveness of mental health education, promotes home-school cooperation, and guarantees students' mental health growth. The five-level grid collaborative student mental

health management mechanism ensures timely and effective attention and treatment of students' mental health problems through close cooperation and communication between dormitory psychological liaison officers, class psychological committee members, college psychological counselors, parents and school psychological counseling centers. This mechanism not only improves the pertinency and effectiveness of students' mental health education, but also promotes home-school cooperation to jointly escort students' mental health growth.

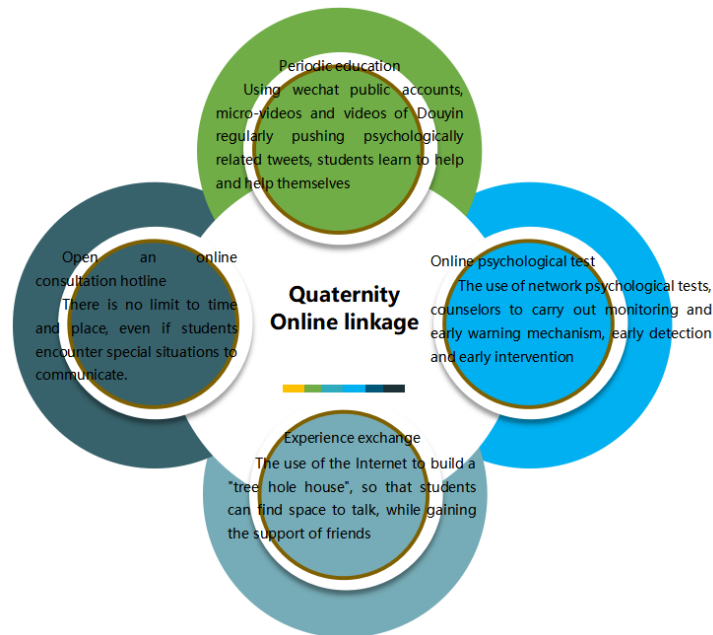


Figure 3. 4-bit integration, accurate guarantee. Establish a 4-person online work system to ensure accurate education.

Build a four-in-one accurate security system and deepen the concept of accurate education (**Figure 3**). We have carefully built an online platform, and regularly publish psychological articles and videos through the public account of "One Heart Together," providing wisdom guidance, nourishing the soul, and helping students to grow up by themselves. Using the network psychological test scale to carry out emotional "physical examination," scientific diagnosis, timely detection of abnormal emotions, to provide a basis for professional intervention. Build a "tree hole house" platform to provide peer help, warm companionship, release pressure, and gain understanding and support from peers. Open psychological network hotline, secret care, connect students and psychological counselors, provide invisible communication channels, widely publicize psychological crisis intervention hotline, and increase students' self-help and safety protection options. Four-in-one precision guarantee, carefully care for students' spiritual growth, and practice the concept of precise education.

6. End ledger, real-time tracking. With the time axis as a coordinate, establish accurate ledger for each student and track in real time

In order to fully and accurately grasp the learning and living status of each student and realize personalized teaching and care, Excel fine management and real-time tracking ensure that each student's growth process can be completely and accurately recorded, providing solid data support for teaching decision-making and student counseling. Each semester, with the time axis as the coordinate, all kinds of information about students are arranged in time order to form a coherent growth trajectory, which is easy to trace and analyze. Students' basic

information, learning progress, extracurricular activities, rewards and punishments, mental health assessment, etc. are recorded in detail to ensure the comprehensiveness and accuracy of the information. Set up a regular review mechanism to check the integrity and accuracy of the ledger records, find problems and correct them in time. At the same time, collect feedback from teachers and students, and constantly optimize the ledger system and management process. Through the implementation of the above programs, we will build an efficient and accurate student tracking ledger system to provide strong support for the comprehensive development of each student.

7. Evaluation and regulation of college students' mental health educators' school cooperative education mechanism under precise ideological and political thinking

In order to promote the effective implementation of college students' mental health education, we should formulate clear evaluation standards and indicators for the home-school cooperative education mechanism, and regularly evaluate the effect of home-school cooperative education, including the improvement of students' psychological quality, the closeness of home-school cooperation and satisfaction. Establish a regular communication mechanism between home and school to share students' mental health status and educational progress in a timely manner, collect parents' opinions and suggestions, and constantly optimize cooperation programs. According to the different psychological needs and characteristics of students, personalized mental health education plans are formulated to ensure that home-school cooperation can accurately meet the actual needs of students. Strengthen the professional training of both home and school in mental health education, improve the professional quality and skill level of educators, and provide strong professional support for home-school collaborative education. To sum up, college students' mental health education under the guidance of precise ideology and politics needs the deep cooperation and support of the home-school cooperative education mechanism. Through a scientific evaluation system, enhanced communication mechanism, personalized education program, and professional support training, we can effectively improve the psychological quality of college students and promote their healthy growth and all-round development.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Hou R, Jin L, He J, 2019, How Learning Strategies Affect Test Anxiety: Construction and Testing of Multiple Mediating Effects Model. *Journal of Southwest University (Natural Science Edition)*, 45(12): 44–55.
- [2] Tang L, 2024, Research on School Coordination Mechanism of College Students' Mental Health Educators. *Knowledge Library*, 40(13): 152–155.
- [3] Bai Q, Li Q, Gu X, et al., 2023, Research on the Working Path of Psychological Education in Colleges and Universities from the Perspective of "Three-Whole Education". *Journal of Jiangsu Shipping Vocational and Technical College*, 22(3): 72–76.
- [4] Ye Q, 2024, Behavioral and Neural Basis of Unconscious Fear Resolution in Individuals With Social Anxiety, thesis, Qinghai Normal University.
- [5] Wang Y, 2018, Dilemma and Strategy of University Mental Health Educators' School Collaborative Education

- Mechanism. *Educational Theory and Practice*, 44(3): 34–37.
- [6] Pan Y, 2023, Research on Accurate Ideological and Political Construction in Universities in the Era of Big Data, thesis, University of Electronic Science and Technology of China.
 - [7] Li H, 2024, The Way to Improve the Sense of Ideological and Political Education of College Students From the Perspective of “Accurate Ideological and Political Education.” *China Transition From Military to Civilian*, 2024(17): 211–213.
 - [8] Xiang C, 2024, China’s Health Needs to Improve the Health Literacy of the Whole People. *Study Times*, 10.
 - [9] Ma C, Liu N, 2024, Research and Practice of “Four-in-One” Collaborative Education Model From the Perspective of Precise Thought and Politics. *Journal of University of Science and Technology Beijing (Social Science Edition)*, 40(4): 26–32.
 - [10] Guo Y, 2022, Precise Thinking and Collaborative Mechanism: The Concept and Problems of “Big Ideological and Political Course” Effectively Integrating Into Home-School Collaborative Education. *Love, Marriage and Family*, 2022(36): 11–12.
 - [11] Chen W, Tan X, 2022, Research on Collaborative Education Between Entrepreneurship and Innovation Education and Ideological and Political Education in Colleges and Universities From the Perspective of Precise Supply. *Educational Exploration*, 2022(5): 36–39.
 - [12] Yang Z, Chen L, Li R, 2023, Research on Field Optimization of Ideological and Political Education in Universities Empowered by Accurate Thinking and Politics. *Educational Exploration*, 2023(2): 33–37.
 - [13] Wang C, 2023, Collaborative Innovation of Ideological and Political Education in Colleges and Universities and Students’ Party Building Work. *College*, 16(26): 60–62.
 - [14] Chen G, 2023, Research on Precise Ideological and Political Work Path Enabled by Data Technology. *Beijing Education (Higher Education)*, 2023(9): 88–90.
 - [15] Wang T, 2019, Research on Differentiated Ideological and Political Education of College Students. *Journal of Jilin Radio and Television University*, 2019(3): 137–138.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ways to Effectively Practice Junior High School English Teaching from the Perspective of Informatization

Haiyan Zhang*

Xizang University, Lhasa 850000, Xizang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: The impact of information technology is pervasive in people's lives, studies, and work. The impact of informatization on education is profound and extensive. Nowadays, the popularization of information technology in the field of education not only enriches the forms and practical methods of education but also has a profound impact on various aspects such as educational philosophy, teaching management, and teaching evaluation. In China, English is a fundamental subject in junior high school classrooms and also an important subject in junior high school entrance exams, which has a significant impact on the long-term academic development of junior high school students. The informatization of English education plays a crucial role in today's education field. Therefore, how to effectively carry out the practice of junior high school English teaching in the context of informatization is a challenge for teachers' quality and ability.

Keywords: Informatization; Junior high school English; Teaching practice

Online publication: April 29, 2025

1. Introduction

In the context of informatization, the education sector is undergoing unprecedented changes, with traditional educational models gradually being overturned and replaced by more open, interactive and personalized teaching methods. Middle school English teaching, as an important subject for cultivating students' language proficiency and intercultural communication skills, also faces the profound influence of information technology education. Information technology education provides rich resources for middle school English teaching, making the teaching content more vivid and diverse. However, the practice of information-based teaching has not gone off smoothly. How to effectively integrate information-based resources and fully utilize the function in junior high school English teaching has become an urgent problem to be solved in current educational practice. This article not only aims to explore how to effectively practice junior high school English teaching from the perspective of informatization, but also analyzes the role of informatization teaching in junior high school English teaching and

proposes specific coping strategies. Through the research in this article, we hope to provide useful references and inspirations for the informatization practice of junior high school English teaching.

2. The role of junior high school English teaching in the context of informatization

2.1. Expand learning methods and enrich teaching resources

By utilizing information technology, teachers can showcase a variety of teaching resources to students in the classroom, such as multimedia courseware, micro videos, online dictionaries, speech databases, corpora, and so on. These resources can help students better understand and master English. Middle school English teachers can use multimedia courseware for teaching, by connecting learners' real-life experiences and environments, selecting examples that are close to life and have characteristics of the times, and with the assistance of information technology, displaying things related to dialogues, short texts, and unit themes in English textbooks on smart screens. This vivid and visual presentation can create vivid situations for students, allowing them to immerse themselves in the scene and stimulate their thinking and interest in learning through pictures or text. Teaching courseware can provide teachers with more choices and rich teaching materials, greatly meeting the needs of English teachers for expanding teaching resources ^[1]. Middle school English teachers can also enhance students' learning interest and language proficiency by using a voice library and corpus in the classroom. As a specialized corpus, learners' voice library databases not only have significant implications for applied linguistics research in second language acquisition, but also have equally important practical significance for foreign language teaching ^[2]. The voice database can focus on the theme content of the textbook, helping students familiarize themselves with and master the content of the textbook. A voice library can provide students with a large number of opportunities for listening, distinguishing, following, imitating, and practicing oral conversations. On the other hand, in junior high school English classrooms, teachers can utilize the rich language resources in corpora to expand students' learning methods. The samples in the corpus are all from real-life scenarios, which helps students understand the practical application of English, cultivate their context perception ability, and enrich their language expression materials. Corpus provides a large amount of authentic materials for English teaching, which can make up for the shortcomings of the real English language environment and promote the cultivation of autonomous learning ability ^[3]. For middle school students who are in their adolescence, their curiosity are strong, so using information technology teaching methods and interesting classroom content can better stimulate their learning motivation.

2.2. Promote teacher-student interaction and enhance learning experience

Network technology is a technical means of using computer networks for information transmission and interaction ^[4]. With the assistance of information technology, middle school English classrooms can promote teacher-student interaction through various means, such as multimedia teaching and online teacher-student interaction platforms. Through the application of network technology, teachers can establish a global foreign language learning community, allowing students to communicate and share knowledge anytime and anywhere ^[5]. Through multimedia materials such as pictures, audio and video, English teachers can combine Internet information with each topic in the textbook to create a dynamic teaching situation. These teaching scenarios that are close to students' actual lives can attract students' attention, help teachers guide students to participate in topic discussions, and thus enliven the atmosphere of the English classroom. Online interactive platforms can help English teachers integrate teaching resources, such as English videos, audios, reading

materials, grammar exercises, English word banks, etc. These resources can provide students with diverse learning experiences, helping them understand and master English knowledge from multiple perspectives through online interaction with teachers. English teachers can also track students' learning trajectories and task performance through online learning management systems, further deepening their understanding of students' weak points in knowledge. This helps teachers provide targeted guidance and assistance based on students' personalized needs and difficulties, promoting one-on-one interaction and communication between teachers and students online. The personalized needs of students are reflected in fully exerting their autonomy, selectivity, and subjective initiative. Teachers should make full use of the diverse presentation methods and abundant teaching resources of information technology to enhance students' learning interest, achieve personalized teaching, and enable students to achieve diversified development ^[6].

2.3. Innovate teaching methods and improve teaching efficiency

For English teachers, the application of information technology in English classroom teaching is not only a simple combination of technological applications, but also a fundamental transformation of teaching methods and teaching concepts. First of all, information-based teaching provides English classes with a variety of teaching resources. Compared to traditional textbooks and other educational resources, digital resources have rich and profound teaching advantages, which are conducive to continuously promoting students to deepen their impression of English knowledge, enabling them to flexibly apply the knowledge they have learned to real-life situations, and greatly improving the practicality of English teaching ^[7].

3. The challenges faced by classroom teaching in the context of informatization

3.1. The imbalance in information technology teaching resources

There are significant differences in information technology teaching resources among different regions and schools. Schools in economically developed regions will have more advanced information technology and richer teaching resources, such as electronic libraries, online courses, electronic whiteboards, etc., providing students with more diverse and personalized learning experiences. The intelligent learning environment, through the deep integration of technology and education, can maximize the optimization of students' learning and teachers' teaching, which is the foundation and key to achieving personalized and differentiated teaching ^[8]. However, due to objective reasons such as insufficient funding, geographical environment and outdated technology, some underdeveloped areas have relatively scarce information technology teaching resources in schools. Students' learning methods and resources are greatly limited, and objective factors make it difficult for some students to enjoy high-quality information technology teaching.

3.2. The informationized ability of teachers needs to be improved

In the context of educational informatization, information technology training for teachers is essential. This is not only an important way for teachers to deepen their information technology education concepts, but also a necessary means to improve their informationized teaching abilities ^[9]. For teachers, they should participate in the information technology application training organized by the school on schedule, which helps them to timely grasp the latest teaching technology platforms and tools, and promote the formation of a foreign language education informationization concept. At the same time, teachers should actively participate in teaching observation activities, allowing themselves to learn from others' excellent teaching methods and information

technology application methods in practice.

3.3. It's hard to guarantee the quality of students' learning quality

The traditional English teaching process focuses on teachers' leadership, while the development of information technology requires more emphasis on students' self-directed and cooperative learning. This transformation may be a challenge for many teachers and students. In the process of information-based teaching, learners need to frequently use electronic devices to participate in learning activities, which may lead to difficulties in self-regulated learning without the help of electronic devices or network information. In the context of informatization, students are prone to distraction when using online learning platforms and may not receive immediate monitoring and feedback from teachers. Long-term use of electronic devices may also weaken students' self-management abilities, ultimately affecting normal learning and life.

4. Teaching strategies for junior high school English under the background of informatization

4.1. Create English learning contexts

Situational teaching can cultivate students' innovative thinking and problem-solving abilities. In the context of informatization, teachers need to fully utilize the advantages of information technology to create middle school English learning scenarios in the classroom. By utilizing the situational and authentic nature of information technology, teachers can create scenarios that are relevant to the classroom theme and as realistic as possible, thus to activate students' reserve experience, stimulate their learning interest and further thinking.

4.2. Integrate informationized teaching resources

Firstly, English teachers need to clarify the goal of integrating informationized teaching resources. Only by clarifying the goal can they select and adjust resources that are suitable for the teaching subject and teaching environment in a targeted manner. Secondly, English teachers should pay attention to the diversified integration of informationized teaching resources, presenting teaching content in various forms such as text, images, tables, animations, videos, etc., making English knowledge more vivid and intuitive. At the same time, this also changes the conventional way of presenting knowledge that relies on teachers' oral and written expression^[10]. By integrating diverse resources, students can gain a more comprehensive and three-dimensional learning experience. Meanwhile, English teachers should also consider the personalized needs of students while integrating informationized resources. Teachers should choose and integrate teaching resources reasonably based on students' interests, vocabulary, verbal ability, and English learning strategies.

4.3. Innovate teaching modes and optimize teaching methods

In the middle school English classroom assisted by information technology, the traditional teaching philosophy of "teacher teaches and student learns" has significantly changed. Under the influence of the concept "sharing" on the internet, a large number of cloud-based online learning resource platforms have been established, and learning has entered the stage of "sharing and co-building" of resources^[11].

To further illustrate, when teaching Unit 9, "Have you ever been to a museum?" in the eighth-grade textbook of People's Education Press, teachers can use multimedia teaching resources to share pictures or short videos of famous museums around the world with students during the introduction stage. Students can also use

online map apps on multimedia computers to mark the approximate geographical locations of famous museums around the world, and teachers can guide students to understand the historical background of these museums. In the presentation and output stage, teachers can showcase the key vocabulary and sentence patterns of this unit on the PPT and guide students to describe the corresponding pictures and videos using the learned vocabulary and sentence patterns, combined with the visual information conveyed by multimedia in the introduction stage. Meanwhile, through the use of online maps, teachers can guide students to plan their “virtual museum trip” by using sentence patterns such as “I will go to...” or “I plan to visit...” and share their travel plans in class. Then, the teacher will invite another group of students to retell the travel plans of the previous group using sentence patterns such as “He/She has been to...” or “He/She has gone to...”. With the help of information technology, teachers use computer applications to assist teaching, which not only attracts students’ classroom attention, improves their classroom participation, but also helps students combine different tense knowledge points in the output stage to complete English expression tasks in daily life. Teachers can also recommend English background knowledge, movies, etc., related to the present perfect tense based on students’ interests and hobbies. For example, the movie Titanic has many uses of the present perfect tense in its dialogues, which can help students better understand and master it ^[12].

4.4. Improve English teaching evaluation

In the context of informatization, teachers can use various evaluation tools, such as online quizzes, electronic learning records, online learning logs, etc. These evaluation tools can reflect students’ current learning situation from different perspectives, thereby providing teachers with more comprehensive and accurate evaluation information. With the rapid development of information technology today, teachers can choose suitable online learning software based on their own teaching needs and students’ personalized development, such as Chaoxing Learning. Chaoxing Learning Platform “is a learning platform for mobile devices, which has strong technical support and makes virtual online teaching more tangible ^[13]. English teachers can create periodic grammar knowledge point tests for students online by utilizing the question bank function of Chaoxing Learning or by adding questions themselves. Teachers can not only set limitations on the testing time, option order, and number of answers during the creation process, but also monitor students’ answering behavior through the system backend. After the quiz test, the teacher can use the software-generated data-driven report to analyze the learning situation and mastery level of English subjects among the students in this class. It is convenient for English teachers to adjust teaching strategies and priorities after analyzing the results, better understand the learning situation of students with different ability levels, and more effectively help students improve their English ability.

In addition, English teachers can also use e-learning portfolios in classroom teaching. An electronic learning portfolio can help teachers record students’ learning progress, such as classroom participation, online test scores, offline exam scores, etc. Students can also independently upload study notes, English question sets, homework photos, etc., on their electronic learning portfolios. Teachers can not only regularly review students’ electronic learning records, but also provide personalized evaluations and suggestions based on the content of the learning records. The electronic portfolio utilizes information technology to present the learning process, reproduce the context of student participation in activities, and reflect the integration of learning and evaluation ^[14]. The use of information technology to improve teaching evaluation in junior high school English classrooms is a comprehensive and systematic process. In this process, English teachers need to constantly explore and practice to adapt to the educational needs of the information age and improve their teaching quality.

5. Conclusion

The trend of educational informatization is unstoppable^[15]. In the context of informatization, the practical exploration of junior high school English teaching has shown broad prospects and profound changes. Through the discussion in this article, it is not difficult to find that information-based teaching plays a crucial role in junior high school English teaching, which can not only enrich teaching resources, stimulate students' interest in learning, but also improve teaching efficiency and quality. However, the practical path of information-based teaching still faces difficulties such as uneven resource allocation and insufficient information technology capabilities of teachers. In response to these issues, this article proposes strategies for effectively utilizing information-based teaching in junior high school English classrooms, aiming to break through difficulties and promote the in-depth development of information-based teaching by integrating high-quality resources, strengthening teacher training, innovating teaching models, and other means. Looking ahead to the future, with the continuous advancement of information technology and innovation of educational concepts, the practice of junior high school English teaching in the context of informatization will become more diverse and enriched, contributing greater strength to the cultivation of talents with international perspectives and cross-cultural communication abilities.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Chai L, 2021, Research on the Deep Integration of Junior High School English Teaching and Informatization Education Based on "Internet Plus." Reading and Writing, 18(10): 136.
- [2] Chen H, Li A, 2008, The Necessity and Concept of Creating an English Phonetic Database for Chinese English Learners. Foreign Language Research, 2008(5): 50–54 + 27.
- [3] Chen X, Du G, 2007, Corpus and Information Technology Teaching: A Perspective on English Teaching. Modern Intelligence, 2007(3): 189–191.
- [4] Li W, 2024, Research on Innovative Thinking in Foreign Language Teaching in the Era of Educational Informatization. English Square, 2024(4): 103–106.
- [5] Lu Q, 2022, Exploration of the Practical Difficulties and Optimization Strategies of Informationization Transformation in Foreign Language Education in Colleges and Universities. Journal of Shanxi Economic Management Cadre College, 30(4): 72–76.
- [6] Zhang P, 2023, The Current Situation and Improvement Strategies of Information Technology Teaching Ability of University Teachers in the Era of Artificial Intelligence: Taking Hubei University of Economics as an Example. Journal of Hubei University of Economics (Humanities and Social Sciences Edition), 20(1): 126–129.
- [7] Song Y, Liu T, 2024, Research on Junior High School English Informatization Teaching in the Era of "Internet Plus." Journal of China Multimedia and Network Teaching (The Second Ten Day Issue), 2024(1): 138–140.
- [8] Yu S, Wang A, 2016, The Transformation Path of "Internet+Education." China Audio Visual Education, 2016(10): 1–9.
- [9] Hu T, 2025, Research on Enhancing the Role Positioning of Teachers in the Context of Educational Informatization. Journal of Shenyang Agricultural University (Social Sciences Edition), 1–7.

- [10] Liu M, 2019, Analysis of Teacher Role Positioning in the Information Age. *Journal of Qilu Normal University*, 34(6): 16–23.
- [11] Qiao X, Li M, 2022, The Transformation of Learning Systems and the Reshaping of Teacher Roles in the Era of Educational Informatization 2.0. *Education and Teaching Research*, 36(6): 68–80.
- [12] Song W, Mu Y, 2023, Exploration of Situational Teaching in Junior High School English Under the Background of Educational Informatization. *English Teacher*, 2023(1): 20–24.
- [13] Liu Y, 2023, Exploration of Blended Teaching Mode for College English SPOC Based on Chaoxing Learning Platform. *Proceedings of the Guilin Branch Forum of the 2023 Higher Education Research Forum School of Foreign Languages, Xichang University*, 2.
- [14] Ju X, 2019, Promoting Students' Autonomous Learning Through Electronic File Bags. *Education*, 2019(37): 30–31.
- [15] Tao X, 2015, The Three Controversies of Online Education in the Cloud Era to Be Resolved. *Shitao Journal*, 2015(December): 4.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Exploration on the Construction of Wisdom Classroom for Biological Science Majors

Chuan-Lei Dong*

School of Life Sciences, Xinjiang Normal University, Urumqi 830017, Xinjiang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the advancement of education information technology, smart classrooms, as a new teaching mode, have been paid more and more attention in college teaching. This paper focuses on the teaching characteristics of biological science majors and deeply discusses the building elements of a wisdom classroom in teaching this major. Through the discussion of teaching design, teaching resources, interactive teaching, and other aspects, the paper puts forward the specific strategies of the construction of a smart classroom. Combined with practical cases, it verifies the remarkable effect of the smart classroom in improving the teaching effect of the biological science major and promoting students' innovative thinking ability. The purpose of this study is to provide theoretical support and practical guidance for the construction of a smart classroom for biological science majors and other related majors.

Keywords: Smart classroom; Biological science major; Education informatization

Online publication: April 28, 2025

1. Introduction

With the deepening of education reform, the traditional classroom teaching model can no longer meet the needs of talent training in the new era. In this context, the smart classroom came into being and has become an important breakthrough in education reform^[1]. In recent years, with the rapid development of biological science, biotechnology has become an important part of the national strategic emerging industries, and the demand for biological science professionals is growing. However, there are some limitations in the traditional teaching mode of bioscience in cultivating students' innovative ability and practical ability. As a teaching mode integrating modern information technology, the smart classroom provides a new idea for the teaching reform of the biological science major^[2]. By optimizing the distribution of teaching resources and realizing the sharing of resources with the help of information technology, a smart classroom effectively reduces the cost of education^[3]. At the same time, smart classroom plays an important role in cultivating students' innovative thinking, practical skills and comprehensive qualities, which is highly in line with the goals of the current education reform, especially in biological sciences, where the cultivation of these abilities is crucial for students' future career development^[4]. Therefore, an in-depth discussion of the construction and development trend of smart classrooms

has far-reaching theoretical value and practical significance for promoting education reform.

2. Building elements of smart classroom for biological science majors

2.1. Teaching objectives of wisdom classroom construction

In the process of building a smart classroom for biological science majors, the setting of teaching objectives should be forward-looking and closely follow the latest research progress and technological innovation in the field of biological science. This aims to ensure the development of professionals who can meet the needs of society in the future. Specifically, the teaching objectives of the Wisdom Classroom for bioscience professionals cover three core areas. The first is the knowledge objective, which aims to enable students to fully master the basic theories, core knowledge and key skills of biological science, and keep pace with the frontier of the subject. Through interactive and inquiry-based learning, students will deepen their understanding of biological science concepts and improve their ability to apply knowledge. The second is the ability goal, which aims to train students to have experimental operation skills, data analysis ability, scientific inquiry method, critical thinking ability and innovative problem-solving ability. At the same time, the application of information technology and interdisciplinary collaboration ability should be strengthened to ensure that students can effectively use the knowledge and skills they have learned in future scientific research work or practice in related fields, to maximize their personal and social value. The last is the quality goal, which aims to comprehensively improve students' comprehensive quality, including scientific literacy, teamwork spirit, independent learning ability and social responsibility, as well as strengthen innovation awareness and practical ability. Through the realization of these goals, the aim is to shape biological science professionals to meet the needs of modern social development ^[5].

2.2. The teaching content of smart classroom construction

In the process of building a smart classroom for biological science majors, the selection and design of teaching content must be closely related to the characteristics and development trend of the biological science field. First of all, the teaching content should be scientific and systematic, covering the basic theory, core knowledge and experimental skills of biological science comprehensively, so as to ensure that students can build a solid professional foundation. Secondly, the teaching content should highlight its cutting-edge and contemporary nature, be updated in time, and integrate the latest scientific research results and technological developments into the curriculum, so that students can timely understand and master the latest developments in the field of biological sciences. Thirdly, the teaching content should emphasize practicality and application, and cultivate students' ability to transform theoretical knowledge into practical application through case teaching, project-driven, experimental operation, and other teaching methods, to enhance students' practical operation skills and problem-solving ability. In addition, the teaching content should be extensible and flexible, by providing rich online resources, interactive platforms and personalized learning paths, to meet the learning needs and interests of different students, and promote the personalized development of students and the cultivation of lifelong learning ability. Finally, the design of teaching content should focus on interdisciplinary integration, encouraging students to combine their knowledge of biological sciences with other subject areas such as mathematics, physics, chemistry and information science, so as to cultivate compound talents with innovative thinking and interdisciplinary problem-solving abilities ^[6].

2.3. The teaching method of smart classroom construction

In the process of building a smart classroom for biological science majors, teaching methods, as the key means to achieve educational goals, must be closely combined with modern information technology to establish a student-centered teaching concept. First of all, interactive teaching constitutes one of the core features of a smart classroom. With the help of an intelligent teaching platform, teachers should effectively promote teacher-student interaction and collaboration among students through online discussion, real-time question-and-answer, group cooperation and other forms, so as to stimulate students' enthusiasm for learning and awareness of participation^[7]. Secondly, as a typical model of smart classroom, blended teaching skillfully integrates online resources with traditional offline teaching, and makes use of digital textbooks, online courses, virtual laboratories, and other rich resources to achieve seamless connection inside and outside the classroom. In addition, the case teaching method plays a crucial role in the smart classroom. By analyzing real biological science cases, students can combine theoretical knowledge with practical problems, thereby improving their ability to analyze and solve problems. Finally, experimental practice teaching, as an indispensable part of biological science professional education, intelligent classrooms should use virtual simulation technology to simulate the experiment process, so that students can carry out experiments in a safe virtual environment to enhance their practical skills.

2.4. Teaching evaluation of smart classroom construction

In the process of building a smart classroom for biological science majors, a perfect teaching evaluation system should be comprehensive, scientific, real-time, and developmental, to meet the specific characteristics and needs of smart teaching. First of all, the wisdom classroom teaching evaluation emphasizes the use of diversified evaluation methods. In addition to the traditional written test and experimental operation exam, it also includes online tests, oral reports, group projects, learning logs and other forms, so as to comprehensively evaluate students' comprehensive qualities such as knowledge mastery, practical ability, innovative thinking, and teamwork. Secondly, the teaching evaluation of the wisdom classroom focuses on the process evaluation. Through the intelligent teaching platform, teachers can track students' learning behavior, participation, and learning progress in real time, make formative evaluation of students' learning process, find problems in time and provide guidance. The teaching evaluation of smart classrooms aims to provide customized learning suggestions and growth paths for each student, and help students find their interests and strengths in the field of biological science^[8]. To sum up, the teaching evaluation of the biological science professional wisdom classroom is a comprehensive, dynamic and developmental process.

3. The strategy of building smart classroom for biological science majors

3.1. Curriculum design strategies for the construction of smart classroom

In the smart classroom for biological science majors, the core of the course design strategy lies in the deep integration of modern educational technology and biological science teaching content, aiming to create an efficient and interactive learning environment. Course design should follow the principle of reverse design, start from the expected learning outcomes, clarify the course objectives and ability requirements, and ensure that the teaching content is consistent with the development trend of the industry and the needs of students' career development^[9]. By constructing a hybrid learning model, online resources are organically integrated with offline activities, and means such as multimedia and network platforms are utilized to expand the spatiotemporal scope of teaching. In the course design, special emphasis should be placed on practicality and inquiry. Through

teaching means such as virtual laboratory and case analysis, students can deeply master biological science knowledge in simulated practice. The curriculum evaluation system should adopt diversified strategies, combine process evaluation and summative evaluation, and comprehensively evaluate students' learning effectiveness. By implementing these strategies, smart classrooms for biological sciences majors can significantly improve the quality of teaching and produce talents in the biological sciences who can adapt to the challenges of the future.

3.2. Teaching resource strategies for smart classroom construction

Teaching resource strategy occupies a core position in the strategy of building a smart classroom for biological science majors, which aims to significantly improve the teaching effect by optimizing the allocation of resources. The diversification of teaching resources is the key to achieving this goal, which should cover various forms such as teaching materials, online resources, experimental materials, video lectures, etc., to adapt to students with different learning styles and needs. The integration and sharing of resources is an important way to realize the optimal utilization of resources. A perfect resource library should be established, and the quality resources should be carefully classified and sorted out, so that teachers and students can quickly retrieve and effectively use these resources. At the same time, the dynamic update of teaching resources cannot be ignored, and the latest research progress and technological dynamics in the field of biological science must be closely followed to ensure the timeliness and advanced nature of resources ^[10]. In addition, the interactive and experiential nature of resources should be strengthened, and cutting-edge technologies such as virtual reality and augmented reality should be utilized to provide students with an immersive learning experience. Personalized and customized teaching resources are also a part that cannot be ignored. Through data analysis, we can deeply understand students' learning preferences and push customized learning content. Through the implementation of these strategies, the biological science professional wisdom classroom will be able to provide students with rich, efficient and personalized learning resources, so as to effectively improve the teaching quality and learning effectiveness ^[11].

3.3. Interactive teaching strategies for smart classroom construction

An interactive teaching strategy plays a crucial role in the construction strategy of a smart classroom for biological science majors. To achieve this goal, the strategy advocates the use of a range of flexible and diversified interactive teaching methods, including but not limited to discussion teaching, group cooperative learning and role playing, which are designed to stimulate students' critical thinking and effective communication skills. At the same time, with the help of modern information technologies, such as online question-and-answer platforms, instant feedback systems and interactive multimedia tools, the strategy effectively breaks through the limitations of time and space in traditional teaching and promotes smooth communication and exchange between teachers and students ^[12]. The interactive teaching strategy also emphasizes the transformation of the teacher's role from the traditional knowledge transmitter to the guide and facilitator of the learning process. In addition, the strategy encourages the active participation of students and enables them to learn and explore in real operation through practical teaching activities such as project-based learning and experimental design ^[13]. Through the implementation of these interactive teaching strategies, the wisdom classroom for biological science majors can create a dynamic and efficient learning environment, which can promote the overall improvement of students' comprehensive quality.

4. Practice cases of smart classroom for biological science majors

In a biological science major at a university, a team of teachers is committed to innovative teaching of Molecular Biology. Based on the advanced concept of “Internet Plus”, they have carefully built a bilingual wisdom classroom ^[14]. The implementation of this teaching model aims to promote the innovation of molecular biology teaching concepts, the diversification of teaching forms, and the systematic cultivation of biological science thinking. Through this series of educational reforms, it can not only comprehensively improve the quality and level of teaching but also effectively optimize the current teaching situation and further stimulate the potential of students to carry out deep learning.

In the bilingual wisdom classroom, teachers make use of multimedia and network resources to combine traditional classroom teaching with online interaction, providing students with a more vivid and intuitive learning environment ^[15]. Students can preview the course content through the online platform, while in class, group discussions and case studies are used to delve into cutting-edge issues in molecular biology. In addition, teachers encourage students to participate in scientific research projects, combining theoretical knowledge with practice to cultivate their ability to innovate and solve practical problems. The implementation of this teaching model not only improves students’ interest in learning but also strengthens their understanding and application ability in the field of biological science.

5. Conclusion

In the process of higher education teaching reform, the construction and exploration of a wisdom classroom for biological science majors is a fruitful attempt. Practice has proved that a smart classroom has significant advantages in improving teaching effect and cultivating students’ comprehensive quality. However, the construction of a smart classroom still needs to be explored and improved in practice. We expect more educators to devote themselves to the research and practice of a smart classroom, and jointly promote the development of bioscience education.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Zhang Y, Zhang X, 2024, The Application of Smart Classroom in Teaching. *China Modern Educational Equipment*, 20: 70–72.
- [2] Xu D, Wang Z, Guo D, et al., 2023, Thinking and Practice on the Reform of Biology Teaching Method in College. *Zhejiang Medical Education*, 22: 199–204.
- [3] Yu H, 2022, Construction and Application of Smart Classroom Model in Biology Teaching. *Biology Teaching in Middle School*, 35: 19–22.
- [4] Peng L, 2024, Research on Data-Driven Smart Classroom Precision Teaching Model. *Modern Vocational Education*, 30: 33–36.
- [5] Chen Z, Liu G, Wu X, et al., 2016, Reflections on the Curriculum System Setting of Biological Science (Normal) Major in Local Colleges and Universities – A Case Study of Huizhou University. *Journal of Hubei Correspondence*

University, 29: 103–104.

- [6] Gao J, 2023, Strategies for Constructing Intelligent Classroom Teaching Model in Colleges and Universities from the Perspective of Deep Learning. *Education and Teaching Forum*, 38: 145–148.
- [7] Ni G, 2024, Research on Activity Structure Design and Practice of Deep Learning in Smart Classroom. *Forestry Teaching*, 12: 120–124.
- [8] Yu H, Yin H, Liu M, 2021, Intelligent Classroom Teaching Evaluation System. *Office Automation*, 26: 6–8.
- [9] Ren Y, 2023, Research on the Evaluation System of Smart Classroom Teaching Effect Under the Background of Big Data. *Journal of Higher Education*, 9: 91–94.
- [10] Tao W, 2024, Intelligent Classrooms Inject Vitality into Collective Teaching. *Primary School Science*, 22: 142–144.
- [11] Jin X, Xing B, Yang X, et al., 2019, Data Flow Mechanism and Ecosystem Construction of Smart Classroom. *China Distance Education*, 4: 74–81.
- [12] Shao A, 2022, Teachers in the New Era Create “New Intelligent Classrooms.” *Forum on Basic Education*, 27: 112.
- [13] Yun Q, Xu S, 2012, Some Thoughts on Classroom Interactive Teaching Strategies. *Journal of Shanxi Radio and Television University*, 17: 3–5.
- [14] Qi R, Guo X, Wu X, et al., 2021, Construction of Bilingual Molecular Biology Wisdom Classroom Based on “Internet +”. *Biology Teaching Research in Universities (Electronic Edition)*, 11: 21–25.
- [15] Zhang C, Du C, 2018, Exploration and Practice of Bilingual Teaching in Molecular Biology Course for Graduate Students. *Education and Teaching Forum*, 17: 164–165.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Significance and Path of the Organic Integration of High School English Teaching and Chinese Excellent Traditional Culture

Jing Su*

Senior High School of Gongliu County, Yili 835400, Xinjiang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Under the background of the current education reform, combining high school English teaching with excellent traditional Chinese culture can not only enrich the content of English teaching, but also enhance students' sense of identity and pride in their own culture. Therefore, teachers should be aware of the importance of traditional culture, the use of multi-form teaching methods in English teaching to penetrate traditional culture. In this way, it can not only stimulate students' interest in learning, but also help them to deeply understand and inherit traditional culture while learning English, feel the profound heritage and unique charm of traditional culture, and enhance students' intercultural communication ability, so as to comprehensively improve the effectiveness of senior high school English teaching. In this regard, this paper first expounds the significance of integrating excellent traditional Chinese culture in senior high school English teaching, and then puts forward effective ways to integrate it, in order to provide some references for relevant education researchers.

Keywords: Senior high school English; Teaching; Excellent traditional Chinese culture; Organic fusion

Online publication: April 28, 2025

1. Introduction

With the acceleration of globalization, integrating excellent traditional Chinese culture into senior high school English teaching can help enhance students' cultural confidence and sense of national identity, encourage them to introduce the essence of excellent traditional Chinese culture to the world, and promote cultural exchange and dissemination^[1]. At the same time, integrating traditional culture into English teaching can make the English classroom more vivid and interesting, and students can understand and master the spiritual connotation of excellent traditional Chinese culture in the English learning process, better demonstrate the charm of traditional Chinese culture in cross-cultural communication, and continuously enhance their English language skills, so as to promote students to achieve all-round development in a real sense. Grow into the talents of the era needed by society.

2. The significance of integrating excellent traditional Chinese culture in senior high school English teaching

2.1. It is conducive to enhancing students' intercultural communication ability

Under the background of the new curriculum reform, teachers should focus on cultivating students' cultural awareness, guiding them to root the correct values in their hearts, continuously enhancing their sense of identity and self-confidence of traditional culture, and taking the initiative to carry out cross-cultural communication. In the process of intercultural communication, due to the obvious differences in language and cultural background of the two sides, students are required not only to continuously consolidate their English foundation, but also to establish a high degree of cultural self-confidence, and to flexibly use English to introduce China's excellent traditional culture to foreign friends, so that traditional cultural features can be vividly displayed ^[2]. The organic integration of traditional culture and senior high school English teaching can promote students to take the initiative to compare the similarities and differences between traditional Chinese culture and other cultures on the basis of learning English knowledge, thus effectively enhancing students' cross-cultural communication ability and better using English to "tell Chinese stories" ^[3].

2.2. It is conducive to enhancing the quality of students' innovative thinking

Under the current educational background, it is advocated that students can recognize and observe the world from different angles and dimensions, which requires teachers to pay attention to cultivating students' innovative thinking and guiding them to think deeply about what they have learned ^[4]. In addition, at present, more English test questions are increasingly related to traditional culture, such as introducing Chinese traditional festivals to foreign friends, inviting foreign teachers to celebrate the Spring Festival, introducing Chinese historical figures and so on. Through the infiltration of traditional culture in English teaching, teachers focus on cultivating the quality of students' innovative thinking, which not only enables them to deeply understand and understand the deep connotation of traditional culture, but also innovatively think about the similarities and differences between Chinese traditional culture and Western culture, and then flexibly transfer and use English knowledge ^[5].

2.3. It is conducive to the development of students' English language ability

Nowadays, the focus of the test of English language ability has changed from "the acquisition of English knowledge in a simple classroom situation" to "the use of English in a real-life situation." Therefore, the traditional English knowledge teaching mode has been unable to activate students' subjective initiative, difficult to take the initiative to participate in English teaching, resulting in students' difficulty in acquiring flexible English language knowledge for oral communication, and thus unable to effectively cultivate students' language ability. In the process of integrating traditional culture, teachers will create multi-form communicative situations in combination with teaching content, such as introducing traditional festivals, customs, food culture, etc., which can not only create interesting communicative situations and arouse students' enthusiasm in oral communication, but also develop and improve students' English language ability ^[6].

3. The path of organic integration of high school English teaching and excellent traditional Chinese culture

3.1. Make full use of English teaching materials and dig deep into traditional cultural elements

In senior high school English teaching, textbooks, as an important carrier of knowledge learning and cultural

transmission, contain rich elements of traditional cultural education. Therefore, to achieve a deep integration of traditional culture and English teaching, students can have a better learning experience of traditional culture and help them effectively understand and master English language knowledge. Teachers should make full use of English teaching materials, and combine the teaching objectives to dig deeply into the traditional culture education elements contained in them, to improve the effect of traditional culture education^[7]. For example, in the teaching of “Food and Culture”, this unit is in essence a manifestation of national customs and spiritual values. The teacher can introduce to students various cuisines of the country, such as Shandong, Sichuan and Guangdong cuisines, and ask students to collect, organize and analyze the characteristics of the eight major cuisines of our country, and then introduce in English. Promote the students’ profound perception of our country’s traditional food culture. In addition, teachers can guide students to explore the differences and connections between Chinese and Western food cultures. By comparing the preparation methods of Chinese food and Western food, table manners, eating habits, etc., students can feel the cultural diversity in the actual use of language. In addition, teachers can also guide students to think about the representative food of each traditional cultural festival, such as eating dumplings during the Spring Festival, eating zongzi during the Dragon Boat Festival, and eating moon cakes during the Mid-Autumn Festival. In this way, students can not only improve their English language ability but also learn how to respect and appreciate different cultures in practice, cultivate cross-cultural communication skills, and deepen their understanding and identification of traditional Chinese culture^[8].

3.2. Combine the text content, cleverly design the cultural introduction

In senior high school English teaching, pre-class introduction is very important, not only to introduce new course content, but also to effectively attract students’ attention and ensure that students can closely cooperate with teachers’ teaching arrangements. Therefore, to effectively integrate the traditional cultural content and enhance the effect of English teaching, teachers should closely combine the teaching content, reasonably design and optimize the pre-class introduction link, to effectively attract students’ attention and fully activate their interest in exploration^[9]. For example, in the teaching of “Teenage life”, teachers can closely combine the theme of “teenage life” and introduce the new content by asking questions. For example, high school students happen to be in this age group, teachers can use such questions as an introduction in class: “Students, what troubles do you have in your adolescent life?” Students have more answers, including study, friendship, life and so on. After further investigation, it is found that many students are interested in “friendship.” At this time, the teacher can tell the story of Zhong Ziqi and Yu Boya to the students and ask the following questions: Do you know these two characters in the story? What’s the story between them? What’s the story between them? Teachers introduce new lessons through short stories of traditional Chinese characters and questions, which can fully mobilize students’ enthusiasm for participation. Teachers can invite students to tell the story of Zhong Ziqi and Yu Boya in English. When they finish telling the story, they can further understand the connotation of friendship, look at friendship correctly, and learn to deal with interpersonal relationships correctly. In this way, by associating traditional culture with an English introduction before class, teachers can ensure that students can take the initiative to explore and carry forward China’s excellent traditional culture while learning English^[10].

3.3. Innovate the mode of English teaching and enhance the effect of cultural integration

In the past high school English teaching, teachers mainly taught English knowledge in the form of verbal explanation, which not only failed to activate students’ desire to explore English knowledge, but also was not conducive to the integration of traditional culture. In this regard, teachers should keep up with the development

trend of The Times and take the initiative to innovate and optimize English teaching methods. For example, teachers can make full use of the advantages of information technology in teaching and integrate traditional culture in the form of pictures and videos, which can not only present traditional culture to students intuitively and vividly, but also make the teaching atmosphere more interesting and constantly stimulate students' interest in learning. Make students take the initiative to participate in the English classroom teaching ^[11]. For example, in "Language around the world" teaching, teachers need to introduce the development history of Chinese on the basis of introducing the languages of other countries. Multimedia can be used to dynamically present the development process of bone script, regular script and official script in the form of video to strengthen students' intuitive feeling of Chinese. Enhance their sense of national cultural identity, and encourage them to actively explore the development history of Chinese ^[12]. At the same time, teachers can also design role-playing activities related to traditional culture according to the English teaching content, so that students can play different roles in the cross-cultural communication simulation scene, such as ancient literati, historical figures, etc. Through role-playing activities, students can not only practice their oral English expression ability, but also have a deeper understanding and experience of traditional Chinese culture. In order to improve their intercultural communication ability in practice. In this way, by using different teaching methods to innovate English teaching models, teachers can effectively enhance the integration of traditional culture, stimulate students' love for traditional culture, and comprehensively improve the quality of English teaching ^[13].

3.4. Actively introduce extracurricular resources to broaden the content of English teaching

Under the current educational background, obvious changes have taken place in the contents of senior high school English textbooks. Although the relevant traditional culture content is incorporated into the textbooks, the content is still limited, and the fields involved are not extensive enough, and the lack of in-depth explanation and explanation makes it difficult for students to understand the deep connotation of traditional culture. Therefore, in order to enhance the integration effect of traditional culture in English classes, teachers should not only explore and make use of traditional culture elements in the textbooks, but also actively introduce traditional culture extracurricular teaching resources in combination with teaching themes and objectives, which can not only broaden the content of English teaching, but also enrich students' traditional culture knowledge reserve and broaden their cultural horizons ^[14]. For example, in teaching "Travelling Around," this section of teaching activities are mainly developed around the theme of "travelling," the country has a vast area and abundant travelling resources very rich, among them, humanistic tourist spot contains rich traditional cultural resources, and the landscape contains a large number of traditional Chinese culture. At this time, teachers should properly integrate some information about Chinese nation cultural monuments, such as the Imperial Palace, which is located in the center of the central axis in Beijing, is one of the largest and most complete wooden structure ancient building complexes existing in the world, is the royal palace of Ming and Qing dynasties, has rich historical and cultural connotation ; Longmen Grottoes, located in Luoyang city, Henan province, are one of the treasure houses of Chinese stone carving art. They are famous for their exquisite carving techniques and rich historical and cultural value. Mogao Grottoes, commonly known as the Caves of a Thousand Buddhas, is located in Dunhuang City, Gansu Province. It is one of the largest and richest sites of Buddhist art in the world, with high historical and cultural value. Teachers can ask students to write an English introduction to their favorite tourist spots based on what they have learned, so that students can learn travel-related English expressions and understand the cultural connotations of humanistic tourist spots. Through the introduction of these extra-

curricular resources, students can not only enrich their English learning content, but also stimulate their interest in and love for excellent traditional Chinese culture, so as to have a deeper understanding and inheritance of the essence of Chinese culture in the process of English learning ^[15].

4. Conclusion

To sum up, inheriting and promoting excellent traditional culture is an important responsibility for every Chinese. In the process of high school English classroom teaching, teachers should update their teaching concepts in time, realize the value of integrating excellent traditional culture into teaching, and actively think about how to integrate traditional culture efficiently. To this end, teachers can make full use of English teaching materials to dig deep into traditional cultural elements; Combined with the text content, cleverly design the cultural introduction; To innovate the mode of English teaching and enhance the effect of culture integration; Actively introduce extracurricular resources, broaden English teaching content and other ways to integrate into traditional culture, so as to better combine English teaching with excellent traditional Chinese culture, fully stimulate students' love for traditional culture, and actively carry forward and inherit excellent traditional Chinese culture.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Ma W, 2025, A Way to Infiltrate Excellent Traditional Chinese Culture in High School English Teaching under “New Curriculum Standards”. *Weekly*, 2025(3): 140–142.
- [2] Liu M, 2024, Problems and Countermeasures of Integrating Excellent Traditional Chinese Culture into High School English Teaching. *Journal of Changchun University of Education*, 40(6): 105–109.
- [3] Xie L, 2024, The Excellent Traditional Chinese Culture Embodied in High School English Textbooks and Its Teaching Enlightenment. *Teachers of English*, 24(24): 184–186.
- [4] Tu S, 2024, Strategies for Integrating Excellent Traditional Chinese Culture into High School English Teaching. *Jiangxi Education*, 2024(47): 13–14.
- [5] Xu H, 2024, Discussion on the Integration of Excellent Traditional Chinese Culture into High School English Teaching. *Journal of Dalian Institute of Education*, 40(4): 33–35.
- [6] Guo Y, 2024, A Study on the Presentation of Excellent Traditional Chinese Culture in High School English Discourse Based on New Curriculum Standards. *Selected Chinese Loose-leaf Texts (Teaching and Research of Traditional Culture)*, 2024(12): 67–69.
- [7] Gu Z, 2024, The Integration of Excellent Traditional Chinese Culture into Senior High School English Teaching. *English for Middle School Students*, 2024(46): 35–36.
- [8] Hua F, 2024, Deep Integration of Chinese Excellent Traditional Culture and High School English Teaching. *College English*, 2024(47): 57–59.
- [9] Liu F, 2024, A Strategic Study on the Integration of Excellent Traditional Chinese Culture into High School English Teaching. *Teachers*, 2024(32): 54–56.
- [10] Zheng X, 2024, Exploring the Integration Path of Chinese Excellent Traditional Culture with High School English

Teaching. Examination Weekly, 2024(45): 101–104.

- [11] Wang C, 2024, Research on the Strategies of Integrating Excellent Traditional Chinese Culture into High School English Teaching under the Background of Core Literacy. *Anhui Education and Research*, 2024(30): 46–48.
- [12] Jiang F, 2024, The Significance and Strategy of Organic Integration of High School English Teaching and Excellent Traditional Chinese Culture. *College Entrance Examination*, 2024(30): 50–52.
- [13] Li Y, 2024, Action Research on the Integration of Excellent Traditional Chinese Culture into High School English Reading Teaching. *English on Campus*, 2024(41): 27–29.
- [14] Jiang X, 2024, The Strategy of Integrating Chinese Excellent Traditional Culture into High School English Teaching. *College Weekly*, 2024(36): 140–142.
- [15] Chen G, 2024, A Brief Analysis on the Penetration of Excellent Traditional Chinese Culture in Senior High School English Teaching. *Knowledge Library*, 40(22): 39–42.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on the Construction of Blended Courses in Labor Economics Empowered by Knowledge Graphs

Renren Li*

Guangzhou Software Institute, Guangzhou 510980, Guangdong, China

*Corresponding author: Renren Li, lirenren2022@163.com

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: The deep integration of digital technology and education is an important trend in current higher education reform. Knowledge graph, as an emerging technology, plays a significant role in promoting the quality of curriculum construction and improving teaching effectiveness. There are pain points in the traditional teaching of labor economics courses, such as the lack of hierarchical course objectives, traditional course content design, flat course resource construction, and single course evaluation feedback. Based on this, this article uses knowledge graphs to explore the path of mixed course construction in labor economics, and proposes countermeasures to solve the pain points by redesigning course structure and content, integrating related teaching resources, using graphs to assist mixed teaching, and multi-dimensional graph evaluation, in order to enhance students' higher-order thinking ability, life growth experience, personalized learning needs satisfaction, and comprehensive literacy evaluation effectiveness.

Keywords: Knowledge graph; Labor economics; Blended curriculum construction

Online publication: April 28, 2025

1. Introduction

The development of artificial intelligence technology has injected new momentum into the high-quality development of higher education teaching. The report "Infinite Possibilities - Digital Development of World Higher Education," released by the Ministry of Education in 2022, points out that digitalization of higher education has become an inevitable trend in the development of world higher education ^[1]. Knowledge graph, as an emerging artificial intelligence technology, has significant advantages in presenting knowledge in a graphical manner, integrating related multi-source data, achieving precise learning resource push, assisting smart teaching, and improving adaptive learning effects, and is gradually being applied in the field of education. This article aims to apply knowledge graph technology to the construction of mixed courses in labor economics for human resource management majors. By analyzing the pain points highlighted in the current teaching status of labor economics, it explores the construction of course knowledge graphs and how graphs will empower

the construction of mixed courses, providing new ideas for solving course pain points and achieving digital transformation of courses.

2. The current situation and pain points of labor economics course teaching

2.1. The course objectives lack hierarchy, and the training of students' higher-order thinking abilities is insufficient

The current objectives of labor economics courses are determined based on the combination of professional talent training programs and job requirements, divided into knowledge objectives, skill objectives, and literacy objectives. However, these three levels of objectives are usually set to enable students to master basic concepts, theories, models, and their simple applications, lacking a hierarchical division from low to high levels, and neglecting the training of students' higher-order thinking abilities. Advanced thinking ability is an important skill for future students to cope with uncertainty and solve complex problems in their work and life. Including dialectical thinking, critical thinking, creative thinking, and the ability to solve complex problems. The classroom teaching of labor economics, which is dominated by knowledge transmission, has led to a lack of initiative and creativity among students in the learning process, and the ability to apply what they have learned to solve practical problems has not been exercised.

2.2. The course content design is traditional, and students' sense of life growth experience is not strong

The structure of the labor economics course is organized according to the traditional theoretical framework. Although the system is complete, the logical coherence between chapters is insufficient, and the content design is biased towards theory, lacking a connection with modern society and students' actual lives. There is also a lack of attention and guidance on students' life growth experiences, which makes it difficult for students to integrate the knowledge they have learned with social reality and personal growth. The lack of learning motivation and interest also limits the cultivation of students' innovative thinking and comprehensive qualities.

2.3. Flattening of course resource construction and low satisfaction of students' personalized learning needs

The construction of labor economics course resources lacks diversity, personalization, and digital features. At present, course resources mainly include textbooks, courseware, case studies, and exercises, but lack expansion resources that reflect new trends in the labor market, industry development trends, workplace hotspots, and new achievements in disciplines. In addition, online learning platforms lack digital transformation, making it difficult for students to easily access the necessary resources. The personalized learning needs of students have not been met, which also limits the exercise of students' self-learning and lifelong learning abilities.

2.4. The feedback on course evaluation is singular, and the effectiveness of students' comprehensive literacy evaluation is insufficient

The evaluation feedback of labor economics courses mainly relies on quantitative evaluation methods such as final exams and regular grades. This evaluation method lacks the collection of data on the entire learning process of students, and cannot form a detailed record of learning trajectories, making it difficult to comprehensively reflect students' learning outcomes and ability levels. At the same time, the single evaluation feedback also limits

students' opportunities for self-reflection and improvement, which is not conducive to the improvement and development of students' comprehensive literacy.

3. Construction of knowledge graph for labor economics course

3.1. Overview of knowledge graph

Knowledge graph is a structured knowledge representation method that represents information such as entities, concepts, and relationships in the form of nodes, edges, and attributes. This concept was officially proposed by Google in 2012 and has since been widely applied in various fields. Its application in the field of education has become an emerging technology for deepening educational reform in recent years. Knowledge graphs have the characteristics of visualization, intelligence, and semantics, and can support various applications such as knowledge retrieval, intelligent question answering, and recommendation systems. According to different application scenarios and construction goals, knowledge graphs can be divided into general knowledge graphs based on common sense knowledge and domain knowledge graphs based on professional knowledge. The former has the characteristics of large scale, wide coverage, and low accuracy, mainly used in search engines and intelligent question answering, while the latter focuses on specific fields. Compared with general knowledge graphs, its scale is smaller, but its depth and accuracy are higher, usually used for professional question answering and decision support. In terms of construction steps, the knowledge graph consists of knowledge point sorting, knowledge graph import, knowledge graph association, and knowledge graph application.

Taking the C++ programming course as an example, Xiao et al.^[2] determined the course knowledge structure based on training plans, course outlines, teaching materials, and lesson plans. Then, according to the process of constructing the knowledge graph ontology, they determined the course objectives, scope, defined knowledge, and their relationships for storage and visualization, and constructed a course knowledge graph that is rich in content, searchable, and upgradable. Tu et al.^[3], based on the concept of knowledge graph, have improved the course knowledge network structure from three dimensions: knowledge, problems, and abilities, and preliminarily explored a new model for the construction of biomedical electronics online courses; Taking the C language programming course as an example, He et al.^[4] analyzed the pain points of course teaching, combined with the learning situation, and carried out a “one body, two wings” modular teaching practice based on knowledge graph reconstruction with students as the center. Wang^[5] takes the construction of digital resources in management accounting as the research object, and uses knowledge graphs to construct high-quality courses. She designs the application path of knowledge graphs from the scenarios of goal setting, content reconstruction, model updating, evaluation profiling, and diagnostic improvement in digital resource construction, and summarizes and promotes the application effect based on evidence.

This article explores the construction of a blended course in labor economics based on knowledge graphs, aiming to form a visual and three-dimensional curriculum knowledge system and teaching resources. By using knowledge graphs to promote blended online and offline teaching, the teaching mode can be transformed, teaching methods can be innovated, and teaching evaluation efficiency can be improved, thereby enhancing the overall quality of intelligent curriculum construction.

3.2. Construction of knowledge graph in labor economics

Why was the knowledge graph of labor economics built, how was it built, and what functions will it play after completion? The exploration of these issues should always revolve around how to achieve the teaching objectives

of the course. In the context of the new liberal arts, labor economics focuses on cultivating future-oriented talents with strong abilities, good thinking, and high literacy. According to Bloom's classification goal theory, memorization and understanding are low-level cognitive goals that focus only on helping students achieve the level of memorizing basic concepts and theories of the course and being able to understand them. To cultivate new high-quality talents with high-level thinking abilities, the focus should be on deep-level high-level goals such as application, analysis, evaluation, and creation. In view of this, labor economics intends to establish curriculum teaching goals from the three dimensions of "quality, ability knowledge," so that they meet the requirements of job abilities and professional talent training goals. The construction of a knowledge graph should be conducive to achieving the teaching objectives of the course. The construction process of the knowledge graph of labor economics is shown in **Figure 1**.

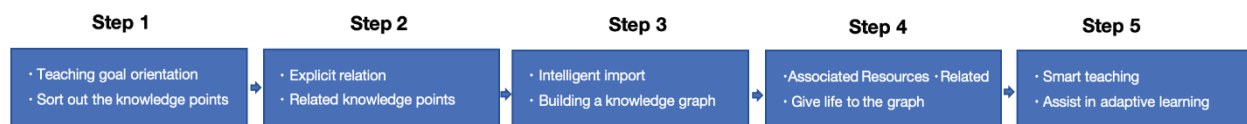


Figure 1. Process of constructing a course knowledge graph.

Among them, the first step to the third step is the preliminary preparation and introduction of the creation of the knowledge map of labor economics courses. Guided by the teaching objectives of the courses, teachers comprehensively sort out and extract knowledge points, clarify their interrelationships, and associate the knowledge points of the courses, interdisciplinary knowledge points and expanded knowledge points to form the "skeleton" of the knowledge map, so that the knowledge system of the courses becomes a visual and three-dimensional framework. The fourth step is to use artificial intelligence technology to link the curriculum resources (courseware, videos, cases, exercises, literature, textbooks, etc.) with knowledge points, endow the map with "flesh and blood," and build an intelligent learning platform for labor economics courses. Later, journals, information hotspots, books, and other expanded resources and knowledge on the Internet can be further expanded points. It should be noted that teaching resources are the "meat" of the knowledge graph, and their quality directly affects the adaptive learning effect of students. The construction quality of teaching resources must be ensured. The knowledge graph of the labor economics course and its related resources are shown in **Figure 2**.

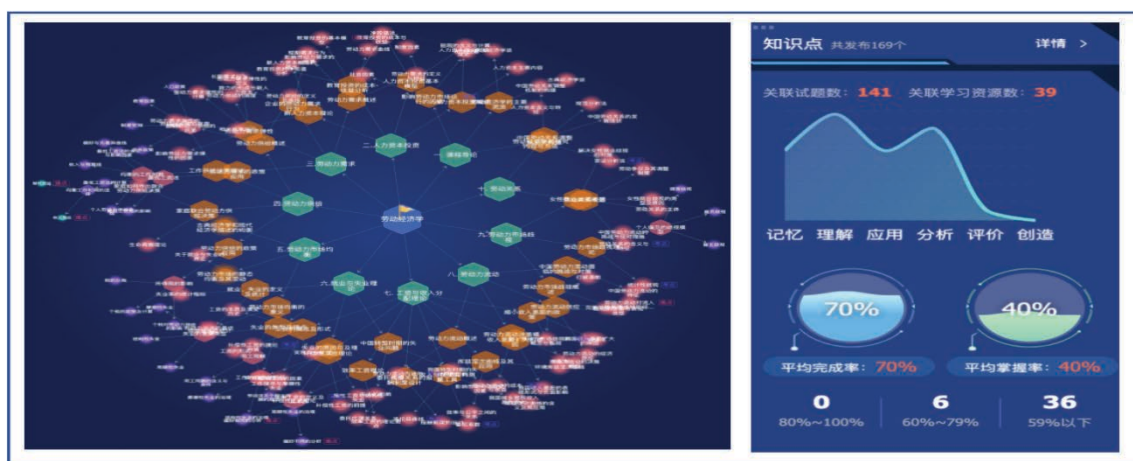


Figure 2. Curriculum knowledge graph and its associated resources.

3.3. Thoughts on the construction of a hybrid course in labor economics based on knowledge graph

3.3.1. Reset the course structure content and construct a course knowledge graph

According to the talent training plan for human resource management, clarify the courses of labor economics, pilot courses, and post courses. The relationship between curriculum design and interdisciplinary courses. Centered around students, with their life growth and career development as the main thread, guided by job demands, and aiming to cultivate new quality talents with strong abilities, good thinking, and high literacy in the era of digitalization, the course content is reconstructed according to the concept of large units and concepts. The specific approach is as follows: break the traditional content arrangement in textbooks that focuses on the behavior of both the supply and demand sides in the labor market, the operation of the labor market, and its institutional construction. Guided by Schubert's career development theory, students' life growth and career development are divided into five stages, and the development focus of each stage is clearly defined, including the growth period (0–19 years old), which mainly pursues physical and mental growth, explores interests, develops abilities, and perceives careers; Exploration period (20–24 years old), with a focus on acquiring professional knowledge and skills and conducting career exploration planning; During the establishment period (25–44 years old), choose and develop a career, and seek a balance between work and life; During the maintenance period (45–64 years old), develop new skills, deeply cultivate the profession, and condense professional achievements; During the decline period (age 65 and above), adjust your mindset to adapt to retirement and strive to develop non professional roles. On this basis, key teaching questions are determined based on the development priorities of each stage, and the core teaching content is matched with problem orientation. For example, in the growth stage, two key questions are set, one is how to correctly invest in human capital? The corresponding chapter is on human capital investment; In the era of intelligence, will companies completely replace human labor with machines? The matching is the chapter on labor demand, and so on, to complete the arrangement of the ten core courses of labor economics. Finally, the ten core contents of the course are summarized into three concepts according to their nature and characteristics, forming three major units of the course, including labor market element units (human capital investment, labor demand, labor supply), labor market operation and its policy system (labor market equilibrium, employment and unemployment theory, wage theory, income distribution, labor mobility, labor market discrimination), and labor relations processing (labor relations). After completing the reconstruction of teaching content, the three-dimensional objectives of “knowledge, ability, and literacy” of the course are determined based on the course syllabus and textbooks. The core concepts, theories, and models of labor economics are integrated, and the attributes, correlations, and key and difficult points of knowledge are marked. On this basis, the course's ideological and political points, interdisciplinary knowledge points, skill improvement points, etc. are further integrated to construct a course knowledge graph, which displays the theoretical knowledge system and enables students to have a comprehensive, systematic, and logical grasp of the course content.

3.3.2. Integrate and link multidimensional resources to achieve precise push of learning resources

In the constructed knowledge graph, multi-dimensional teaching resources (including foundational resources such as courses) are integrated. Items, videos, cases, literature, exercises, workplace knowledge, etc. are placed into knowledge points and organized in the form of network diagrams to form three-dimensional teaching resources. By utilizing knowledge graph technology, students can obtain accurate resource push based on their personalized

learning needs, and trace the source in a network structure to enhance their understanding and mastery of knowledge. In addition, knowledge graph technology can automatically associate expandable resources such as e-books, online journals, and information hotspots, achieve dynamic updates, and provide students with rich, intelligent, and convenient learning resources for personalized inquiry learning.

3.3.3. Knowledge graph supports blended learning and enhances adaptive learning effectiveness

The Labor Economics course relies on the Chaoxing Learning Platform and adopts the PBL+BOPPPS model for online implementation. Offline blended learning. In the pre-class stage, students mainly engage in online self-learning. Guided by the problems or situations in this chapter, students complete self-directed learning through activities such as publishing topics, participating in discussions, and conducting pre-class self-tests. Their learning data will be fully and tracked and recorded by knowledge graph technology, forming a learning trajectory. By analyzing the real learning situation, teachers can obtain the mastery rate of each knowledge point and develop targeted teaching strategies in advance. In the classroom, the teacher first explains and guides students on their weak points of knowledge. Based on this, teaching activities are carried out to train students' higher-order thinking abilities, guiding them to conduct in-depth exploratory learning in teams, and cultivating their ability to apply theory to solve complex problems. After class, focus on results results-oriented approach, guide students to apply knowledge through precise testing and practical projects, and enhance their ability to apply and transfer knowledge. Taking the chapter on human capital investment as an example, after students completed online self-study before class, the learning data formed by the knowledge graph showed that students did not have enough understanding and mastery of the structural changes in human capital demand in the digital economy environment. In response to this weakness, the teacher emphasized this knowledge point in class and conducted a high-level thinking ability training and exploration activity, "Human Capital Investment Strategy Simulation Decision." Students were required to divide into groups to play the role of human resource management directors of different industry enterprises, think about how to formulate a human capital investment plan for the next 3 years under the budget constraint of 5 million yuan under the challenge of digital transformation, and defend the plan at the board meeting. Around the task, the group conducted in-depth discussions to form preliminary ideas, and after class, the members further implemented the plan. Through practical training, students' theoretical mastery and decision-making ability in complex situations have been improved, while their data analysis and teamwork skills have also been significantly enhanced, and their ability to solve complex real-world problems has steadily improved. Overall, through blended learning based on knowledge graphs, students can have a clear understanding of their level of achievement in professional ethics, knowledge learning, and mastery of professional skills, stimulate their interest and confidence in learning, and engage in adaptive learning based on personalized learning paths generated by graphs. They can also use knowledge graph technology to search and obtain relevant resources, thereby improving learning efficiency and effectiveness.

3.4. Multi-dimensional evaluation of courses, detailed chemical situation diagnosis and rectification

The reform and innovation of educational and teaching evaluation required in the era of digitization mainly manifest in process evaluation, value-added evaluation, and comprehensive evaluation. By analyzing the learning trajectory, knowledge mastery level, teaching evaluation results, and emotional interaction characteristics collected by knowledge graph technology, a multidimensional graph model can be formed to provide more scientific methods and support for digital transformation, such as education evaluation and rectification ^[6]. The

Labor Economics course adopts a multidimensional evaluation method, and students' comprehensive grades are calculated by weighting their regular grades (accounting for 60%) and final exam grades (accounting for 40%). The evaluation of grades focuses on the evaluation of students' learning process, ability, and literacy, and the achievement of course objectives. Among them, the regular grades cover three stages before, during, and after class. Before class, a comprehensive evaluation of students' online self-learning activities, including previewing, pre-test, and discussion activities, is mainly conducted; In class activities focus on evaluating students' collaborative exploration, including answering questions in class and completing team tasks such as theme presentations, situational simulations, case studies, debates, and speeches; After class, students' knowledge application and completion of challenging tasks are evaluated through exercise quizzes and practical projects. The final exam tends to focus on subjective questions related to hot topics in the labor market and workplace issues, comprehensively evaluating students' ability to apply theoretical knowledge to solve complex real-world problems. The application of curriculum knowledge graph technology breaks the traditional evaluation mode of single dimension in teaching. Through a visualized multi-dimensional evaluation system, students' knowledge, emotions, attitudes, thinking, and behavior data throughout the entire process can be clearly presented. On the one hand, it is beneficial for students to understand their real learning situation, so as to plan learning paths accordingly. On the other hand, it can also allow teachers to evaluate students' efforts, learning performance, etc. from a developmental perspective, timely identify problems, adjust and optimize teaching plans, and promote the improvement of teaching quality.

4. Conclusion

In the era of digitization, knowledge graph technology has become a new engine for innovation in higher education teaching. The concept of graph, centered on students and starting from the cultivation of new quality talents, explores new ideas for the construction of labor economics courses from the aspects of restructuring curriculum structure, integrating teaching resources, implementing blended learning, and multidimensional evaluation. It conforms to the trend of open, personalized, and precise smart education and has practical significance. However, it is worth noting that as the leaders of education and teaching, teachers should not only enjoy the benefits of technology-empowered education but also have a correct understanding of the relationship between technology and education. They should not be satisfied with the simple embellishment of technology on education, but should deeply recognize that human development needs are the intersection and integration point of technological development and educational reform. Therefore, from this perspective, teachers should grasp the following aspects to better achieve the two-way empowerment of technology and education: Firstly, teachers should always adhere to the student-centered concept, follow the basic teaching values of "paying attention to students' growth, exploring and enhancing their life value," and avoid excessive reliance on technological means, which leads to the situation of "only technology in their eyes, no one"; Secondly, teachers should keep pace with the times and comprehensively consolidate the basic skills of digital teaching, including the ability to design blended learning environments (including online course construction, learning platform use, etc.), the ability to design blended learning environments, the ability to organize deep learning in the classroom, the ability to personalize teaching, and the ability to reflect on teaching evaluation. They should fully utilize technological advantages to empower the entire teaching process and focus on improving teaching effectiveness; Finally, teachers should enhance their awareness and ability to connect with society, take participation in social practice as an important extension and supplement of classroom teaching, discover new opportunities and

topics for educational reform through strengthening the integration of industry and education, school enterprise collaboration, and other models, and effectively integrate the reform results into daily teaching to improve teaching level and talent cultivation quality.

Funding

Guangzhou Software Institute 2024 School Level Quality Engineering Reform Project, “Construction of an Evaluation System for the Effectiveness of Ideological and Political Education in the Labor Economics Course Based on the CIPP Model” (Project No.: JYJG202416)

Disclosure statement

The author declares no conflict of interest.

Reference

- [1] Wu Y, 2023, Creating a Leading Indicator for the Digital Development of Higher Education in the World – Preface to “Infinite Possibilities: Report on the Digital Development of Higher Education in the World.” China Education Informatization, 2023(1): 3–4.
- [2] Xiao M, Su L, Jiang J, 2022, Construction of Knowledge System for C++ Programming Course Based on Knowledge Graph. Educational Observation, 2022(10): 68–71.
- [3] Tu H, Wang X, Cha Y, et al., 2023, Preliminary Exploration of Online Course Construction in Biomedical Electronics Based on Knowledge Graph Concept. Health Vocational Education, 2023(10): 19–22.
- [4] He K, Chen Z, Kong W, et al., 2024, Modular Teaching Practice of “One Body, Two Wings” Based on Knowledge Graph Reconstruction. Software Guide, 2024(23): 215–220.
- [5] Wang M, 2024, Research on the Digital Resource Construction of Vocational Management Accounting Curriculum Empowered by Knowledge Graph. China Management Informatization, 2024(10): 81–84.
- [6] Li Z, Zhou D, 2022, Intelligent Cognitive Diagnosis and Evaluation Method Based on Disciplinary Knowledge Graph. Modern Educational Technology, 2022(11): 118–126.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Analysis on the Innovative Path of Ideological and Political Course Teaching Empowered by AR Technology

Tingmeng Shen*

Communication University of China, Nanjing 210000, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In the context of the digital age, ideological and political course teaching is facing challenges and opportunities, and the development of AR technology makes it possible for its innovation. This research comprehensively uses a variety of methods to elaborate on the connotation and characteristics of AR technology as well as the teaching objectives and requirements of ideological and political courses, and explores the theoretical basis for the integration of the two. Through case analysis, it shows its effectiveness in improving students' knowledge mastery, interest stimulation, and value shaping. It constructs the online teaching mode of ideological and political courses empowered by AR technology, including resource integration, activity design, and effect evaluation; and explores offline teaching practices, such as innovative classroom applications and the expansion and deepening of practical teaching. The empirical analysis of the effectiveness of the online and offline integrated teaching shows that it has a positive impact on students' learning, but it also faces challenges such as technology, teacher capabilities, teaching resources, and student adaptability, and corresponding strategies are proposed. The research confirms that this integrated teaching has significant advantages. Looking forward to the future, the application prospect of AR technology in ideological and political course teaching is broad, aiming to promote the high-quality development of ideological and political course teaching.

Keywords: AR technology; Ideological and political course teaching; Innovative path

Online publication: April 29, 2025

1. Introduction

1.1. Research background and significance

In today's digital age, ideological and political course teaching is facing many challenges and opportunities. On the one hand, the traditional teaching mode of ideological and political courses is difficult to meet the increasingly diversified learning needs of students to some extent, and students have a higher demand for vivid and interactive teaching methods. On the other hand, the rapid development of information technology provides a broad space for the innovation of ideological and political course teaching. As an emerging educational

technology, augmented reality (AR) has unique advantages. It can integrate virtual information with real scenes and bring a new experience to ideological and political course teaching. The application of AR technology in ideological and political course teaching is helpful to innovate the teaching mode, improve the education quality, make ideological and political courses better understood and remembered by students, and cultivate students' correct world outlook, outlook on life and values ^[1].

1.2. Research status at home and abroad

Foreign countries have carried out extensive research in the field of AR technology education applications. For example, Azuma (1997) explored the basic theory and early application of AR technology, laying a foundation for subsequent research ^[2]. In terms of educational practice, some schools in developed countries have applied AR technology to multidisciplinary teaching and achieved certain results. In China, the research on the application of AR technology in education is also deepening. Some scholars have explored its application potential in college course teaching ^[3]. However, there are relatively few systematic studies on the application of AR technology in ideological and political course teaching. This research will focus on ideological and political courses teaching to fill the gap in targeted research in this field.

2. Theoretical overview of AR technology and ideological and political course teaching

2.1. Connotation and characteristics of AR technology

AR technology is a technology that superimposes virtual information on the real world in real time to realize the integration of virtual and real. It has remarkable characteristics such as the integration of virtual and real, real-time interaction, and three-dimensional presentation. According to the Reality-Virtuality Continuum Theory proposed by Milgram *et al.* (1994), AR technology is located between the real environment and the virtual environment and can provide users with a unique immersive experience ^[4]. In the field of education, this characteristic enables students to access abstract knowledge content in familiar real scenes, enhancing the intuitiveness and interest of learning and helping to improve students' learning enthusiasm and participation.

2.2. Theoretical basis for AR technology empowering ideological and political course teaching

According to the spirit of documents such as "Several Opinions on Deepening the Reform and Innovation of School Ideological and Political Theory Courses in the New Era," ideological and political course teaching aims to achieve multiple goals such as knowledge imparting, value shaping, and ability cultivation ^[5]. From the perspective of educational technology, AR technology provides new teaching means and resource presentation methods for ideological and political course teaching, enriching the teaching media. The constructivist learning theory believes that learning is when students obtain knowledge through meaning construction by means of necessary information with the help of others in a certain situation. AR technology can create realistic learning situations, such as simulating historical event scenes, which is conducive to students' knowledge construction. The situational cognition theory emphasizes the interdependence of knowledge and situation ^[6]. The application of AR technology in ideological and political course teaching can place ideological and political knowledge in specific historical and social situations, promoting students' understanding and transfer of knowledge, thus providing a solid theoretical basis for the integration of AR technology and ideological and political course teaching.

3. Case analysis of the application of AR technology in ideological and political course teaching

3.1. AR/VR ideological and political classroom project of Penglai No. 1 Middle School

Penglai No. 1 Middle School actively explores the application of AR technology in ideological and political course teaching and has built an AR/VR ideological and political classroom. This classroom is equipped with advanced hardware facilities such as head-mounted display devices and interactive handles, and at the same time, a virtual teaching resource library covering each chapter of the ideological and political teaching materials has been developed (according to the internal teaching materials of Penglai No. 1 Middle School) ^[7]. In teaching practice, for example, when explaining the course “Outline of Modern and Contemporary Chinese History,” teachers use AR technology to allow students to immerse themselves in historical events and see battlefields filled with smoke. Students can see the smoky battlefield, the scene of signing unequal treaties, etc. Through the questionnaire survey of students, it is found that the students participating in this project teaching have significantly improved their knowledge mastery, significantly enhanced their learning interests, and have a deeper understanding of relevant historical events. The average score is about 10% higher than that of the classes not participating in the project (referring to the teaching achievement statistics of Penglai No. 1 Middle School).

3.2. The virtual simulation ideological and political course experience teaching center of Southeast University

The virtual simulation ideological and political course experience teaching center of Southeast University has carried out a variety of teaching activities ^[8]. In this teaching mode, students’ classroom participation has been greatly improved, and the number of active questions and discussions has increased ^[9]. According to the statistical data of the center, after the implementation of AR technology teaching, students’ satisfaction with ideological and political courses has increased from 60% to 80%. Students have also achieved good results in value shaping, have a deeper understanding of the connotation and value of the Long March spirit, and show stronger dedication spirit and teamwork consciousness in social practice activities (based on the teaching practice feedback report of Southeast University).

4. Construction of the online teaching mode of ideological and political courses empowered by AR technology

4.1. Online resource integration and platform construction

Integrate various high-quality ideological and political teaching resources, such as the online virtual exhibition resources of the National Museum of China, historical documentaries, etc., to build an online teaching resource library for ideological and political courses. Build a fully functional teaching platform, such as using learning management systems (LMS) such as Moodle to achieve functions such as resource sharing, communication and interaction, and teaching management ^[10]. Teachers can upload AR teaching courseware, videos and other resources on the platform, and students can learn anytime and anywhere, and communicate and interact with teachers and classmates through the online discussion area to share learning experiences and insights.

4.2. Teaching activity design and implementation

Design diversified online teaching activities, such as carrying out “Online Theme Discussion on Red Culture.” Teachers put forward topics about the inheritance and development of red culture, and students collect and

analyze materials with the help of AR resources such as virtual red memorial halls, and then express their views in the discussion area. Organize group project cooperation, such as taking “Innovation Practice of Ideological and Political Courses in the New Era” as the theme, each group uses AR technology to design ideological and political course teaching plans, and improves students’ innovation ability and teamwork ability through online display and mutual evaluation. In the implementation process, teachers should give full play to their guiding role, answer students’ questions in time, encourage students to actively participate, and use the interactivity and interestingness of AR technology to enhance the attractiveness and practicality of teaching.

4.3. Learning effect evaluation and feedback

Construct a scientific and reasonable learning effect evaluation index system, including aspects such as knowledge test scores, online discussion participation, and project completion quality. Use data mining technologies such as the Apriori algorithm to analyze students’ learning behavior data on the platform, such as learning time, resource access frequency, etc., combined with learning analysis technologies such as learning path analysis to comprehensively understand students’ learning situation ^[11]. According to the evaluation results, provide personalized feedback and guidance for students, such as pushing targeted AR learning resources for students with learning difficulties to help them consolidate knowledge and improve learning effects.

5. Practical exploration of offline teaching of ideological and political courses empowered by AR technology

5.1. Innovative application in classroom teaching

In the classroom teaching of ideological and political courses, teachers use AR technology to create vivid teaching situations. For example, when teaching “Principles of Marxist Philosophy,” teachers use AR technology to show the mutual relationship between matter and consciousness, transforming abstract philosophical concepts into intuitive visual images. For example, when showing the active role of consciousness in matter, a virtual scene of human beings transforming nature is presented. This helps to promote teacher-student interaction. Teachers can guide students to observe the scene and ask questions, and students actively answer and participate in the discussion. At the same time, students are encouraged to personally experience the AR teaching content. For example, when teaching “Core Socialist Values,” students participate in virtual community construction activities through AR devices to understand the connotation and application of values in practice, improving the vividness and participation of classroom teaching ^[12].

5.2. Expansion and deepening of practical teaching

Apply AR technology to the practical teaching link of ideological and political courses. When visiting patriotic education bases on the spot, students can use AR guide applications to obtain more stories and knowledge behind historical relics and cultural relics, enriching the visiting experience. Carry out social practice surveys based on AR technology, such as investigating the current situation of local red cultural resources. Students use AR technology to produce promotional materials and design virtual display schemes, enhancing students’ understanding and application ability of theoretical knowledge, and at the same time improving students’ social practice ability and social responsibility.

6. Achievements and challenges of AR technology empowering the blended teaching of ideological and political courses online and offline

6.1. Empirical analysis of teaching achievements

Through conducting questionnaires in many schools that implement AR technology to empower the blended teaching of ideological and political courses online and offline, a total of 1,000 valid questionnaires were collected. The results show that 80% of the students think that this teaching method helps to improve their learning interest in ideological and political courses. By comparing students' grades, it is found that the average grade of classes participating in blended teaching in the final examination is about 15 points higher than that of classes not participating. Classroom performance observations also indicate that students pay more attention in class and the number of voluntary speeches increases. In terms of value formation, students show stronger abilities in moral judgment and behavioral choice in social practice. For example, in community volunteer service activities, students participating in blended teaching are more active in taking responsibilities and practicing the Core Socialist Values, fully proving that blended teaching has a positive promoting effect on students' knowledge mastery, ability improvement and value formation ^[13].

6.2. Challenges and coping strategies

In the process of blended teaching, many challenges are faced. In terms of technology application, there may be problems such as device compatibility and insufficient software stability in AR technology. In response to this, schools should strengthen the construction of technical maintenance teams, regularly update and optimize equipment and software to ensure the stable operation of the technology. In terms of teachers' abilities, some teachers have a limited mastery of AR technology and it is difficult for them to carry out teaching effectively. It is necessary to carry out teacher training work, such as organizing training seminars on the teaching application of AR technology, inviting experts to conduct technical training and teaching guidance, and improving teachers' information technology literacy and teaching abilities. In terms of teaching resources, high-quality AR teaching resources for ideological and political courses are relatively scarce. Schools, enterprises and scientific research institutions should be encouraged to cooperate in multiple ways to jointly develop a rich variety of teaching resources and establish a resource-sharing platform. In terms of students' adaptability, some students may have difficulties in adapting to the new teaching methods. Teachers should strengthen guidance, introduce teaching processes and methods in detail in the early stage of teaching, encourage students to actively try, and gradually improve students' adaptability and participation.

In terms of knowledge imparting, with the help of AR technology, abstract knowledge is visualized, helping students to understand and remember better; in terms of value shaping, through immersive experiences, students' sense of identity and ability to practice values are enhanced; in terms of ability cultivation, students' innovative thinking, practical ability and teamwork ability are exercised.

Looking ahead, with the rapid development of science and technology, the application of AR technology in the teaching of ideological and political courses has a broad prospect. On the one hand, AR technology will continue to be updated and iterated, and its immersion and interactivity will be further enhanced, and it is expected to create more realistic teaching situations and achieve a smoother human-computer interaction experience ^[14]. For example, in the future, it may be possible to achieve in-depth interactive learning of multiple people in the same virtual scene at the same time ^[15]. On the other hand, the teaching model will continue to be innovated, and the integration of online and offline will be closer and seamless, forming a more complete "blended teaching" ecology. Meanwhile, the trend of interdisciplinary integration will be more obvious.

AR technology will have in-depth intersections with multiple disciplines such as pedagogy, psychology and communication, providing more scientific and comprehensive theoretical and practical guidance for the teaching of ideological and political courses. Subsequent research can focus on the precise teaching application of AR technology in the teaching of ideological and political courses, such as providing customized teaching content according to students' differences; improving the teaching evaluation system and establishing more scientific and comprehensive evaluation indicators for blended teaching; exploring how to better use AR technology to promote the international dissemination and communication of ideological and political courses to promote the teaching of ideological and political courses to keep up with the pace of the times and achieve high-quality and sustainable development.

Funding

2025 Jiangsu University Philosophy and Social Sciences Research Special Project on Ideological and Political Education, "Research on Innovative Approaches to AI-Empowered Party History Education"

Disclosure statement

The author declares no conflict of interest.

References

- [1] Abulimiti A, Wu L, 2024, The Internal Mechanism, Principle Adherence and Practical Path of Integrating the Spirit of the Third Plenary Session of the Twentieth Central Committee of the Party into College Ideological and Political Courses. *Journal of Inner Mongolia Agricultural University (Philosophy and Social Sciences Edition)*, 2024(12): 1–9.
- [2] Azuma RT, 1997, A Survey of Augmented Reality. *Presence: Teleoperators & Virtual Environments*, 6(4): 355–385.
- [3] Zhang Y, 2018, Research on the Application of Augmented Reality Technology in Higher Education. *Fujian Computer*, 34(7): 160–161.
- [4] Milgram P, Kishino F, 1994, A Taxonomy of Mixed Reality Visual Displays (Special Issue on Networked Reality). *IEICE Transactions on Information and Systems*, 77(12): 1321–1329.
- [5] People's Daily, 2016, Integrate Ideological and Political Work throughout the Whole Process of Education and Teaching to Create a New Situation in the Development of China's Higher Education Cause. *People's Daily*, 2016-12-09(1).
- [6] Wang Y, Zhang F, Liu J, et al., 2024, The Occurrence Elements of Adult Online Deep Learning and Their Enlightenment to Curriculum Design. *Modern Educational Technology*, 34(12): 115–124.
- [7] Guo X, 2020, Research on the Strategies to Enhance High School Students' Cultural Confidence. *Modern Education*, 2020(11): 28–31.
- [8] Zuo D, Gao F, 2022, Design and Implementation of a VR/AR Red Culture Virtual Simulation Education System. *Computer Era*, 2022(2): 66–68 + 79.
- [9] Su Y, Du Q, 2024, Southeast University: Building "Golden Courses" of Ideological and Political Courses to Cultivate New Era Talents. *Guangming Daily*, 2024-03-19(008).

- [10] Wang Y, 2024, Transformation and Promotion Strategies of Higher Mathematics Education in Higher Vocational Colleges in the Digital Intelligence Era. *China Journal of Multimedia & Network Teaching* (Mid-monthly), 2024(8): 171–174.
- [11] Gao S, 2022, Research on the Correlation between College Students' Daily Behaviors and Grades Based on the Apriori Algorithm, thesis, Shenyang Normal University.
- [12] Zhang S, 2024, Exploration of the Education of Ideological and Political Courses in Higher Vocational Colleges Empowered by Virtual Simulation Technology. *The Road to Success*, 2024(34): 5–8.
- [13] Zeng X, 2023, Research on the Reform and Innovation of the Teaching Paradigm of Ideological and Political Theory Courses in Colleges and Universities—Taking Hunan Institute of Technology as an Example. *Journal of Baise University*, 36(3): 120–126.
- [14] Zhu D, 2023, Research and Implementation of Key Technologies of AR System with Multi-terminal Sharing and Collaboration, thesis, Beijing University of Posts and Telecommunications.
- [15] Song M, Pan Z, 2024, Practice and Improvement of Virtual Simulation Teaching of Law under the Background of New Liberal Arts. *Journal of Jiangsu Vocational Institute of Architectural Technology*, 24(2): 56–61.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Practice Exploration of Community Elderly Care Service under the Mode of “Five-Social Linkage”: Taking X Community as an Example

Jiale Zhao^{1*}, Qing Wang²

¹College of History and Society, Xinjiang Normal University, Urumqi 830017, Xinjiang, China

²College of Foreign Languages, Xinjiang Normal University, Urumqi 830017, Xinjiang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the increasing aging of China's population, community support has become an important way to relieve the pressure of family support and improve the quality of life of the elderly in their later years. Under this background, the “five-society linkage” model as an innovative community governance model provides a new idea for community old-age. The linkage of the five social groups is the cooperation between the community, social organizations, social workers, social charity funds and community volunteers. Based on the successful practice of X community's social work participation in community elderly care under the five-social linkage model, this paper reveals the important role of the five-social linkage model in community elderly care, and puts forward suggestions for further optimization.

Keywords: Linkage of five social groups; Community pension; Social work

Online publication: April 28, 2025

1. Introduction

Based on China's seventh national census data, the country's total population stands at approximately 1.44 billion individuals. Among this population, 18.70% are aged 60 or older, while around 13.50% are aged 65 or above. In comparison with the sixth national census, the proportion of individuals aged 60 and above has risen by 5.44%, and the proportion of those aged 65 and above has increased by 4.63%. These figures indicate an overall upward trend and a progressively aging society^[1]. As economic and living standards continue to improve, the needs of elderly individuals in China are transitioning from basic survival-oriented requirements to development-oriented demands. To effectively address the challenges posed by an aging population, the Third Plenary Session of the 20th Central Committee of the Communist Party of China proposed enhancing policy frameworks aimed at fostering the growth of elderly care services and the elderly care industry, thereby promoting high-quality advancements in elderly care services. Within the broader elderly care service system, the community-based

elderly care model serves as a critical component, playing a vital role in encouraging collaborative involvement among various community stakeholders and delivering more proactive and health-focused elderly care solutions for seniors.

2. The elements of the “five-social linkage”

The five-social linkage model draws on the unique experiences of public health governance while highlighting the significant contributions made by social volunteers and charitable organizations. This enables social workers to address the limitations of the traditional “three-social linkage” framework^[2]. In this paper, the “five-social linkage” model is presented as an innovative approach that uses the needs of community residents as a guiding principle. It positions the community as an integrated service platform, leverages social organizations as service providers, relies on social workers for professional support, engages community volunteers for assistance, and utilizes social charity resources as a guarantee for service delivery. By doing so, it enhances and refines the “three-social linkage” model at both theoretical and practical levels, effectively mobilizing broader societal participation^[3]. Inspired by the five-social linkage framework, social workers embrace the core values of “helping others to help themselves” and actively participate in community elder care as service facilitators. Through the application of professional methodologies, they foster a community atmosphere of respect and care for the elderly, offer diverse services tailored to their needs, and ultimately enhance the quality of life for seniors.

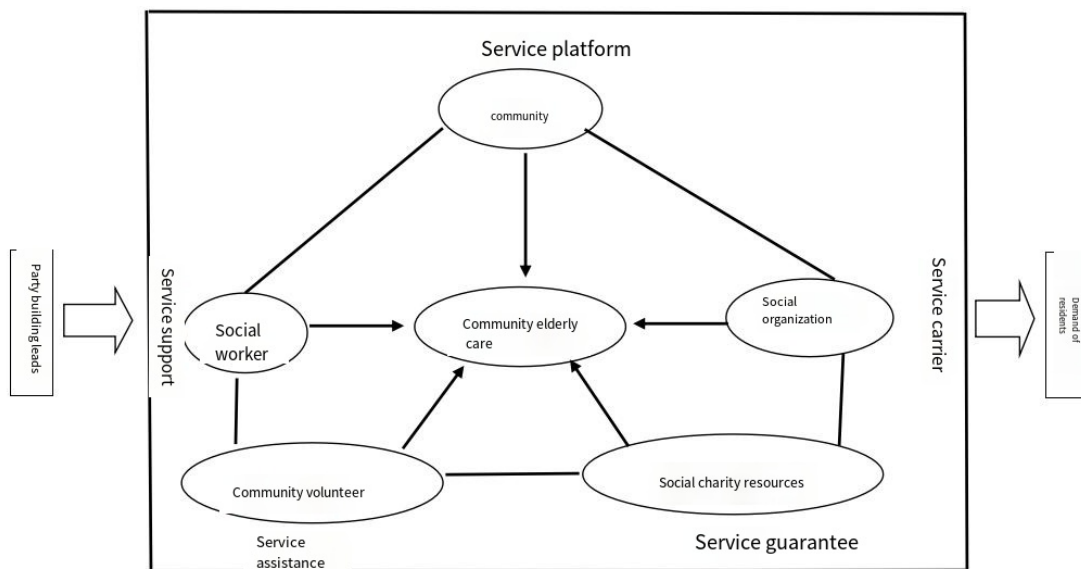


Figure 1. Model of the five social groups' joint participation in the community for the aged.

2.1. Community as a service platform

The community serves as the foundational component in connecting the five social organizations. It functions not only as a platform that facilitates collaboration among various parties but also acts as the central entity for community activities. The community plays a crucial role in resource integration, event coordination, and service delivery. By leveraging available resources, it establishes facilities such as day care centers, rehabilitation services, and sports centers for the elderly. These facilities offer essential services, including daily care,

recreational activities, and health consultations to meet the needs of the senior population.

2.2. Social organizations as carriers

Social organizations act as bridges and connectors in linking the five social entities, guiding all parties to offer a range of services for elderly individuals within the community. Additionally, these organizations can take on aging-related service projects from either the government or local communities, thereby advancing the standardization and professionalism of such services ^[4]. Through involvement in community-based social organizations, older adults can more effectively engage in community governance and better access community-provided services.

2.3. Social workers as support

Social workers serve as the key professional support within the linkage model of the five social organizations. Throughout the project's execution, they apply their expertise and skills to develop tailored service plans for elderly individuals. Additionally, social workers act as intermediaries, facilitating communication and coordination between residents and neighborhood committees, as well as among residents themselves. This ensures the effective consolidation of resources from various stakeholders, thereby enhancing the overall efficiency of services provided to the elderly population.

2.4. Social charity funds as a guarantee

Social charity funds, which encompass government allocations, donations from society, and welfare funds, play a crucial role in complementing the five-social linkage model. By actively attracting external financial resources, communities can effectively integrate various resources, providing essential financial support and material guarantees for elderly care services. This approach has transformed the long-standing passive and monotonous “blood transfusion” supply into an active and diverse “blood production” supply, ensuring the sustainability and stability of the “Five Societies Linkage” model ^[5].

2.5. Community volunteers for assistance

Community volunteers serve as a supporting force within the collaborative framework of the five social organizations. They represent not only a significant resource for local leaders but also a crucial addition to the professional service workforce. Their involvement infuses community elderly care services with substantial internal momentum ^[6]. Through activities like volunteering and neighborhood assistance, they help address the shortfall in community elderly care staff while offering emotional support to seniors via companionship and care, thereby easing feelings of loneliness and isolation.

3. Practice and exploration of the X community

The X community in Karamay City is an urban community where the primary type of housing consists of affordable units. Overall, the community exhibits the features described as “two shortages and four abundances” (limited jurisdictional resources, fewer co-construction organizations, a higher proportion of low-income groups, retired soldiers, elderly individuals, and children). Most residents in this area belong to subsistence allowance recipients, low-income households, ethnic minority populations, and single-parent families, resulting in a diverse demographic composition.

The X community fully utilizes the “five-social linkage” approach, establishing an innovative social work sharing platform that integrates hub-type entities (such as social work agencies and volunteers), professional teams (like social workers), and promotes community services through innovation. Guided by grassroots Party organizations, the social work station uses the community as its foundational platform, with offices for community social workers and social organizations serving as the operational carriers. This initiative is supported by skilled social workers and specialized social work methodologies, while volunteer services provide valuable supplementary support in delivering social services. As a result, the “five-social linkage” model has been successfully activated, fostering enthusiastic resident participation, strengthening the cohesion between communities and social organizations, and achieving remarkable people-oriented volunteer services.

3.1. Construction of the elderly care service system

Guided by grassroots Party organizations, social work stations establish collaborative practice service roles for the five social groups on a community-based platform. For instance, they create “health management homes” to serve lonely and isolated elderly individuals. These initiatives offer ongoing health management services, maintain records, and monitor health conditions in real-time. Pilot health management programs have been introduced, registering citizens aged 60 and above while providing on-site services from professional social workers for those over 80. Community social organizations are nurtured through community social worker offices and social entities, fostering domestic service volunteer teams that provide in-home haircuts, housekeeping, and psychological counseling to meet the needs of older adults. Leveraging the Tianshan Heart Home Social Work Service Society, efforts focus on developing four key social service organizations, such as the “Yinling Elder Care Service Group.” A variety of community activities, like “Culture Running Xinjiang,” are organized to enhance the spiritual and cultural lives of seniors. The community also conducts case consultations and youth growth groups, emphasizing the mental well-being of the elderly and the development of children. Regular volunteer services act as a valuable supplement. Additionally, a “Red Sunday” service day is established for public convenience, offering services such as haircuts, knife sharpening, and blood pressure measurements to improve the quality of life for older individuals.

3.2. Resource integration of the five social organizations

Party building facilitates the integration of community resources. Fully leverage the central leadership role of Party organizations by integrating community social organizations, volunteers, and charitable resources into a “five-social linkage” framework. This fosters collaboration and collectively enhances community elderly care services. Public charitable resources have been introduced, with coordination involving higher-level departments such as the Civil Affairs Bureau, the Municipal Charity Federation, and the Municipal Culture, Sports, and Tourism Bureau. Over 700 books and magazines were received, while the municipal Lucky Lottery Center donated dozens of umbrellas and sets of volunteer uniforms to support community development and activities. Using the community as a platform, governance has been coordinated and promoted. A “practice service position for the five social groups” was established, transforming eight rooms in the office building into spaces like dance studios, reading rooms, and table tennis rooms at a cost of over 50,000 yuan. These resident activity areas enrich the cultural ambiance of the community and strengthen residents’ sense of belonging. With “red blood cell” party members as the core, the initiative attracts community party members, retired officials, and physically fit older adults to participate. A public service platform is provided to encourage residents to engage in volunteer work. By implementing the “rolling incubation of community social organizations” development strategy, the initiative

has successfully fostered 27 community social organizations across three domains: grassroots governance, social services, and cultural and sports activities ^[7]. These organizations have significantly bolstered residents' capacity for self-governance and have proven indispensable during crucial times, such as public security reviews and emergency situations.

3.3. The cooperation mechanism of the five social organizations

In the “Five-Social Linkage” mechanism, X Community fully leverages the collaborative impact of the five stakeholders. The “two committees” within the community foster mutual support and resource sharing through regular consultation meetings, with assistance and coordination from members of the major Party committees at the street and district levels. During the early stages of projects, social workers engage in communication and negotiation with community party organizations and residents' committees to establish cooperative agreements. They employ professional methodologies to organize events like the Dragon Boat Festival and the Party Building Festival for target service groups, cultivating a positive community environment. A mutually beneficial mechanism titled “engaging in public welfare and showcasing image” is established to encourage residents to join volunteer teams. To further motivate volunteers, X Community has implemented a comprehensive reward system based on volunteer points. By allowing points to be exchanged for daily necessities, residents are incentivized to actively participate in community volunteer services. This approach not only improves the efficiency of volunteer activities but also strengthens resident involvement in community affairs, fostering a favorable scenario of joint construction, co-governance, and shared benefits.

4. Analysis of difficulties and development suggestions

4.1. Analysis of dilemma

4.1.1. Linkage mechanism is not perfect

The connection model of the five social organizations demands strong collaboration and coordinated efforts among different entities. Nevertheless, in practical implementation, the ambiguity in responsibility distribution among primary parties, coupled with inadequate communication and a flawed incentive system, leads to an imperfect linkage mechanism. This, in turn, negatively impacts the efficiency and outcomes of the services provided ^[8]. The involvement of multiple parties might introduce challenges in coordination, necessitating the establishment of an efficient communication framework.

4.1.2. Resources are not allocated properly

Social resources play a crucial role in ensuring the efficient functioning of the collaboration model among the five social organizations. Nevertheless, factors such as low resident engagement within communities, insufficient trust, and the absence of an effective resource integration system have led to a scarcity of social resources. This shortage has, in turn, impacted the effectiveness of the collaboration model in community elderly care services. Further study and investigation are required to determine how to more effectively consolidate and make use of these resources, thereby enhancing the sustainability and efficacy of the project.

4.1.3. Uneven service quality

The shortage of professionals in community elderly care services hinders the ability to satisfy the increasingly demanding needs for such services. This sector encompasses a wide range of specialized areas, including

medicine, nursing, psychology, and law, all of which require staff with high levels of professional competence. Furthermore, the development of social organizations remains underdeveloped. As a critical component connecting the five types of social organizations, the progress of these entities significantly impacts both the quality and sustainability of community elderly care services. Nevertheless, currently, social organizations often face challenges such as limited size, inadequate funding, and restricted service capabilities, which prevent them from fully realizing their potential within community elderly care services. In X community, 70% of community-based social organizations primarily focus on cultural and sports activities, necessitating a transformation into life-service and community-affairs organizations tailored to this demographic.

4.2. Development suggestions

4.2.1. Change the concept of governance and enhance governance capacity

Community governance focuses on the administration of public affairs through collaboration and dialogue, addressing the shortcomings or inefficiencies of government and market mechanisms in the distribution of social resources. While facilitating the shift of government governance from a management-oriented approach to a governance-focused one, it is also necessary to upgrade the underlying concepts^[9]. The “integration of five social organizations” represents a process where the government, communities, and social workers fulfill their respective roles, forming part of a multi-party system. The case of Community X demonstrates that Party-building leadership serves as the central driving force for advancing community governance. By engaging residents in diverse activities and promoting policy implementation, Party organizations have significantly enhanced resident satisfaction and refined the social governance framework. Leveraging modern scientific and technological advancements, community-based elderly care services are provided based on local conditions. Technologies such as the Internet of Things, big data, and cloud computing are integrated to establish a smart elderly care platform. This platform collects and analyzes real-time information regarding the daily lives, health, and safety of seniors, thereby improving the quality of elderly care services^[10].

4.2.2. Improve the market mechanism and invite social workers to participate

To foster the integrated development of social work and community elderly care services, it is essential to prioritize the needs of financially disadvantaged disabled, elderly, and uncared-for seniors by leveraging both government-purchased services and direct service provision. A collaborative platform should be established, engaging the government, enterprises, social organizations, and social workers to enhance information sharing and resource coordination^[11]. Various methods, including project collaboration and service procurement, should be utilized to ensure that social work services permeate all market sectors, offering tailored and professional support to market participants^[12]. By refining the market mechanisms for social workers’ involvement in community elderly care, market vitality can be enhanced, resource allocation improved, and the diverse needs of the elderly better met, thereby promoting the sustainable and healthy development of elderly care services.

4.2.3. Strengthen the linkage of subjects through community joint meetings

The primary challenge for the collaborative model involving the five cooperatives is establishing an effective coordination mechanism among them. To address this, the Tianshanxin Social Work Station has developed a community joint meeting system. This involves convening monthly meetings with representatives from at least three relevant entities to discuss key issues. During these meetings, social workers present the outcomes of their previous month’s efforts, highlight major challenges encountered, outline plans for the upcoming month, and

identify areas requiring assistance. The presence of leaders from these entities facilitates swift problem-solving and decision-making. By implementing this joint meeting system, the efficiency and relevance of collaboration among the various stakeholders are enhanced, thereby ensuring the effectiveness of services provided by the five social groups.

4.2.4. Cultivate professional talents and develop local talents

The advancement of professional social work services relies on the collaborative efforts of both specialists and local talent. To enhance both the number and caliber of social work professionals, it is crucial to intensify training and educational initiatives aimed at boosting their expertise and capabilities. Additionally, by recruiting qualified social work professionals and forming dedicated teams, we can more effectively establish a robust social work professional corps and deliver superior social work services ^[13].

During the execution of services, social workers can assume the role of educators, developing a pool of talents within the community who possess specialized service capabilities. Additionally, they can foster and support volunteer groups focused on elderly care. Building on this, there should be a gradual establishment of community-based social organizations. Consequently, an integrated elderly social service network will emerge, combining the efforts of social workers, employees from elderly care facilities, and volunteers. This network will further leverage disciplinary traits and operational outcomes to enhance social services for the elderly ^[14].

5. Summary

In summary, the integrated model of the five cooperatives is driven by the needs of community residents. It operates with the entire community as a service platform, social organizations as service providers, social workers as service supporters, community volunteers as supplementary service assistants, and social charity resources as service guarantors. Guided by Party building, this model aims to achieve high-quality development in community elderly care services ^[15]. However, the current integration mechanism among these five social entities remains imperfect, and its closed-loop operation requires further optimization. In the context of community elderly care, this integrated model faces challenges such as a shortage of professional talent, inefficient resource allocation, inconsistent service quality, and an underdeveloped coordination mechanism. To ensure the effective operation and sustainable development of this integrated model in community elderly care services, collaborative efforts from multiple stakeholders are essential. These include the government, communities, social organizations, social workers, community volunteers, and social charity resources. Specific measures that can be implemented include: (1) transforming governance philosophies and enhancing governance capabilities; (2) establishing and refining market mechanisms to encourage social worker participation; (3) strengthening coordination among various parties through community joint meetings; and (4) cultivating and attracting professional talent to bolster the local talent pool. By implementing these strategies, the integrated model of the five social entities can play a more significant role in community elderly care services, ultimately providing higher-quality care for the elderly population.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] National Bureau of Statistics. Seventh Census Data, 2021, Bulletin of the 7th National Population Census, visited on November 26, 2021, <https://www.stats.gov/sj/pcsj/rkpc/d7c/>
- [2] Liu Z, 2024, Collaborative Logic of “Five-Social Linkage” to Support Community Elderly Care Service – Based on a Single Case Study of H Community in X County. *Journal of Panzhuhua University*, 41(5): 20–31.
- [3] Xu X, 2024, From Institutional Innovation to Ecological Construction: The Inheritance and Transcendence of “Five-Society Linkage” to “Three-Society Linkage.” *Social Science Frontiers*, 2024(8): 241–250.
- [4] Xie Z, Cao L, Shi H, et al., 2024, Resource Activation: Exploring the Strategy of Promoting High-Quality Development of Community Governance by “Five Cooperatives.” *Journal of Xiangyang Vocational and Technical College*, 23(5): 112–116.
- [5] Tian S, Diliziba T, 2022, “Linkage of Five Social Organizations” in Community Governance: Connotation, Mechanism and Dilemma. *Journal of Hunan Institute of Administration*, 2022(4): 101–108.
- [6] Wen J, Ao S, 2024, Study on Voluntary Service Participation Mechanism in Community Governance Scenario. *Gansu Social Sciences*, 2024(5): 105–115.
- [7] Xu W, Shi X, 2019, Interest Coupling, Common Action and Emotional Resonance: A Three-Level Approach for Social Organizations to Construct Community Governance. *Public Administration and Policy Review*, 13(1): 68–84.
- [8] Dong Z, Shi Y, Feng Q, 2024, Current Situation and Countermeasures of Elderly Care in Smart Community in China. *Cooperative Economy and Technology*, 2024(23): 170–172.
- [9] Zhang S, Zhou J, 2024, Innovation and Exploration of Community Elderly Care Service Model Under the Linkage of Five Social Organizations: A Case Study of S Community, J District, D City. *Journal of Qiqihar University (Philosophy and Social Sciences Edition)*, 2024(6): 85–91.
- [10] Gu Y, Li Y, Yuan X, 2024, Market Participation Path and Practice Logic of Urban Community Elderly Care. *Shanghai Urban Management*, 33(1): 60–68.
- [11] Jiang L, 2024, Research on the Problems and Practices of Social Work Involving Urban Community Residents in Community Governance. *International Public Relations*, 2024(13): 59–61.
- [12] Ren M, Luo Y, Lv J, 2023, Re-Opening of Community Service Center for the Elderly – Social Workers’ Practical Action to Promote “Five-Social Linkage” Through the Balance of Diverse Needs. *Chinese Social Work*, 2023(15): 21–24.
- [13] Niu M, Li H, 2024, Practice Exploration of Community Home-Based Care Service Under the “Five-Community Linkage” Model – A Case Study of Dongting Community Home-Based Care Service Project in Wuhan City. *Journal of Lianyungang Vocational and Technical College*, 35(3): 58–64.
- [14] Zhou J, 2022, An Empirical Study on the “Five Social Associations” Assisting Community Elderly Care Service – A Case Study of D Community in Jiangyou City. *Vitality*, 2022(16): 127–129.
- [15] Xu J, Cheng L, 2023, “Service Activates Society” – The Operation Mode of the Five Social Organizations to Drive Social Construction. *Governance Research*, 39(2): 33–45 + 157–158.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on the Reform and Innovation of College English Teaching under the Background of New Media

Yunxi Shao*

XianDa College of Economics and Humanities, Shanghai International Studies University, Shanghai 430019, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: The widely used new media has produced a profound impact on college education and teaching, and also provides new technical support and methods for the reform and innovation of college English teaching in the new era. The deep integration of new media technology and college English teaching not only fundamentally promotes the optimization and reform of the traditional teaching model centered on textbooks, but also provides a large number of high-quality resources for the reform and innovation of English teaching. Based on this, this paper expounds the practical significance of college English teaching reform and innovation under the background of new media, and combines with the current practical problems in college English teaching reform and innovation, focusing on how to make use of new media technology to reform and innovation, so as to give full play to the educational and teaching advantages of new media technology and improve the educational level of college English teaching.

Keywords: New media; College English; Reform and innovation

Online publication: April 28, 2025

1. Introduction

New media refers to a new mode of information dissemination relying on Internet technology and using mobile phones, computers and other platforms as carriers. Compared with the traditional means of information transmission, new media has stronger timeliness and can transmit more resources and content^[1]. Therefore, promoting the reform and innovation of college English teaching based on new media technology can help students achieve better self-improvement and self-development on the basis of enriching their own knowledge reserves.

2. The significance of college English teaching reform and innovation under the background of new media

2.1. Extending college English teaching

The deep integration of new media technology and college English teaching has fundamentally broken through

the constraints of time and space under the traditional teaching horizon, and then extended the former English teaching mainly in the classroom to the online space, as well as to students' spare time and extracurricular life. It can be seen that new media technology strengthens students' independent learning and enables them to continuously optimize their own learning time and learning methods with the help of new media resources in combination with their actual conditions ^[2]. At the same time, new media technology strengthens the communication and interaction between teachers and students, and promotes the flow of resources and information exchange between them. This is of great significance and value for promoting the effective extension of college English teaching.

2.2. Improving the working level of college English education

The application of new media technology in college English teaching can help teachers reform their teaching concepts and construct new teaching concepts, to make full use of the advantages of new media in educational reform and innovation ^[3]. At the same time, in the process of learning, operating, and using new media, English teachers can change their self-cognition and ideas imperceptibly, and effectively transmit this new teaching concept to students, thus improving the actual efficiency and quality of education and teaching virtually.

2.3. The necessary measures to realize education informatization

The application of new media is of landmark significance in promoting the informatization reform of college English wisdom education. It is the only way to promote the connotative construction and high-quality development of colleges and universities, and also an important engine to improve the quality of English talent cultivation. With the gradual advancement of education informatization, the disadvantages of college English teaching and communication mode are gradually exposed ^[4]. Therefore, the use of new media technology to solve specific problems in college English teaching can comprehensively promote the process of college English information teaching in the process of integrating Internet resources, reshaping educational concepts and innovating teaching modes, and build a new teaching mode that promotes students' knowledge expansion and independent learning under the empowerment of network new media technology to fundamentally solve the problem of the overall imbalance of classroom ecology.

3. Practical problems in college English teaching reform and innovation

3.1. Practical output needs to be improved

Under the influence of traditional teaching thinking, college English teachers often find it difficult to get rid of the inherent thinking of humanistic subject teaching, that is, they attach importance to written input and ignore practical output ^[5]. In classroom teaching, teachers usually spend a lot of time guiding students to learn the knowledge content presented in the textbooks, and adopt the written teaching mode to help them master English vocabulary, grammar, and other content. This kind of teaching method and mode seriously affect the improvement of students' communicative ability and the learning effect of practical language skills, thus deviating from the essence of English language learning and making it difficult to further improve students' English practical ability ^[6].

3.2. It is difficult to highlight the dominant position of students

In essence, college English teaching is a two-way interaction between teachers' teaching and students' learning.

Therefore, it is necessary not only to give full play to teachers' guiding role in classroom teaching, but also to highlight students' dominant position, to build a benign teaching ecology based on two-way interaction between teachers and students ^[7]. However, due to the comprehensive interference of various practical factors, English teachers do not effectively highlight the dominant position of students in teaching, and often use the teaching method of indoctrination and stuffing to explain the knowledge in textbooks directly to them. This leads to students being in a passive state of learning for a long time, which limits the improvement of the English teaching level and education quality ^[8].

3.3. The content of textbooks lacks the characteristics of the era

With the advent of the new media era, college English textbooks have exposed a major drawback, that is, a lack of contemporary needs. As a result, students can only master outdated knowledge, and it is difficult to meet the new requirements of talent training put forward by the development of the era. As a result, English teaching loses its practical value and significance ^[9]. New media accelerates the flow of various information resources. If it is difficult for English teachers to integrate and reconstruct various information resources with the theme of teaching materials by using new media technology, they will lag behind the development of the era.

4. The path of college English teaching reform and innovation under the background of new media

4.1. Introduction of situational teaching

From the perspective of new media, if English teachers still construct their teaching according to traditional concepts, it is difficult to meet the actual needs of deepening the reform of higher education in the new era ^[10]. Therefore, it is very important to strengthen the reform and innovation of English teaching by relying on new media technology. For example, English teachers can use multimedia technology to play videos related to this lesson and guide students to learn English by combining video materials. In this way, a vivid and interesting English situation can be created, which can give students both visual and auditory stimulation, and further improve students' sensitivity to learning the English language. After the video is played, English teachers can use the whiteboard to show the key content of this lesson and encourage students to create situational dialogues in small groups, combined with the teaching theme of this unit. This kind of open situational teaching method enables students to constantly expand their self-thinking and enhance their consciousness of innovation in practical experience and independent thinking. In a word, promoting students' classroom practice and deep thinking through situational dialogue can help them achieve comprehensive development and comprehensive improvement in English communication ^[11].

4.2. Guide self-directed learning

The improvement of college students' English learning level cannot be limited to classroom teaching. English teachers can make use of the advantages of new media technology to help them form good English learning habits in independent learning. For example, make use of micro-lessons flexibly. Micro lessons usually focus on a specific knowledge point or key content, which can help students concentrate their attention quickly in a short time. Therefore, using short, lively, and interesting micro lessons in college English teaching can not only help improve students' autonomous learning ability but also effectively improve the flexibility of English teaching. In the pre-class stage, English teachers can release preview tasks to students through micro-lessons to help them

get familiar with the teaching content in advance. Students who enter the university stage often have a certain ability to self-control. Micro-lessons can help students grasp the important and difficult knowledge in the pre-class preview, and then encourage them to interact with teachers in class in a targeted way. In class, English teachers can show other famous teachers' video explanations to students with the help of micro-lessons, to provide new ideas for students' self-study and self-development in the future. After class, students can use micro-lessons to review knowledge, or they can combine the new ideas in class to find other materials on a certain knowledge point, so that they can understand some knowledge points thoroughly in a second understanding and review ^[12]. Moreover, English teachers can also create online classes with the help of new media technology. The class hours of college English teaching are scattered, which makes it difficult for students to have frequent offline communication with teachers. In this regard, by relying on new media technology to create online classes, English teachers can better help students solve the difficult problems encountered in independent learning. On the one hand, according to the development of The Times, English teachers can push diversified English videos and English learning materials to students through online classes, to guide students to enrich their knowledge reserves and broaden their learning horizons through independent learning. On the other hand, students can post their doubts in the online class to exchange knowledge and discuss problems with teachers and other students. This measure is of great help and value for improving students' autonomous learning ability and improving their English literacy ^[13].

4.3. Enhance classroom interaction

Under the traditional teaching perspective, the paper-based assessment method is difficult to comprehensively evaluate the learning effect of students, and often needs to occupy a lot of space resources ^[14]. In this regard, college English teachers can develop interactive platforms of new media technology to mobilize students' enthusiasm to participate in classroom interaction and give them timely evaluation and feedback. First of all, the interactive teaching platform based on new media technology should have the advantages of rich functions and be easy to use, and then trigger students' deep learning by presenting diversified video resources. For example, English teachers can encourage students to have in-depth discussions on topics published in online discussion boards, collect and organize students' opinions and ideas with the help of a timely feedback system, and then give them personalized comments on this basis. This can monitor the development and improvement of students' English literacy and language communication ability in real time, and effectively enhance the vividness and interest of classroom interaction ^[15]. Secondly, new media technology can be used to integrate discipline competition and game elements into college English teaching, to enhance students' learning motivation and improve their enthusiasm and initiative to participate in classroom interaction. To be specific, English teachers can set up game elements such as challenges and leaderboards, and create challenging game tasks around the teaching content, to enhance students' sense of achievement in English learning through competition and cooperation. Finally, online activities should be organized regularly, such as a speech contest, a debate contest, a study project, etc. These diversified learning projects can fully activate students' learning enthusiasm and creativity, and encourage them to constantly improve their comprehensive quality in the process of learning from each other.

4.4. Improving teachers' new media literacy

Improving the new media literacy of English teachers is the key driving force to promote the reform and innovation of college English teaching in the background of new media, and is of great help to improve the

education level of English teaching. This measure can enable English teachers to fully understand the educational advantages of new media technology and effectively integrate it into education and teaching. In this regard, college English teachers can continuously improve their technical knowledge and teaching ability under the guidance of the TPACK framework. First of all, learn the necessary new media technology skills. Independent learning is an important channel for college English teachers to improve their own new media literacy. They can keep abreast of the current development prospects and application status of new media technologies by observing the information-based teaching of other excellent teachers and consulting relevant literature resources, to constantly master advanced education and teaching methods on this basis. At the same time, the interconnectedness of new media technologies enables English teachers to build a learning community with like-minded friends across the limitations of time and space, and jointly explore innovative ways to use new media technologies. Secondly, colleges and universities can regularly carry out diversified training and seminars based on the personal situation and actual needs of English teachers, to popularize the latest developments of new media technologies and the best practices in education integration, and to give them more teaching inspiration. At the same time, colleges and universities can arrange practical and operational content in a targeted way, and encourage English teachers to internalize the training content into their knowledge and skills by designing teaching cases and classroom records. Finally, a variety of new media competitions should be held to guide college English teachers to actively cooperate and communicate with their peers. Promoting learning and teaching through competition can better stimulate the innovative spirit of English teachers and encourage them to actively explore the innovative integration of new media and education and teaching in practice and innovation.

5. Conclusion

To sum up, it is of great practical significance and value to rely on new media technology to promote the reform and innovation of college English teaching, which can create a good English learning environment for students and lead them to grow into high-quality English talents who meet the needs of the new era. In this regard, college English teachers should fully grasp the development trend of the new media era, and give full play to the educational and teaching advantages of new media technologies by innovating teaching models, enhancing students' independent learning, improving classroom interaction and deepening their own new media literacy to promote the all-round development of students.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Wu X, 2024, Teaching Innovation and Exploration of College English Majors Based on “Comprehensive English” Curriculum Reform: A Review of Curriculum System Construction and Teaching Reform for College English Majors. *Science and Technology Management Research*, 44(1): 244.
- [2] Lin Y, 2023, Reform and Innovation of English Translation Teaching in Colleges and Universities: A Review of The Reform of English Teaching in Colleges and Universities Based on the Cultivation of Translation Ability. *China Education Tribune*, 2023(9): 113.

- [3] Zhou D, 2023, A Practical Exploration on the Reform and Innovation of Blended Teaching of Core Curriculum for English Majors in Applied Undergraduate Colleges: A Case Study of Comprehensive English. *Overseas English*, 2023(12): 129–131.
- [4] Zhang H, 2023, Research on Innovative Strategies of College English Teaching Reform from the Perspective of “Internet Plus.” *Overseas English*, 2023(8): 135–137.
- [5] Li R, 2023, Reform, Innovation and Practice of College English Teaching in the New Media Era: A Review of English Teaching from the Perspective of Computer Network. *China Education Tribune*, 2023(2): 128.
- [6] Zou C, 2022, Thinking on the Reform and Innovation of College English Teaching from the Perspective of Multi-Culture. *Science and Technology Information*, 20(17): 165–167.
- [7] Deng H, 2022, Research on Reform and Innovation of College English Teaching under New Media Environment. *Industry and Science Forum*, 21(3): 170–171.
- [8] Li W, 2020, Analysis of English Teaching Reform and Innovation in Higher Vocational Colleges under the Background of New Media. *College English*, 2020(29): 64–65.
- [9] Guo Q, 2024, Reform and Practice Analysis of Practical Training for English Majors in the New Era. *Intelligence*, 2024(33): 154–157.
- [10] Lu F, 2024, Strategies for College English Teaching Reform from the Perspective of Multiculturalism. *English for Middle School Students*, 2024(36): 59–60.
- [11] Yang R, 2024, A Study on the Reform Strategies of College English Teaching in Application-Oriented Universities. *Journal of Contemporary Teaching and Research*, 10(10): 36–39.
- [12] Hu Z, 2024, The Improvement of College English Teaching Quality from the Perspective of “Three-Whole Education”. *Henan Daily · Rural Edition*, 2024-06-20(003).
- [13] Li K, 2024, Research on the Reform of English Teaching Mode in Colleges and Universities from a Diversified Perspective. *Journal of Hubei Open Vocational College*, 37(15): 185–187.
- [14] Li Z, 2024, Research on Ideological and Political Teaching Reform of College English Curriculum in the New Era. *Reference for Middle School Political Teaching*, 2024(20): 97–98.
- [15] Zhang Y, Wang Y, 2024, Research on Teaching Reform of English Majors in Applied Universities. *Educational Theory and Practice*, 44(12): 58–61.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

A Preliminary Study on the Teaching Reform of Biological Instrument Analysis Course

Ye Xu*, Liang Yuan, Han Wang

International Research Center of Cross-Border Pest Management in Central Asia, Xinjiang Key Laboratory of Special Species Conservation and Regulatory Biology, College of Life Sciences, Xinjiang Normal University, Urumqi 830017, Xinjiang, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: The teaching of biological instrument analysis plays a key role in the development of modern life science field. With the deepening of life science research, new instrumental analysis techniques and methods continue to emerge. These technologies have been widely used in the fields of biology, clinical diagnosis, medicine, materials and so on with their rapidity, accuracy, good selectivity and high sensitivity. As the core component of biology teaching system, the course of biological instrument analysis is very important for cultivating students' experimental and theoretical knowledge and scientific research ability. However, with the emergence of new testing methods and testing instruments, the course of biological instrument analysis is faced with many challenges, including lagging teaching content, single teaching method and insufficient cultivation of students' practical ability, which directly affect the teaching effect and the improvement of students' comprehensive quality. In view of this, this paper makes an in-depth analysis of the main problems existing in the current teaching of biological instrument analysis, and puts forward targeted improvement strategies, aiming to effectively improve the teaching effect of biological instrument analysis experiment by optimizing the course system, innovating teaching methods, strengthening practical operation and other means, and cultivate more innovative application talents with solid theoretical foundation and practical ability. In order to meet the needs of social and scientific and technological development.

Keywords: Biological instrument analysis; Experimental teaching; Teaching reform

Online publication: April 28, 2025

1. Introduction:

The teaching of biological instrument analysis plays a vital role in modern production and scientific research. It not only provides an effective means for the acquisition of material information, but also acts as a comprehensive and professional analysis and testing method, involving many subject areas, such as biology, chemistry, physics, mathematics and computer science and technology^[1-2]. The cross-fusion between these disciplines makes the teaching of biological instrument analysis extensive in content, strong in theory, and the knowledge permeates

and influences each other^[3-4].

As a practical course, the teaching content of the biological instrument analysis experiment course is divided into two parts: classroom theory teaching and field experiment teaching. As an extension of theoretical teaching, experimental teaching plays an irreplaceable role in cultivating application-oriented talents^[5-6]. Under the background of China's education reform, the focus is on cultivating students' practical ability and innovation ability, aiming at cultivating innovative talents who can adapt to the needs of society^[7-9].

The experimental course of biological instrument analysis, as an extension of classroom theoretical teaching, aims to enable students to master the methods of independent scientific experiments through practical teaching, develop good experimental habits, and improve students' ability of judgment, reasoning, observation and thinking^[10-11]. However, in the current biology teaching experiment, there are still a series of problems in the application of instrumental analysis, such as outdated teaching content, a single teaching method, insufficient opportunities for students to practice, etc. These problems seriously restrict the improvement of teaching quality and the cultivation of students' ability^[12-16]. Therefore, this paper aims to explore the problems existing in the teaching of biological instrument analysis, and put forward corresponding countermeasures to reform the experimental teaching methods, enrich the experimental teaching methods, lay a good foundation for the follow-up study and practice of students, and contribute to the cultivation of innovative application talents.

2. Problems existing in the teaching of biological instrument analysis

2.1. The teaching content is complicated and outdated

The teaching content of a biological instrument analysis course involves many complicated instrumental analysis theories and techniques, and some content may not be updated in time, which makes it difficult for students to digest and absorb. In addition, the old teaching content is also difficult to stimulate students' interest in learning, affecting the overall teaching effect. This not only increases the difficulty of students' learning, but also limits their understanding and mastery of the latest instrumental analysis technology.

2.2. The experimental conditions are limited and the teaching effect is not good

In the actual experimental teaching of biological instrument analysis, due to the limitations of experimental conditions, such as an insufficient number of instruments, obsolete instruments and equipment, and a shortage of experimental materials, students cannot fully carry out practical operations, affecting the effect of experimental teaching. Experimental teaching is an important part of the course of biological instrument analysis. Poor experimental teaching results will lead to students' lack of understanding and application ability of theoretical knowledge.

2.3. Students' basic knowledge is weak and their learning enthusiasm is not high

When students learn the course of biological instrument analysis, due to the lack of solid basic knowledge in the early stage and insufficient background knowledge, such as physics, chemistry and other relevant basic knowledge, it will lead to many difficulties in the learning process, which greatly affects the enthusiasm of students. In addition, due to the boring teaching content and methods, the learning motivation of students is further weakened, and the low enthusiasm of students will further affect the overall teaching effect and reduce the learning outcome of students.

2.4. Disconnection between theory and practice, single assessment method

In the teaching of a biological instrument analysis course, the disconnection between theory and practice is a common problem. Students learn a lot of theoretical knowledge in the classroom, but it is often difficult to combine the learned knowledge with practical operation in the actual experiment. In addition, the assessment method is often too simple, mainly relying on written tests or the writing of experiment reports, which may lead students to pay more attention to the memorization of theoretical knowledge and neglect the cultivation of practical ability.

3. Biological instrument analysis of teaching reform countermeasures

3.1. Clarify the main line of knowledge and grasp the key points of teaching

The teaching reform of the course of biological instrument analysis should start with clarifying the main line of knowledge, clarifying the teaching focus, and ensuring that students can systematically master the core knowledge and skills. It is necessary to deeply analyze the course content, systematically integrate complex theoretical knowledge, highlight key knowledge points, and help students establish a clear knowledge framework. At the same time, we should pay attention to the combination of theory and practice, and stimulate students' interest in learning and improve teaching effect through case teaching and problem-oriented teaching.

3.2. Optimize the structure and content of the course according to the frontier of scientific research

The biological instrument analysis technology is constantly updated and developed, and the teaching reform should be combined with the trends of scientific research frontiers, and constantly expand and update the course content, so that students can timely understand the latest instrumental analysis technology and application. The practicability and prospectivity of the course can be increased by introducing the latest scientific research achievements and technological trends. In addition, experts in related fields can be invited to give lectures to share the latest research progress and technology applications and broaden students' academic horizons.

3.3. Reform the experimental teaching model and strengthen the combination of theory and practice

Experimental teaching is an important part of the course of biological instrument analysis. In the experiment teaching, we should reform the traditional experiment teaching mode and realize the organic combination of theory teaching and experiment teaching. Through the design of targeted and practical experimental projects, students can deeply understand the theoretical knowledge in the process of hands-on practice, and promote the cultivation of students' practical and innovative abilities. At the same time, the experimental teaching should be oriented to the actual needs of society, optimize the experimental content, and increase the practicality and application of the experiment.

3.4. Experimental teaching content should be set by classification, and experimental teaching classrooms should be designed by project level

According to different backgrounds and needs of students, experimental teaching content can be classified to achieve personalized teaching. The experimental teaching classroom is designed with project-based grading, and the experimental content is divided into basic, comprehensive, innovative, and other levels, so as to gradually

improve students' practical ability and innovative ability. In addition, students can be encouraged to participate in scientific research projects to cultivate their scientific research literacy and teamwork ability.

3.5. Innovate teaching methods and means to improve teaching effect

To improve the teaching effect, teaching plans should be written reasonably, and a variety of teaching methods and means should be adopted. We can use a project-type graded experimental teaching class to stimulate students' learning interest and initiative through group cooperation and a project-driven approach. At the same time, we should make full use of modern information technology means, such as virtual simulation experiments, online teaching platforms, etc., to provide students with more abundant and convenient learning resources and environment.

3.6. The teaching team should cooperate to implement experimental teaching practice

Establish a professional teaching team to realize the collaborative division of labor among teachers and jointly participate in the experimental teaching practice. Through teamwork, the efficiency and quality of experimental teaching can be improved to provide students with a better learning experience. Teaching team members can exchange teaching experience with each other, jointly discuss the improvement of teaching methods and experimental techniques, and constantly improve the teaching level.

3.7. Multi-level construction of teaching resource platform

According to the different needs of students, the teaching resource platform shall be constructed in different layers to provide rich and diverse teaching resources, such as online courses, experimental instructions, and scientific research papers. Through the establishment of the teaching resource platform, it can meet the needs of students' independent learning and improve the learning effect. In addition, teachers can also make use of the teaching resource platform to conduct teaching research and academic exchanges, and promote their professional development.

3.8. Build a diversified assessment system to comprehensively assess students' abilities

In terms of assessment, a diversified assessment system should be built, including comprehensive experimental teaching reform that combines process assessment and target assessment. Students' knowledge mastery, practical ability, and teamwork ability are comprehensively assessed through regular test reports, classroom performance, group discussion, and other forms of assessment. At the same time, mechanisms such as peer review and student mutual evaluation can be introduced to increase the fairness and objectivity of assessment. Such an assessment system can not only more accurately reflect students' learning outcomes, but also promote their comprehensive development. The comprehensive assessment method can evaluate the learning effect of students more comprehensively and promote the comprehensive development of students. According to students' performance and feedback, teachers can adjust teaching strategies in time to improve teaching quality.

4. Conclusion

The implementation of the teaching reform of the biological instrument analysis course can improve the teaching quality and students' learning effect more effectively, and enhance students' practical and innovation abilities. By optimizing the course content, innovating the teaching method, and strengthening the experimental teaching,

the students not only master the solid theoretical knowledge, but also can flexibly apply it in practice to solve practical problems. To sum up, we will continue to deepen the teaching reform, explore more efficient teaching methods, strengthen the cross-integration with other disciplines, and further improve the comprehensive quality of students. At the same time, we will continue to pay attention to industry trends, ensure that the teaching content is updated with the era, and contribute to the cultivation of biological science talents with an international vision and competitiveness.

Funding

Undergraduate Education Research and Reform Project of the Autonomous Region, “Construction and Practice of Multi-dimensional Process Evaluation System of Cell Biology Course under the Background of Teacher Professional Certification” (Project No.: XJGXPTJG-202229)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Liu Y, Tian Y, Chen L, et al., 2022, Discussion on the Teaching of Instrumental Analysis Experiment Course for Biological Science Majors. *Guangzhou Chemical Industry*, 50(10): 145–146.
- [2] Li Y, 2015, Exploration and Thinking on Teaching Reform of Biological Instrument Analysis. *Beijing Agriculture*, 2015(3): 271.
- [3] Wang L, Wang L, 2020, Discussion on Teaching of Biological Instrument Analysis Experiment Course. *Chemistry of Life*, 40(9): 1636–1640.
- [4] Li S, Guo M, Zhou J, et al., 2018, Problems and Countermeasures of Experimental Teaching of Instrumental Analysis in Agriculture and Forestry Majors. *Chemical Education (Chinese & English)*, 39(20): 57–62.
- [5] Zhu Y, Xue T, Sheng W, et al., 2020, Discussion on Teaching Reform of Instrumental Analysis Course for Biological Engineering Major. *Journal of Fuyang Normal University (Natural Science Edition)*, 37(3): 111–114.
- [6] Zhang J, Wang M, 2019, Exploration of Application-Oriented Teaching Reform of Instrument Analysis for Biotechnology Major. *Shandong Chemical Industry*, 49(19): 169–170.
- [7] Wang R, Ji M, Zhang L, et al., 2011, Teaching Practice and Exploration of Instrumental Analysis Theory Course. *Spectral Laboratory*, 28(1): 259–261.
- [8] Li F, Cao Q, Ling J, et al., 2019, Instrumental Analysis Experiment Teaching Reform Aiming at Improving Students' Comprehensive Ability. *Journal of Yunnan University (Natural Science Edition)*, 42(S1): 18–20.
- [9] Cai X, Wang X, Li Y, 2014, Reforming Instrumental Analysis Experiment Teaching to Cultivate Students' Innovation Ability. *Laboratory Research and Exploration*, 33(11): 168–171.
- [10] Li Z, Yuan Z, Liu F, et al., 2014, Discussion on Instrumental Analysis and Experimental Course Teaching for Bioengineering Majors. *Higher Chemical Education*, 31(2): 68–71.
- [11] Huang H, 2001, Discussion on Teaching Content and Curriculum System Reform of Biochemical Instrument Analysis. *Analytical Instruments*, 2001(1): 36–38.
- [12] Zhen S, 2013, Thinking on Teaching Reform of Instrumental Analysis Course. *Journal of Southwest Normal*