



Volume 8
Issue **04**

December 2024

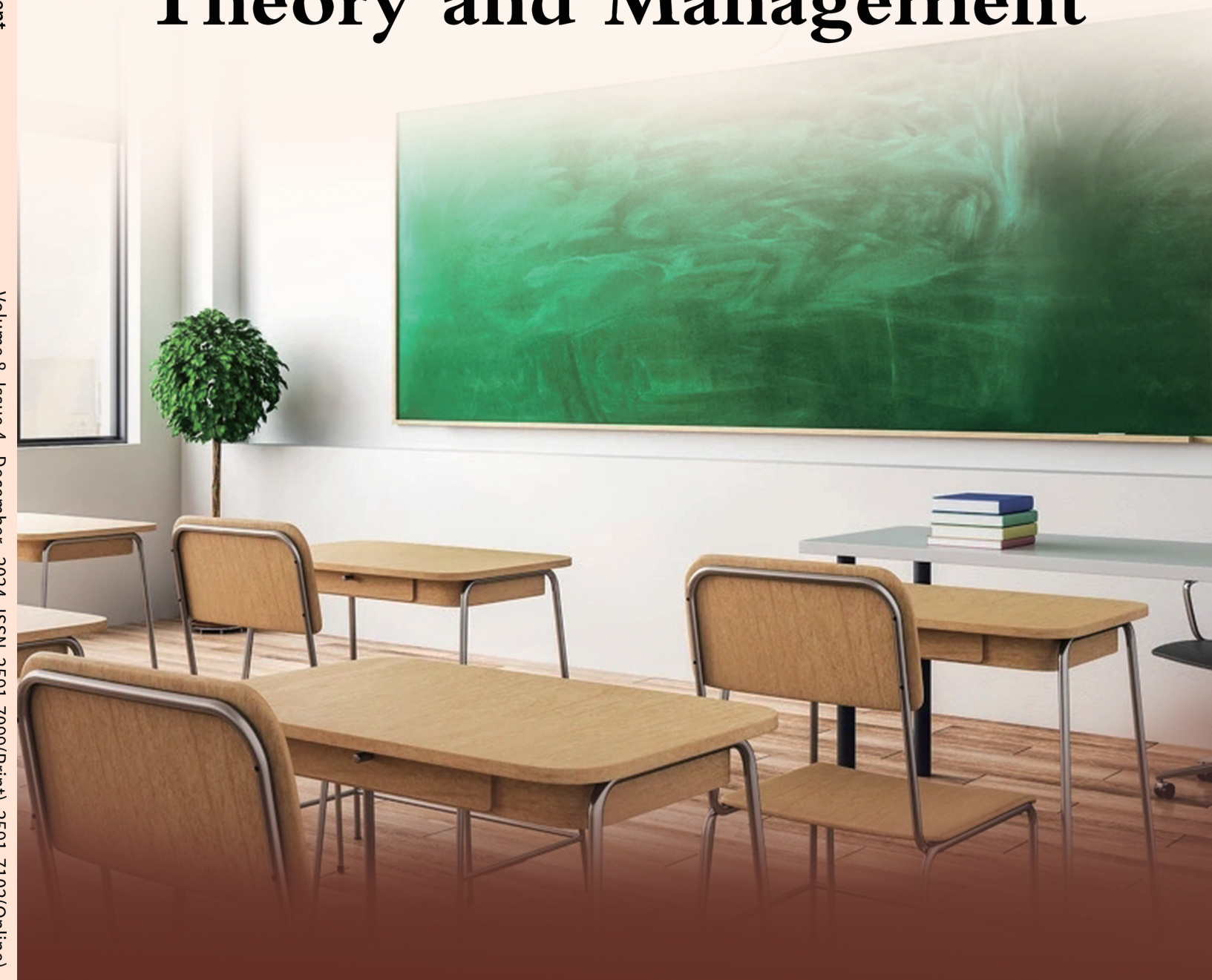
ISSN 2591-7099(Print) 2591-7102(Online)

Journal of Educational Theory and Management



Journal of Educational Theory and Management

Volume 8 · Issue 4 · December 2024 · ISSN 2591-7099(Print) 2591-7102(Online)



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ISSN 2591-7099

9 772591 709242 04 >

Journal of Educational Theory and Management**Volume 8 Issue 4 • December 2024 ISSN 2591-7099 (Print) ISSN 2591-7102(Online)**

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Volume 8 Issue 4 · December 2024 · ISSN 2591-7099 (Print) 2591-7102(Online)

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Editor-in-Chief

Huimin Feng, Wuhan University

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Enhancing College English Education Management: Integrating Technology and Pedagogy for Effective Learning

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ARTICLE INFO

Article history

Received: 7 October 2024

Accepted: 14 October 2024

Published Online: 30 December 2024

Keywords:

College English Education Management

Digital Tools

Data-Driven

Multimodal Teaching

ABSTRACT

This paper investigates the role of technology in optimizing college English education management systems. By examining the integration of digital tools and pedagogical strategies, it explores how institutions can enhance learning outcomes and streamline administrative processes. Through case studies and theoretical frameworks, the paper proposes innovative approaches to leverage technology for efficient and learner-centered English education management.

1. Introduction

With the acceleration of globalization and the rapid development of information technology, college English education is facing increasing challenges, including the need for innovative teaching methods and the accommodation of students' diverse learning needs. Traditional teaching methods and management models have proven inadequate in addressing these changes. The widespread application of modern technology has brought new opportunities to the field of education, allowing for continuous innovation and optimization of teaching content, learning approaches, and management processes. Therefore, exploring the application of technology in college English education management, as well as the effective integration of technology and pedagogy, holds significant practical and theoretical value. This paper aims to analyze the current state

and challenges of college English education and propose strategies that incorporate modern technology, providing insights for improving the quality of college English teaching and management efficiency.

2. Current Situation and Challenges in College English Education Management

2.1 Limitations of Traditional Teaching Methods

Traditional teaching methods in college English education are primarily teacher-centered, often relying on fixed textbooks and uniform teaching approaches, which have significant limitations. These methods emphasize knowledge transmission while neglecting the application of skills, resulting in a classroom environment dominated by teacher lectures and passive student reception (Sun, 2024). This limits the development of students' auto-

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mous learning abilities and practical language skills. English teaching often focuses on the systematic explanation of grammar and vocabulary, overlooking the cultivation of listening and speaking abilities. This issue is particularly evident in large classes, where students have very limited opportunities for speaking practice, significantly reducing the chance for language output. Consequently, students struggle to use English fluently in real-life communication.

Traditional teaching methods also fail to effectively accommodate individual differences among students. In a classroom with a heterogeneous learning group, students have varying levels of English proficiency, learning goals, and learning abilities. The uniform course design and teaching schedule cannot meet the needs of every student, resulting in some students finding the content too simple, while others find it too challenging. Furthermore, the over-reliance on exams as the sole means of evaluating teaching outcomes neglects formative assessment and the development of comprehensive qualities. This shifts students' learning motivation toward improving test scores rather than enhancing overall language proficiency (Zhou, 2024). These issues demonstrate that traditional teaching methods struggle to meet the diverse needs and dynamic changes in modern English education. There is a need to integrate modern technology and innovative teaching approaches to overcome these limitations.

2.2 Diversified Learning Needs of Students

With the rapid development of society and the acceleration of globalization, college students' English learning needs are becoming increasingly diverse. This diversification is not only reflected in different learning goals but also in the variety of learning content and approaches. Some students learn English to meet the needs of academic communication and research, focusing on academic writing conventions and oral presentation skills for conferences. Others aim to enhance their career prospects by studying business English or industry-specific English to improve their competitiveness in the job market (Yan, 2023).

English learning is no longer confined to classroom instruction; many students prefer to enrich their learning experiences through online resources, self-study applications, and international exchange programs. These informal learning methods pose new challenges to the design of formal courses. Students' learning motivations and interests are also becoming more varied. Some students favor immersive language learning experiences, such as participating in short-term study abroad programs or language club activities, while others prefer using efficient self-study tools to quickly improve their test-taking abil-

ities (Zeng, 2023). As a result, traditional, uniform course designs struggle to fully meet these diverse needs. Education management departments urgently need to flexibly adjust curricula and teaching strategies according to students' individualized learning needs, in order to provide more effective support and guidance for learners at different levels.

2.3 Issues with Administrative Efficiency

The issue of administrative efficiency in college English education has become increasingly prominent in recent years. Traditional management models often rely on paper documents and manual operations, resulting in lengthy and error-prone information transfer processes. The repeated data entry and manual review not only increase the complexity of administrative work but also raise the error rate (Cui, 2023). There is often a lack of close integration between administrative management and teaching activities, with course scheduling, course selection systems, and grade management frequently lacking flexibility. This not only affects students' learning experiences but also limits the rational allocation of teaching resources.

For universities with large student populations, traditional manual management methods are clearly insufficient to meet the growing administrative demands. Course selection systems tend to crash or experience delays during peak periods, and the allocation of teaching resources is often unbalanced. For example, some courses may have overly large enrollment numbers, leading to excessive workload for instructors, while others may be canceled due to insufficient enrollment. Additionally, there is a lag in course evaluation and feedback mechanisms, making it difficult to provide timely and effective support for teaching improvements (Zhao, 2021). To address these issues, it is necessary to introduce modern management systems that leverage information technology and big data analytics. This can enable intelligent scheduling of teaching resources and precise tracking of students' learning progress, thereby improving administrative efficiency and optimizing teaching outcomes.

3. Application of Technology in English Education Management

3.1 Enhancing Teaching Quality through Digital Tools

The application of digital tools in college English education is becoming increasingly widespread, significantly improving teaching quality. These tools include not only online learning platforms, virtual classrooms, and mul-

multimedia resources but also intelligent language learning software and mobile applications. By providing diverse teaching content and learning methods, they enhance students' interest and engagement in learning. Virtual classrooms can break the spatial limitations of traditional classrooms, allowing students to access course content, participate in discussions, and engage in practice anytime and anywhere, thereby enabling more flexible learning.

Multimedia resources, such as videos, audio, animations, and interactive courseware, offer students a more intuitive and vivid learning experience, helping them better understand and retain the taught content. Intelligent language learning software, based on artificial intelligence technology, can provide personalized learning suggestions and feedback, adjusting the teaching content and difficulty according to students' learning progress and performance. This adaptive, personalized teaching approach better meets individual learning needs and improves learning outcomes. The use of mobile applications has also greatly enriched the forms of extracurricular learning, allowing students to make use of fragmented time for self-study or practice, thus increasing learning efficiency. The application of digital tools has not only transformed the format of classroom teaching but also brought innovation to the presentation of teaching content and students' learning methods, laying a technological foundation for improving the overall quality of college English education.

3.2 Automation and Process Optimization in Teaching Management

The introduction of automation technology in college English education management has significantly improved administrative efficiency and simplified complex management processes. The application of automated systems in areas such as course scheduling, course selection, grade management, and teaching evaluation allows many tasks that previously relied on manual operations to be completed automatically, reducing the error rate associated with human intervention.

The course scheduling system can automatically generate the optimal timetable based on students' course selections and teachers' availability, avoiding resource waste and excessive teacher workloads. During peak periods of course selection, the automated system can allocate courses based on students' preferences, minimizing conflicts and system slowdowns. The grade management system can automatically compile and analyze students' exam results and learning performance, providing data support for teaching decisions. Teaching evaluation systems can quickly generate feedback reports through online surveys and data analysis, enabling teachers to promptly adjust

teaching strategies and improve course content. The application of these automation technologies not only increases the efficiency of teaching management but also optimizes the allocation of teaching resources, helping to build an efficient and flexible teaching management system.

3.3 Data-Driven Personalized Learning

Data-driven personalized learning is gaining increasing attention in college English education. Through big data analytics, educators and administrators can gain deep insights into students' learning habits, performance, and individual differences, allowing for more targeted teaching support. Learning management systems (LMS) and online learning platforms can record real-time data on students' learning progress, study duration, and test results, helping teachers identify students' weaknesses and learning needs.

Based on this data, teachers can create personalized learning plans for students, such as recommending suitable learning resources, adjusting course difficulty, or providing additional tutoring materials to enhance learning outcomes. Big data analytics can also predict learning trends and potential risks, enabling early identification of struggling students and taking intervention measures to reduce failure rates and dropout rates. By continuously tracking and analyzing student learning data, data-driven personalized learning helps teachers adjust their teaching methods in a timely manner, achieving differentiated instruction and improving the overall quality and efficiency of education.

4. Strategies for Integrating Technology and Pedagogy

4.1 Learner-Centered Teaching Model Design

In college English education, the integration of technology and pedagogy should focus on a learner-centered teaching model, aiming to meet students' personalized learning needs and diverse learning goals. This approach requires breaking away from the traditional teacher-dominated, one-way knowledge transmission method and emphasizes fostering students' active participation and autonomous learning abilities.

Using learning management systems (LMS) and online learning platforms, teachers can provide adaptive learning resources and diverse learning pathways for students at different levels, allowing them to learn at their own pace. The design of personalized learning plans takes into account students' interests and learning progress, which not only increases engagement but also motivates students intrinsically. The learner-centered model also emphasizes collaborative learning and task-based learning approaches.

Through group tasks and project-based activities, students can develop language skills and problem-solving abilities in real-life language use scenarios. In this model, technology is not merely a tool to assist teaching but a key means of achieving educational innovation and personalized student development. It makes teaching more flexible and efficient, better suited to the demands of modern education.

4.2 Technology-Supported Interactive Teaching and Feedback Mechanisms

The application of technology has significantly enhanced interactive teaching and feedback mechanisms in college English classrooms. Through online interactive platforms, virtual classrooms, and learning management systems, teachers can interact with students in real-time before, during, and after class, collect learning data, and provide timely feedback. During classroom instruction, teachers can use online quizzes, real-time polling, and discussion forums to assess students' understanding of the course content and adjust the teaching material and pace accordingly based on the feedback.

After class, students' online assignments and learning records provide teachers with detailed data on learning performance, helping them offer targeted guidance and support. Technology also diversifies feedback mechanisms, including voice and video feedback, instant grading, and automatically generated error analysis reports. These feedback forms enhance students' awareness of their learning outcomes and help them correct deficiencies in a timely manner. Technology-supported interactive teaching and feedback mechanisms not only improve the precision and effectiveness of instruction but also create a more engaging and interactive learning environment for students.

4.3 Application and Practice of Multimodal Teaching Methods

Multimodal teaching methods emphasize the integrated use of various information symbol systems, such as language, images, videos, and audio, during the teaching process to enhance students' multiple understandings and experiences of knowledge. In college English teaching, the application of multimodal methods can effectively stimulate students' interest in learning and improve their overall language proficiency. Teachers can combine text reading, video explanations, and image presentations to help students better understand language materials through multisensory stimulation.

Multimodal teaching can also involve task-driven learning activities, such as role-playing, situational sim-

ulations, and multimedia project creation, allowing students to experience and learn in real-life language use environments, thereby enhancing learning outcomes. This approach requires teachers to fully utilize digital tools and multimedia resources in course design, incorporating multimodal teaching concepts into classroom practice. As a result, the teaching content becomes more vivid and concrete, and the learning process more closely resembles real language use scenarios, which helps improve students' overall language skills and intercultural communication abilities.

5. Conclusions

This paper analyzes the current situation and challenges in college English education, exploring the crucial role of technology in improving teaching quality and optimizing management processes. The application of digital tools provides a wide range of options for teaching content and learning methods, while the introduction of automation technology significantly enhances administrative efficiency. Data-driven personalized learning achieves the goal of targeted instruction. The strategies for integrating technology and pedagogy further promote the implementation of learner-centered teaching models, interactive teaching, and multimodal teaching methods. These innovative approaches not only improve the overall quality of college English education but also offer valuable insights for future educational management and teaching reforms. In the future, as technology continues to advance and educational needs diversify, further research on the deep integration of technology and teaching will help achieve more efficient English education management.

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An Empirical Study of the Effect of “Model United Nations” Activities on the Cultivation of Critical Thinking Ability among College Students

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ARTICLE INFO

Article history

Received: 18 September 2024

Accepted: 25 September 2024

Published Online: 30 December 2024

Keywords:

MUN activities

Critical thinking ability

Empirical research

ABSTRACT

With the deepening of globalization, cultivating college students' critical thinking ability has become the core goal of foreign language education in China. On the basis of clarifying the theoretical connotation of critical thinking ability, this paper attempts to construct the evaluation criteria of its core elements and expounds the internal relationship between Model United Nations (MUN) activities and its cultivation in line with this evaluation criteria. Then, through questionnaire and individual interview, this paper conducts an empirical research on the effect of MUN on the cultivation of students' critical thinking ability. The results show that MUN activities have a positive effect on the cultivation of students' critical thinking ability.

1. Introduction

Traditional college English teaching in China emphasizes the learning of basic English knowledge and the training of language skills, which highlights the instrumental nature of language. In the new era, China's higher foreign language education shoulders the heavy responsibility of cultivating outstanding foreign language talents who can participate in global governance, and critical thinking ability is an indispensable ability for excellent foreign language talents (Sun Youzhong 2017). The *Guide to College English Teaching* (2020 edition) includes critical thinking ability as the core training goal of foreign language teaching, and jointly promotes the development of multiple abilities of foreign language talents together with language application ability, cross-cultural ability and self-learning ability. In short, critical thinking is of

great significance to personal growth and development, academic research and learning, career development and competitiveness, improvement of civic literacy, and expansion of global vision.

Model United Nations (MUN), an educational activity that highly simulates the international political scene, has become an indispensable and effective means to cultivate the critical thinking ability of contemporary college students with its unique operating mechanism and rich agenda setting.

2. The connotation and evaluation criteria of critical thinking ability

2.1 Definition and connotation

It has been widely recognized that critical thinking

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ability is not only one of the deep-seated goals of language learning, but also a necessary quality for students to adapt to the complex and changeable social environment in the future. Foreign scholars have been studying critical thinking ability for a long time and have achieved fruitful results. In 1987, the American Philosophical Union commissioned Peter Facione to convene 45 famous philosophers, scientists and experts from the United States and Canada for the “Delphi” Project (APA 1990). The “Delphi” project finally defined critical thinking ability as two dimensions of cognitive ability and affective trait, and proposed a double-cone model. The cognitive dimension can be broken down into six abilities: interpretation, analysis, evaluation, reasoning, interpretation, and self-regulation. Among them, analysis, evaluation and reasoning are the core skills. The affective traits include curiosity, confidence, openness, flexibility, fairness, honesty, prudence, studiousness, and understanding. Paul and Elder (2006) constructed a ternary structure model, which covers three components: thinking elements, thinking criteria and intelligence characteristics.

Domestic scholars put forward their own model of critical thinking ability based on the actual situation of foreign language education in China. Lin Chongde (2006) proposed a three-prism structure model, which includes six factors: thinking purpose, thinking process, thinking materials, thinking self-monitoring, thinking quality, and cognitive and non-cognitive factors in thinking. Wen Qiufang (2009) proposed a hierarchical model on the basis of the two-dimensional model, the three-dimensional model and the three-dimensional model. The hierarchical model proposes to divide critical thinking ability into two levels: meta-critical thinking ability and critical thinking ability. The first level of meta-critical ability refers to the ability to plan, check, adjust and evaluate one’s own critical thinking. The second level includes cognitive skills and criteria as well as emotional traits associated with critical qualities. Sun Youzhong (2015; 2016; 2017; 2019), repeatedly emphasizes the integration of critical thinking ability into foreign language teaching, pointing out that advanced language ability includes critical thinking ability, that is, the ability to interpret, analyze and evaluate input information, as well as the ability to reason and explain based on indirect or directly acquired information. In this sense, language ability includes critical thinking ability; A language ability without critical thinking is a poor language ability that neither understands nor produces text/discourse rich in meaning and logical rigor.

To sum up, based on aforementioned analysis, this paper attempts to define the critical thinking ability as six cognitive skills (interpretation, analysis, evaluation, reasoning, explanation, self-regulation) and six dispositions

(curiosity, openness, confidence, humility, integrity, perseverance).

2.2 Evaluation criteria

In order to explore the way to cultivate college students’ critical thinking ability and carry out empirical research to test its effectiveness, this paper attempts to construct evaluation criteria for critical thinking ability on the basis of clarifying the core components of critical thinking ability. Table 1 lists the evaluation criteria of six critical thinking skills and six emotional qualities. It is worth noting that although there are differences in the specific evaluation criteria for different cognitive skills, they should all follow several basic principles, namely clarity, relevance, logic, profundity and flexibility. Specifically, clarity emphasizes the need for precision in the critical thinking process; relevance requires that the content of speculation must be closely related to the core topic and clearly structured. In addition, the principle of logic ensures that the thinking is well organized, the argument is reasonable and persuasive; profundity means that reflective activities should have both breadth and depth; flexibility, on the other hand, requires the ability to be flexible and changeable, and properly examine problems from different angles (Wen Qiufang 2009). Together, these principles form the basic framework for evaluating cognitive skills.

3. The role of MUN activities in cultivating critical thinking ability

3.1 The promoting effect of “MUN” on improving six cognitive skills

Interpretation ability: participation in MUN activities requires participants to deeply understand and accurately explain the historical background, current situation, national interests involved and international laws and regulations of the conference topics. This process exercises the students’ ability of information integration and expression, enabling them to accurately convey complex information and lay the foundation for subsequent discussions.

Analytical skills: in the face of complex international issues, students need to use critical thinking to analyze the cause, impact and possible trend of the problem from different perspectives. This multi-level analysis training greatly enhances the students’ logical analysis ability and problem identification ability.

Evaluation ability: in the MUN conference, students need to objectively evaluate the positions and proposals of various parties to judge their rationality and feasibility. This process promotes students to form independent value judgments, learn to weigh pros and cons, and make wise

decisions.

Reasoning skills: during discussion, students need to build arguments based on facts and use logical reasoning to refute the other side’s views. This logical and rigorous reasoning training will help students develop rigorous thinking and improve the effectiveness and persuasiveness of arguments.

Explanation ability: when elaborating a country’s position or proposal, students need to explain their own views and reasons logically and reasonably, and ensure that the information is accurately transmitted to other delegations. This process develops the students’ expression-related skills, enabling them to accurately convey their ideas and promote consensus formation.

Self-regulation ability: in MUN activities, students

need to face challenges such as time pressure and conflict of views, learn emotional management, and master pressure adjustment strategies. The cultivation of self-regulation ability will help students stay calm under high pressure, respond flexibly to difficulties and challenges.

To sum up, MUN provides a comprehensive and multi-level training platform for students’ critical thinking ability through which participants can not only deepen their understanding of international affairs, but also significantly improve their cognitive skills such as explanation, analysis, evaluation, reasoning, explanation and self-regulation, laying a solid foundation for becoming future leaders with an international perspective and higher-order thinking ability.

Table 1. Evaluation criteria of core elements of critical thinking ability

Cognition		Disposition	
Skills	Standard	Quality	Attitude
Interpretation	Understand meaning accurately and categorize correctly	Curious	Be interested in new things and good at asking questions
Analysis	Identify arguments and analyze the process of argument	Openness	Respect different opinions and improve your own
Evaluation	Evaluate ideas and arguments rationally	Self-confidence	Be confident in your own reasoning and dare to challenge authority
Reasoning	Challenge evidence and propose alternative hypotheses	Humility	Evaluate yourself and others objectively and have a strong sense of empathy
Explanation	Explain and draw conclusions based on reasoning	Integrity	Pursue truth and stand for justice
Self-regulation	Assess and adjust yourself flexibly and appropriately	Perseverance	Strong tenacity and never give up easily

3.2 The promoting effect of “MUN” on cultivating six dispositions

Curiosity: MUN’s activities cover a wide range of topics, from global climate change to regional conflicts. During the preparation process, participants need to actively collect information and understand the positions of countries, which greatly excites their curiosity and desire to explore.

Openness: in the multicultural exchange of MUN activities, students need to listen to the views and voices of different countries, learn to respect differences and tolerate diversity. Such an open attitude not only contributes to international understanding, but also broadens the participants’ personal horizons and changes their way of thinking.

Confidence: by simulating the role play of a diplomat, the trainees gave speeches and held debates in public, which greatly exercised their expression skills and self-confidence. The experience of successfully coping with challenges and winning recognition makes the trainees more confident in their own abilities and worth.

Humility: in heated debates, participants come to

realize the limitations of their own knowledge and the one-sidedness of their perspectives. In the face of refutation and questioning from others, students learn to reflect and be self-critical, developing the quality of humility and an attitude of constant learning.

Integrity: MUN activities emphasize the principles of integrity and impartiality, requiring participants to follow international law and ethical norms while representing national interests.

Perseverance: In the face of intense preparation work and intense conference process, participants need to overcome various difficulties and challenges and persevere to the end. This experience not only exercises the trainees’ willpower, but also cultivates tenacity and courage in the face of adversity.

3.3 An empirical study on MUN ’s effect on the cultivation of critical thinking ability

In order to fully understand the actual impact of MUN activities on the training of college students’ critical thinking ability, the author selected 50 students who often participate in MUN activities in our university as the research

objects. According to the aforementioned definition of critical thinking ability and evaluation criteria, questionnaire and individual interview were conducted.

A total of 46 valid questionnaires were collected, and the data showed that all participants believed that participating in MUN activities could promote the cultivation of critical thinking ability. Among them, 87.0% of the participants strongly agreed that MUN activities can effectively improve the ability to elucidate cross-cultural issues; 84.8% agreed that MUN activities could effectively improve their ability to analyze cross-cultural problems; 82.6% of the participants strongly agreed that MUN activities can effectively improve the ability to evaluate cross-cultural problems; 84.8% agreed that MUN activities could effectively improve their ability to reason cross-cultural problems; 87.0% of them agreed that MUN activities could effectively improve their ability to explain cross-cultural problems; 82.6% of the participants strongly agreed that MUN activities could effectively improve their self-regulation ability. The vast majority of the participants also strongly agreed with the role of MUN activities in cultivating the six core dispositions: among which “curiosity, openness, confidence, humility, integ-

rity and perseverance”, the proportion of the participants who “strongly agreed” was 95.7%; 87.0%; 91.3%; 87.0%; 87.0%; 84.8% respectively.

Considering the disparity in students’ original critical thinking ability and in the frequency of participating in MUN activities, the author selected 3 representative students to conduct individual interviews. The interviews show that although the starting point of critical thinking ability is different, the interviewees all agree that MUN activities have played a positive role in cultivating their critical thinking ability. They said that they were “proud to express their insights and display their youthful style at the venue” and that MUN activities “not only improved their English expression skills, but also improved their negotiation skills and negotiation ability.” Some students said with emotion, “What I gained is not only the award, but also the improvement of my ability and the precious friendship.” Participants at different levels can experience “the difficulty of safeguarding national interests in international negotiations, and the importance of cooperation and consultation in solving global problems” through participating in MUN activities.

Table 2. Results of questionnaire about the effect of MUN activities on the training of students’ critical thinking ability

Questions/Options	Disagree	Ambiguous	Agree	Highly agree
It can effectively improve my ability to elucidate cross-cultural issues.	0	2	4	40
It can effectively improve my ability to analyze cross-cultural issues.	0	2	5	39
It can effectively improve my ability to evaluate cross-cultural issues.	0	3	5	38
It can effectively improve my ability to reason cross-cultural issues.	0	2	5	39
It can effectively improve my ability to explain cross-cultural issues.	0	3	3	40
It can effectively improve my self-regulation ability.	0	2	6	38
It enhances my desire to explore.	0	1	1	44
It teaches me to respect difference and embrace diversity.	0	2	4	40
It enhances my expression and self-confidence.	0	1	3	42
It enhances my reflective ability and promotes self-growth.	0	2	4	40
It strengthens my pursuit of truth, justice and noble sentiments.	0	1	5	40
It steels my willpower.	0	2	5	39

4. Conclusion

To sum up, on the basis of clarifying the connotation of critical thinking ability, this paper constructs the evaluation criteria of its core elements, and then explains the internal logical correlation between participation in MUN activities and cultivation of critical thinking ability with an empirically study on its actual effects through questionnaire and individual interview. The results show that “MUN” not only provides a platform for students to reach international affairs, but also stimulates their ability of active exploration, critical thinking and effective commu-

nication. In the process of participation, the students not only enhanced their comprehensive language application ability and broadened their vision, but more importantly, their critical thinking ability was substantially improved. Therefore, MUN activities should be regarded as an effective means in the cultivation of critical thinking ability to promote students’ all-round development.

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An Analytical Study on the Role of Activating Creativity in Regulating Secondary School Students' Emotional Management—Shanghai, China As An Example

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ARTICLE INFO

Article history

Received: 16 September 2024

Accepted: 24 September 2024

Published Online: 30 December 2024

Keywords:

Emotion management

Implementation strategy

Interest cultivation

Interpersonal relationship

ABSTRACT

Secondary school students in their adolescence are facing great physiological, cognitive and social changes, and thus are troubled by many negative emotions. Starting from the emotional characteristics of adolescent students, the study explores the importance and necessity of providing emotional management support to students at this stage and proposes corresponding implementation strategies. Research shows that, on the one hand, adolescents have stronger emotional sensitivity, and negative emotions can hinder students' learning and cognitive development; on the other hand, adolescents have better physiological mechanisms for emotional management, schools should pay attention to the mental health education of students at this stage, scientifically guide students to manage their emotions, create a more favourable environment for the sustainable and healthy development of students, cultivate more interests, form an atmosphere of solidarity and mutual help, and thus create a more favourable environment for students' sustainable and healthy development. , forming an atmosphere of solidarity and mutual help, so as to promote interpersonal relationships and interactions.

1. Introduction

The China Youth Development Report released by the China Youth Research Centre in August 2021 shows that 30 million young people and children under the age of 17 in China suffer from a variety of emotional, psychological and behavioural problems. For many adolescents, it is difficult to free themselves from emotional distress. If not intervened in a timely manner and effectively controlled, emotional problems can erode their psychological and physiological health, which in turn affects students' life, learning and even long-term development. Therefore, schools should pay special attention to the emotional problems of secondary school students, and do a good job

in students' emotional management intervention and education. Research in educational neuroscience has brought many insights in this regard. Based on empirical evidence, it has shown the characteristics of adolescents' emotions and their brain development, revealed the physiological causes of adolescents' emotional problems and their effects, etc. This also provides scientific strategic support and effective practical guidance for schools to carry out education on emotion management for secondary school students and to create a positive emotional environment in schools. Students in secondary school, i.e., adolescence (about 12 to 18 years old), are gradually moving from childhood to adulthood, experiencing significant physical, psychological and social changes, and facing pressure

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to advance to higher levels of education, which leads to greater psychological pressure on secondary school students. Psychological studies have found that many adolescents suffer from negative emotions. The proportion of adolescents experiencing negative emotional distress is on the rise.

2. Adolescents have stronger emotional sensitivity and a better foundation for emotional management

From the perspective of neuroscience, adolescents have the following two main emotional characteristics.

On the one hand, adolescents have stronger emotional sensitivity. Psychological research shows that adolescents' emotions are highly sensitive and unstable, and adolescents react more strongly to both negative and positive emotions than children and adults. Adolescents are more susceptible to negative emotions than adults and children. For example, peer acceptance or rejection has a direct impact on adolescents' self-esteem, sense of belonging, sense of control, and sense of being; and adolescents experience greater emotional changes than adults when they are socially excluded. In addition, adolescents respond more strongly to positive emotions than adults and children. One study found that the ventral striatum of adolescents showed stronger activation in response to expressions showing happy emotions. And this region is involved in the process by which people process rewards. This study also reveals why adolescents are more likely to adopt risk-taking behaviours, as risk-taking gives them more positive emotional experiences.

On the other hand, adolescents have a physiological basis for better emotion management. Emotion management is the act of monitoring, evaluating, and regulating emotional responses, and involves both implicit emotion management, which is unconscious automatic control, and explicit emotion management, which is the use of strategies to regulate one's emotions.

First of all, studies have shown that the brain undergoes a process of grey matter pruning during adolescence, in which the grey matter density of the brain tends to decrease with age, and this process is considered to be a gradual maturation of the brain. In particular, the frontal grey matter is pruned to become more efficient in the areas of the brain that are primarily responsible for planning, reasoning, judging, managing emotions and controlling impulses. Secondly, neuroscience research has also shown that the amygdala's connections to brain regions involved in control become stronger in adolescence. For example, the medial and lateral orbitofrontal cortex, the anterior cingulate cortex, and the dorsolateral prefrontal cortex

are better connected to the amygdala as a result of the increasing volume of white matter in the brain. These are the brain regions that play a role in controlling emotions in adults when faced with emotion-related stimuli. This suggests that brain functions related to emotional control are more involved in emotional processes during adolescence. In turn, the continued development of the prefrontal cortex, particularly the dorsolateral region, during adolescence promotes continued progress in impulse control, working memory, and complex reasoning. Although adolescents are still less capable of emotional processing than adults, they are more able to exercise self-control than in childhood, and this ability continues to develop.

3. Emotions have a significant impact on students' learning and cognitive development

Although adolescents' emotional control ability is developing gradually, it is not yet compatible with the development of their limbic system (including the amygdala and the ventral striatum), which leads to specific behavioural preferences in adolescence, such as impulsivity and low mood. Strong emotional experiences not only affect adolescents' daily lives and behaviours, but also their academic and cognitive development. Research has shown that students' perceived emotional experiences such as happiness, hope, anxiety, and shame have a significant impact on their motivation, learning strategies, cognitive resources, self-management, and academic achievement. At the same time, emotions also affect students' memory and attention. However, the relationship between emotions and cognition is often overlooked by many schools and teachers, and neuroscience has provided deeper insights into this relationship. The resting network of the brain is an important brain area that is activated during cognitive activities such as elaboration, creation, and reflection that focus on past experiences or future scenarios. Students in secondary school need to learn and think through a lot of these cognitive activities. A neuroscience study found that people's resting networks are inhibited to varying degrees when they feel different emotions, with less inhibition of the resting network when they feel happy than when they feel sad or angry. This suggests that it is more difficult for people to engage in cognitive activities such as creativity, which require detachment from the current situation, when they are in a negative mood. This also explains why positive emotions stimulate more open and creative thought patterns.

The study found that people also activated the above areas when feeling the emotion of fear, and that people's accuracy in attentional tasks was inversely proportional to brain activation. This suggests that the processing of

fearful emotions uses key brain regions of the attentional network, taking up brain resources. In contrast, positive emotions promote more cognitive flexibility than negative emotions. In the task-switching paradigm, subjects in the positive mood condition had shorter reaction times and more flexible responses. Emotions can have a significant impact on students' cognitive activities. Negative emotions not only occupy attention-related brain networks and inhibit students' attention to learning content, but also negatively affect students' creativity, cognitive flexibility, etc., and hinder their learning and cognitive development.

4. Guiding secondary school students to manage their emotions based on evidence-based science

Compared with adults, adolescent students and children are more susceptible to emotions, and negative emotions may even affect students' cognitive development and learning outcomes to a greater extent. Therefore, schools should pay particular attention to the mental health education of students at this stage, and guide students to manage their emotions in a scientific manner, so as to effectively improve their mental health and create a more favourable environment for their sustainable and healthy development. To this end, schools can focus on the following implementation strategies.

4.1 Build a harmonious environment and guide students to form correct self-knowledge

Individual self-perception and emotion management are closely related, and adolescents' self-perception and identity construction are mainly realised through social cognition. Schools and teachers should endeavour to build a harmonious and friendly campus and classroom environment, lead students to establish and maintain healthy and good peer relationships, and guide students to rationally view others' evaluations, so as to form a comprehensive and correct social cognition and self-perception. Research shows that adolescents are particularly sensitive to peer relationships, such as peer acceptance and rejection, and evaluations from friends and classmates may trigger their positive or negative emotions. Social perceptions of adolescent students largely influence their self-perceptions, and peer and even teacher evaluations shape students' views of themselves, leading to different emotions. Therefore, schools can rely on teachers' evaluation, classmates' evaluation, parents' evaluation and other diversified evaluation methods to guide others to make comprehensive and positive evaluations of students in terms of moral conduct, classroom performance, extracurricular participation, etc.

Through the selection of the school's virtuous teenagers, the establishment of class honour wall and other activities and methods, students can feel the attention, affirmation and appreciation from their peers, teachers and even their parents, which will trigger their positive emotions and positive actions.

4.2 Make good use of positive assessment to motivate students to develop a positive mindset in learning and mistakes

Emotions are closely related to students' learning and cognitive development. Positive and optimistic emotions and mindsets are conducive to enhancing students' motivation and endurance in learning, which in turn enhances students' learning outcomes.

When assessing students' learning, teachers need to focus on positive emotions about the content and outcomes of learning through timely affirmations, challenges, and encouragement to leapfrog, so that students are willing to continue to engage in new learning.

However, creating positive emotions about learning does not mean that teachers can only give positive feedback; in fact, paying attention to and correcting mistakes is an essential part of learning. On the one hand, teachers can mould students' growth mindset, and on the other hand, they can guide students to pay more attention to mistakes, so as to cultivate a positive mindset and the ability to think positively in learning, thus improving students' learning effectiveness. Teachers can improve students' self-reflection ability through the feedback method of "reminding mistakes-inspiring thinking-affirming positive expression", make students realise that learning is a process of constantly correcting mistakes, encourage students to express themselves, and create a learning atmosphere of "I don't agree with your viewpoint, but I respect your expression". Encourage students to express themselves, create a learning atmosphere of 'I don't agree with your opinion, but I respect your expression', and build a learning scaffold for students by using ingenious rhetorical questions or successive follow-up questions to promote students' in-depth understanding of knowledge in the process of correcting mistakes, so as to guide students to look at mistakes in learning scientifically and correctly and let them make progress and growth in the midst of their mistakes.

4.3 Create a positive emotional environment through a variety of 'mental education' activities

The school pays attention to the psychological state of students, and through carrying out a variety of mental

health education activities and establishing the ‘first lesson’ education mechanism, creates a positive emotional environment for students’ learning and life, and accumulates inexhaustible “heart” power for empowerment and development.

On the one hand, through a variety of forms of activities to regulate the psychological state of students. The school routinely carries out psychological screening at the beginning of the school year, stress relief group counselling for graduating classes, and organises the ‘Mental Health Month’ for nine consecutive years to help students relax, relieve stress and adjust their psychological state. For example, the school carries out students’ “self-management day” and teachers’ ‘zero-criticism day’ activities, guiding teachers to see students’ strengths and flashpoints with the eyes of appreciation and development, so as to mobilise students’ self-management of the positive emotions, and cultivate students’ ability of self-assessment, self-education and self-development, so that students’ self-management and self-development can be improved. The students’ ability of self-evaluation, self-education and self-development will be cultivated, so that they can gradually realise self-management.

4.4 Explore the implementation of positive evaluation and organise a variety of activities to stimulate growth potential

The school innovates the evaluation mechanism, optimises the evaluation content, and carries out the exploration and practice of positive evaluation, aiming to bring positive emotional experience to students through evaluation and motivate them to grow up continuously. For example, the implementation of the ‘Happy Growth Climbing Card Evaluation System for Students’ invites staff, parents, students and even the community to participate in the evaluation system. When students are found to have good performance in academics, character, participation in activities, etc., they can be issued with cumulative cards, so that they can be evaluated positively in time for their positive behaviours; and stimulate students to move forward and continue to climb up the ladder of positive emotions and potential for growth. This stepped evaluation mechanism pays full attention to the psychological characteristics of young students.

Each progress is not only a positive experience of

success, but also a new starting point for the next station. Some students have created a climbing wall in their homes and posted their climbing cards on the wall according to their grades, forming a pyramid-like climbing path to motivate them to keep moving forward.

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Research on Improvement Measures of Student Management in Vocational Undergraduate Education

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ARTICLE INFO

Article history

Received: 7 October 2024

Accepted: 14 October 2024

Published Online: 30 December 2024

Keywords:

Vocational undergraduate

Student management

Current situation

Causes

Measures

ABSTRACT

Vocational undergraduate education is a type of vocational education formed under the background of China's economic and social development. At present, vocational undergraduate education in China has entered a period of rapid development. The model of vocational undergraduate education has gradually taken shape, but there are still some problems in student management in vocational undergraduate colleges. This paper mainly analyzes the problems existing in vocational undergraduate student management and the causes of these problems, and proposes improvement measures from strengthening students' self-management ability, establishing a complete mental health service system, improving the home-school cooperation mechanism, enhancing the practice and innovation mechanism, and implementing personalized management strategies, hoping to provide a reference for vocational undergraduate student management.

1. Introduction

The "National Vocational Education Reform Implementation Plan" clearly states that vocational education and general education are two different types of education and have equal importance. The students cultivated by vocational undergraduate education are high-quality laborers and technical and skilled talents. Guided by promoting employment and meeting the needs of industrial development, vocational undergraduate education is different in both curriculum arrangement and student management. In vocational undergraduate student management, it should be closer to market demand and strengthen the cultivation of practical and innovative abilities. At present, although vocational undergraduate education has made remarkable progress in curriculum system construction and teaching model innovation, at the student management level, fur-

ther reform is still needed to meet the development needs of vocational education in the new era.

In the realm of vocational undergraduate education, the diversification of enrollment channels has introduced unprecedented disparities within the student populace. These disparities manifest not merely in academic backgrounds and skill proficiencies but also significantly influence learning dispositions, life perspectives, and future career aspirations. Vocational undergraduate institutions often witness a harmonious blend of students who have gained admission through the conventional college entrance examination and those who have been selected through alternative pathways, such as skill-focused entrance exams and independent admissions. The former cohort typically possesses a robust theoretical foundation and established learning competencies, whereas the latter emphasizes

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practical competencies and domain-specific expertise.

This dichotomy fosters varied needs and distinct traits among students during their academic pursuits, posing challenges to student administration. Furthermore, on the expansive canvas of vocational undergraduate education, the yearning for practical application and innovation among students stands out prominently. In contrast to traditional higher education, vocational undergraduate students exhibit a heightened tendency to promptly translate acquired knowledge into practical skills. They eagerly seek to hone their abilities within genuine projects and cultivate innovative thought patterns amidst problem-solving endeavors. Consequently, in the context of these unique characteristics inherent to vocational undergraduate students, which diverge significantly from those observed in general undergraduate education, certain issues have emerged as particularly pressing concerns.

2. Analysis of the current situation of vocational undergraduate student management

2.1 Insufficient self-management ability of students

There exist issues pertaining to students' self-restraint and self-management within the realm of vocational undergraduate student management. These issues are explicitly evident in the following dimensions: Firstly, students demonstrate inadequate self-restraint: As vocational undergraduate education becomes increasingly prevalent and enrollment methods diversify, the student population exhibits a similar trend of diversification. Certain students display laxity in self-discipline, lacking definitive learning objectives and career blueprints, thereby resulting in inadequate academic motivation and poor behavioral discipline. Daily instances of tardiness, early departures, and absenteeism from classes frequently occur, significantly undermining learning efficacy and teaching standards. Secondly, students exhibit a deficiency in self-management skills: Vocational undergraduate education underscores the importance of practical application and innovation, necessitating a relatively elevated level of self-management from students to navigate intricate vocational settings and challenges. Nevertheless, some students manifest notable shortcomings in time allocation, task organization, and emotional regulation, impeding their ability to effectively orchestrate learning and practical endeavors, thereby hampering personal development and career progression. Thirdly, students possess a feeble professional mindset. A proportion of vocational undergraduate students lack profound comprehension of their majors' professional prospects and industry evolution, fostering a weak sense of professional identity and conse-

quently, a lack of drive and enthusiasm in their academic pursuits. Furthermore, there is an absence of a clear comprehension and roadmap for translating acquired knowledge into practical work competencies and for establishing a foothold and progressing in the professional arena.

2.2 Psychological and other problems are increasingly prominent

With social development, the popularization of the Internet and the explosive growth of information, the increase in employment pressure and the intensification of social competition, vocational undergraduate students are facing pressure from multiple aspects such as academics, employment, and interpersonal relationships. The untimely psychological work leads to some students having mental health problems such as anxiety and depression due to their inability to effectively cope with these pressures, affecting their normal study and life. It is specifically manifested in the following aspects:

2.2.1 Widespread anxiety and depression emotions

When vocational undergraduate students face academic competition, employment pressure and future uncertainties, they are prone to anxiety. This anxiety may stem from doubts about one's own abilities, concerns about employment prospects, and confusion about future planning. If long-term anxiety is not effectively relieved, it is easy to develop into depression, affecting students' physical and mental health and daily study and life.

2.2.2 Social barriers and loneliness

Although the convenience of the Internet provides students with a broad space for information exchange, it also makes some students addicted to the virtual world and ignore social activities in real life. In addition, the training goal of vocational undergraduate education determines the heavy learning tasks, and the face-to-face communication opportunities between students are reduced, leading to some students having social barriers and a sense of loneliness, affecting their mental health.

2.2.3 Internet addiction problem

While the Internet is a learning tool, it also brings the risk of internet addiction. Some vocational undergraduate students rely excessively on the Internet for activities such as entertainment and social interaction, resulting in the compression of learning time, a decline in academic performance, and even the appearance of internet addiction symptoms, seriously affecting their studies and physical and mental health.

3. Analysis of the causes of student management problems

3.1 School-level factors

3.1.1 Outdated management concepts

As vocational undergraduate education progresses rapidly, substantial alterations have been observed in its educational environment, teaching methodology, and the unique attributes of its student population. Nevertheless, certain institutions have been unable to promptly align their managerial ideologies and approaches with these transformations, leading to deficiencies in fostering students' self-regulatory abilities. The traditional, inflexible management paradigm struggles to accommodate the multifaceted and individualized requirements of students, impeding their ability to strike a balance between self-discipline and self-management. Furthermore, the increasing diversity among vocational undergraduate students poses additional challenges for student administration. Regrettably, some vocational undergraduate institutions continue to adhere to outdated management models and inadequately harness technological tools, thereby encountering difficulties in effectively supervising students.

3.1.2 Imperfect mental health education system

In the face of the increasingly prevalent psychological issues among students, several vocational undergraduate institutions exhibit deficiencies in their mental health education programs. Firstly, in light of the increasingly salient psychological issues confronted by students, the teaching faculty for mental health education is relatively inadequate, struggling to fulfill the requirements of the student populace. It is evident that certain vocational undergraduate institutions are deficient in the realm of mental health education. Secondly, the content and methodology employed in mental health education may be lacking in relevance and efficacy, thereby hindering their ability to effectively assist students in navigating various pressures and challenges. Furthermore, the inadequate integration of mental health education with routine student management practices undermines its preventive and interventional outcomes.

3.1.3 Imperfect home-school cooperation mechanism

The development and growth of students inherently necessitates the support and collaboration of families. Nevertheless, in the realm of vocational undergraduate student management, the mechanism of home-school cooperation frequently falls short of perfection. Parents often lack an adequate comprehension of their children's academic environments, while schools, conversely, struggle to fully comprehend students' familial backgrounds and psychological dispositions. This asymmetry of information can potentially result in a disconnection within the realm of student management and education, thereby impeding the formation of an effective united front aimed at fostering the holistic development of students.

3.2 Student-level factors

3.2.1 Unclear self-cognition and positioning of students

The diversification of the composition of vocational undergraduate student cohorts leads to variations in students' self-awareness and positioning. Certain students may possess a lack of a precise comprehension of their personal interests, strengths, and future career aspirations, ultimately resulting in a dearth of definitive goals and motivation in both academic pursuits and personal life. Furthermore, societal cognitive biases pertaining to vocational education have the potential to influence students' self-identity and career trajectory planning, thereby diminishing their enthusiasm towards self-regulation and personal management.

3.2.2 Insufficient psychological adjustment ability of students

In the epoch of globalization, societal values have become increasingly diverse, and the openness and virtual nature of cyberspace have rendered students susceptible to a wide array of information. Additionally, the escalating employment pressure has exacerbated the psychological burden borne by university students. This confluence of factors poses formidable challenges to students' psychological resilience and adaptability.

On the one hand, the plurality of values and the immersive virtual network environment can foster introversion, lethargy, and poor communication skills in real-life settings, thereby weakening students' interpersonal abilities. On the other hand, the pressure to secure employment prompts students to engross themselves in the study of specialized courses, foreign languages, and computer skills in an effort to enhance their employability, which in turn may hinder the development of their comprehensive qualities and emotional intelligence. For instance, some students, engrossed in the virtual realm, neglect

real-life interpersonal interactions, leading to a decline in their psychological resilience. Conversely, others become excessively anxious due to concerns over employment, thereby adversely affecting their academic pursuits and personal lives.

4. Vocational undergraduate student management improvement initiatives

4.1 Enhance the development and nurturing of self-regulatory skills

To enhance the self-management capabilities of students, vocational undergraduate institutions ought to undertake a series of strategic measures. Primarily, these institutions should introduce dedicated self-management courses aimed at imparting skills such as time management, task planning, and emotional regulation to students. Furthermore, in the realm of student management systems, it is imperative for vocational undergraduate colleges to continually refine their frameworks to ensure both their scientific rigor and operational feasibility. This necessitates the formulation of clear behavioral guidelines for students, outlining prohibited and restricted actions along with corresponding disciplinary measures. Additionally, the establishment of a robust student management structure, encompassing a student management committee and class management groups, is crucial for overseeing daily administration and addressing infractions. Concurrently, institutions must amplify the dissemination and education of these management systems to guarantee that all students comprehend and adhere to the relevant regulations.

Regarding implementation, vocational undergraduate colleges must fortify their supervisory mechanisms and rigorously address any infractions to uphold a conducive campus environment conducive to learning. Furthermore, these institutions should augment their instructional offerings by incorporating activities such as professional orientations, industry lectures, and internship training. Such initiatives will enable students to gain a profound understanding of professional prospects, industry trends, and career trajectories, thereby fostering a heightened sense of professional identity, mission, and academic motivation.

4.2 Enhance the provision of mental health education and support

Given the rapid evolution of society and the intensifying competitive landscape, vocational undergraduate students are confronted with unprecedented pressures and challenges. Consequently, vocational undergraduate institutions must accord paramount importance to mental health education and devise a comprehensive mental

health support system. In the realm of student administration, a pivotal focus must be placed on nurturing students' mental wellbeing, necessitating the establishment of a robust mental health service system to promptly and effectively furnish students with psychological assistance and support.

Hence, vocational undergraduate schools are obligated to fortify their mental health education endeavors. This entails offering mental health courses, reinforcing the infrastructure of psychological counseling centers, and assembling a proficient mental health service team comprising specialized counselors. This team will offer students counseling, psychological evaluations, crisis intervention, and instruct them in techniques like emotion regulation and stress management, thereby bolstering their psychological resilience.

Moreover, schools should organize positive and impactful mental health awareness campaigns to disseminate mental health knowledge and fortify students' psychological adjustment capacities. For instance, during the freshman year, by organizing diverse activities, students can discern their interests, mitigating early enrollment-related adaptability issues and enriching their campus lives. In the sophomore year, mental health activities should be staged to encourage students to confront themselves, setbacks, and challenges head-on, thereby enhancing their resilience. Customized activity methodologies tailored to students' unique characteristics should be devised to deliver targeted mental health education.

4.3 Strengthen the emphasis on practical and innovative education

To alleviate students' feelings of anxiety and disappointment, vocational undergraduate institutions ought to enhance practical and innovative education. Such education inherently prioritizes hands-on experience and creativity. Strengthening ties and collaborations with diverse societal sectors, including government, enterprises, and industrial associations, is imperative to jointly foster the progression of vocational undergraduate education, thereby affording students a more expansive arena for employment and personal growth.

Schools and enterprises should collaboratively establish training facilities that mimic real-world vocational settings, enabling students to learn and mature through practical engagement. Furthermore, inviting corporate experts onto campuses to deliver lectures and conduct training sessions can aid students in grasping industry trends and career trajectories.

Additionally, organizing students to engage in corporate projects and competitions can stimulate their innova-

tive mindset and practical competencies, bolstering their professional confidence and laying a robust foundation for their future careers. Simultaneously, both schools and the government must actively disseminate the merits and accomplishments of vocational undergraduate education to enhance societal recognition and support for this vital educational path.

4.4 Improve the home-school cooperation mechanism

Vocational undergraduate institutions should prioritize the enhancement of communication and collaboration with parents, thereby establishing a comprehensive and well-structured home-school cooperation framework. By means of regular parent-teacher conferences, home visits, and online communication platforms, institutions can effectively disseminate information pertaining to students' academic progress and school life to parents, while simultaneously gathering and incorporating parental viewpoints and recommendations regarding the school's educational practices. This collaborative approach fosters a joint focus on the holistic growth and development of students, ultimately leading to the formation of a cohesive educational alliance.

4.5 Improve the level of information management

In the contemporary information age, it is imperative for the management of vocational undergraduate students to adapt to the times. This necessitates the full utilization of information technology tools to enhance both the efficiency and standard of management. Given that each student possesses unique characteristics, encompassing differences in their learning, life, and psychological states, it is crucial for institutions to establish a robust system for the management of student files and information. This system should enable a comprehensive understanding of students' family backgrounds, academic performance, psychological wellbeing, and other pertinent aspects, thereby facilitating the provision of tailored assistance and support.

To achieve this, the implementation of a student management information system and an online service platform is paramount. These platforms facilitate the swift gathering, processing, and analysis of student data. Furthermore, the utilization of advanced technologies such as big data and artificial intelligence enables the precise analysis and forecasting of students' academic pursuits, lifestyles, career prospects, and other dimensions. This, in turn, enables the provision of more individualized and accurate services and management strategies.

Concurrently, through these information-based means,

educational institutions can promptly grasp student dynamics, promptly identify and address issues, and ultimately enhance the relevance and efficacy of student management practices.

4.6 Implement personalized management strategies

In light of the diverse nature of student cohorts, vocational undergraduate institutions ought to adopt individualized management approaches to cater to the varied requirements of students. Specifically, for students encountering academic challenges, the institutions should allocate dedicated professional tutors or counselors to each student for personalized guidance, paying heed to their individual needs and development, and offering support and assistance across multiple domains, encompassing academics, career prospects, and psychological well-being. Furthermore, students should be encouraged to engage in student-led organizations, such as student unions and clubs, fostering self-management skills and enhancing their sense of responsibility and teamwork abilities through active participation. By compiling and analyzing multi-faceted information pertaining to students' academic achievements, interests, and personality traits, personalized student profiles can be established, thereby facilitating the implementation of precise management strategies.

5. Conclusion

In conclusion, the reform of vocational undergraduate student management constitutes a comprehensive endeavor that necessitates concerted efforts from multiple stakeholders, including schools, enterprises, and society. To achieve this, we must persist in innovating management mechanisms, fortifying students' self-regulatory capabilities, prioritizing mental health education, enhancing collaboration between schools and families, and implementing a multi-faceted approach. Only by adhering to these principles can we effectively elevate the quality and standard of vocational undergraduate student management, thereby ensuring robust support for the nurturing of high-caliber laborers, technicians, and skilled professionals.

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Exploration of a Three-Stage Blended Teaching Model for the Medical Microbiology Course in the Context of Smart Education

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ARTICLE INFO

Article history

Received: 13 October 2024

Accepted: 17 October 2024

Published Online: 30 December 2024

Keywords:

Smart Education

Three-Stage Blended Teaching

Medical Microbiology

ABSTRACT

Objective: This study explores the effectiveness of a three-stage blended teaching model in the Medical Microbiology course for Clinical Medicine students within the context of smart education.

Methods: Clinical Medicine students from the 2021 and 2022 classes were studied, comparing the traditional and three-stage blended teaching models. Academic performance and survey feedback were analyzed.

Results: The research group's academic performance, including daily, final exam, and average scores, was significantly higher than the control group ($P < 0.05$). Over 95% of students approved of the new teaching model, noting improvements in competencies.

Conclusion: The three-stage blended teaching model effectively boosted student engagement, interaction, academic performance, and overall skills, showing potential for broader application in medical education.

1. Introduction

In recent years, China has made significant strides in advancing educational modernization, issuing policy documents such as the Education Informatization 2.0 Action Plan and China Education Modernization 2035. These documents emphasize the deep integration of information technology with education, charting a clear path for teaching reform in both basic and higher education^[1,2]. As a driving force behind educational reform, smart education leverages intelligent teaching platforms, virtual laboratories, and other digital tools to provide more efficient teaching and learning experiences, significantly improving the quality of education^[3]. In the field of higher education, where diverse student needs and society's demands for innovation and practical skills are increasing, blended teaching models have emerged as a key trend in educa-

tional innovation^[4]. This model overcomes the limitations of traditional teaching in terms of time and space, fostering interaction and collaboration between teachers and students, enhancing students' self-directed learning and problem-solving skills, and laying the foundation for cultivating high-quality, application-oriented professionals.

Medical Microbiology, as a fundamental course in Clinical Medicine, plays a critical role in developing students' professional skills and competencies^[5]. However, being a traditional morphology-based course, Medical Microbiology is content-heavy and conceptually abstract, making it difficult for traditional teaching methods to effectively engage students or facilitate deep knowledge assimilation^[6]. With the rapid development of information technology and the growing popularity of smart education, the limitations of traditional teaching models

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have become increasingly evident, no longer meeting the demands of modern medical education for cultivating innovative and practical talents^[7]. Therefore, exploring and implementing a new teaching model that deeply integrates information technology and aligns with the principles of smart education has become a pressing issue in medical education today. The three-stage blended teaching model, built on the Learning Pass platform, follows a structured approach: “online knowledge acquisition, large-class skill training, and flipped classroom for innovative thinking.” This model successfully integrates online and offline learning, offering a fresh perspective and method for the reform of Medical Microbiology education.

2. Materials and Methods

2.1 Study Participants

This study selected Clinical Medicine students from Pingdingshan University, specifically the 2021 and 2022 cohorts. A total of 60 students from the 2022 cohort formed the research group, while 59 students from the 2021 cohort comprised the control group. Baseline characteristics such as gender, age, origin, and entrance scores were compared, showing no statistically significant differences ($P > 0.05$), confirming comparability between the two groups.

2.2 Teaching Models

2.2.1 Grouping

The control group followed a traditional lecture-based teaching approach, while the research group utilized the three-stage blended teaching model. Both groups received 50 hours of theoretical instruction and 16 hours of laboratory practice. Continuous assessment (40%) and final exams (60%) were used for evaluation, including quizzes, classroom participation, assignments, and lab reports. To ensure consistency, both groups used the same textbooks and materials.

2.2.2 Optimization of Online Learning Resources

Given the rapid developments in microbiology due to emerging infectious diseases, the course content was updated to reflect the latest advances. Several innovations were implemented: ① **Micro-Lecture Videos:** Engaging videos were created to simplify complex microbiology concepts, utilizing high-quality visuals and animations to enhance understanding. ② **Clinical Case Studies:** Real-world case studies were integrated to bridge theory and practice, encouraging students to analyze case details and apply their microbiology knowledge to clinical problem-solving. ③ **Ideological and Political Education:** Relevant

materials were incorporated to instill professional ethics, scientific thinking, and social responsibility within the curriculum. ④ **Comprehensive Online Resources:** The online course included clearly defined learning objectives, interactive videos, and multimedia tools, providing students with an immersive, multi-dimensional learning experience.

2.2.3 The Three-Stage Blended Teaching Model

The three-stage model was implemented as follows:

(1) Online Knowledge Acquisition

Before class, instructors meticulously design self-study task sheets with clear learning objectives to guide students in conducting efficient and organized self-learning. The online tasks include watching instructional videos, reading relevant literature, and completing exercises to help students build a solid foundational knowledge in microbiology.

① **Instructional Videos and Literature Review:** Students start by watching engaging instructional videos that present core microbiology concepts in a vivid and intuitive manner, helping them form an initial understanding. They then read relevant literature to expand their knowledge of the latest research advances and theoretical perspectives, strengthening their grasp of the subject’s cutting-edge developments.

② **Interactive Feedback Mechanism:** During online learning, the platform provides features for real-time questioning and discussion, allowing students to interact with instructors and peers. This enhances student engagement. The course also includes online quizzes to assess learning effectiveness and identify knowledge gaps.

③ **Feedback and Personalized Guidance:** Quiz results serve as a tool for students to self-assess their progress and for instructors to adjust their teaching strategies. Teachers discuss common problems and offer personalized guidance for individual challenges, ensuring all students stay on track with their learning.

④ **Post-Class In-Depth Learning:** After class, students are encouraged to use platforms like “Learning Pass” to explore advanced topics in microbiology. Through reading the latest research findings and participating in instructor-led offline discussions, students deepen their understanding of the subject. This in-depth learning and reflection process not only ignites their interest in scientific research but also enhances their innovative thinking and practical skills.

By incorporating the online component of the three-stage blended teaching model, we effectively cultivate students’ self-directed learning abilities, laying a solid theoretical foundation for their future scientific research and

clinical practice.

(2) Large-Class Teaching for Skill Development

The large-class teaching phase is based on the analysis of students' self-study progress before class, integrating interactive and practical activities to reinforce theoretical knowledge and improve clinical thinking and practical skills.

① **Mind Mapping and Multimedia Teaching:** In class, instructors use mind maps to systematically present complex knowledge systems, helping students build a clear and organized knowledge framework. By gradually expanding the mind map, instructors guide students to organize their thoughts and deepen their understanding. To address challenging topics, teachers employ visual aids and animations to illustrate abstract microbiological structures and pathogenic mechanisms, increasing classroom interactivity and engagement.

② **Clinical Case Analysis:** Instructors introduce representative clinical cases to strengthen the connection between theory and practice through group discussions and analyses. Students apply their knowledge to analyze pathogen characteristics, transmission routes, and pathogenic mechanisms, then explore appropriate treatment strategies. This group case discussion approach not only helps internalize knowledge but also fosters teamwork, communication skills, and clinical reasoning among students.

③ **Laboratory Skills Development:** Laboratory practice is a key component of large-class teaching and a crucial method for translating theoretical knowledge into practical skills. In the laboratory, instructors first demonstrate essential microbiological techniques, such as aseptic technique and streak plating. Students then practice these skills in groups, with instructors providing immediate feedback and guidance. Peer teaching further promotes mutual learning and improvement, enhancing students' practical abilities and their awareness of laboratory safety and scientific literacy.

Through large-class teaching, students reinforce their theoretical knowledge while significantly improving their practical skills and clinical thinking, laying a solid foundation for future clinical practice and research.

(3) Flipped Classroom for Innovative Innovation:

The flipped classroom, as the final stage of the three-stage blended teaching model, aims to cultivate critical thinking, innovation, and problem-solving abilities through active student participation and deep learning.

① **Pre-Class Preparation and Self-Study:** Instructors present relevant hot topics or clinical cases in medical microbiology, requiring students to conduct research and

prepare initial viewpoints before class. This self-directed learning empowers students to explore the content and establishes a foundation for in-depth classroom discussions.

② **Classroom Presentation and Interaction:** During class, students take the lead by sharing their research findings and discussing their conclusions in groups. This active process of presenting significantly enhances knowledge internalization. Through presentations, students improve their communication skills while deepening their understanding and application of the material. Instructors and peers provide constructive feedback, challenge ideas, and pose questions, encouraging students to engage in deeper reflection and exploration.

③ **Instructor Guidance and Inspiration:** In the flipped classroom, instructors act as facilitators, posing thought-provoking, open-ended questions to inspire deeper student reflection. The design of guiding questions pushes students to move beyond superficial answers, encouraging them to analyze critically, question assumptions, and embrace innovative thinking.

④ **Team Collaboration and Idea Exchange:** The flipped classroom fosters communication and collaboration among students. Group discussions and interactions inspire students to exchange ideas and motivate one another, sparking collective growth and innovation. This cooperative learning environment nurtures teamwork and creative thinking, leading to the generation of innovative ideas.

By promoting active student participation and offering structured instructor guidance, the flipped classroom effectively deepens students' knowledge, enhances their ability to apply knowledge to real-world problems, and lays a solid foundation for future clinical practice and research innovation.

2.3 Evaluation of Effectiveness

The academic performance of both groups was assessed through means \pm standard deviation and analyzed using SPSS 25.0 software. Independent samples *t*-tests were conducted, with a significance level set at $P < 0.05$. Additionally, student feedback was gathered via questionnaires and analyzed descriptively using percentages.

3 Results

The results indicated that the course grades of students in the research group were significantly higher than those in the control group (see Table 1), with a statistically significant difference ($P < 0.05$).

Table 1. Comparison of Course Performance Between Groups

Group	<i>n</i>	Average Score ($\bar{x}\pm s$)	Regular Score ($\bar{x}\pm s$)	Final Exam Score ($\bar{x}\pm s$)
Control Group	59	74.81±8.81	86.12±5.64	65.27±12.65
Research Group	60	78.64±6.47	88.60±4.55	72.00±10.73
<i>t</i>		-2.699	-2.642	-3.312
<i>P</i>		0.008*	0.009*	0.002*

Note: *indicates $P < 0.05$.

Following the implementation of the three-stage blended teaching model, a satisfaction survey was conducted among students in the research group. The results are as follows: Over 95% of students expressed satisfaction with the three-stage blended teaching model, highlighting its clear advantages over traditional teaching methods. 92% of students felt that this model enhanced their self-directed learning abilities and increased their interest in the subject. 92.5% of students reported that the three-stage blended teaching model encouraged active participation in classroom discussions, thus enhancing classroom interaction. 90% of students believed that this model helped them overcome knowledge gaps and improved their learning outcomes. More than 87% of students felt that this model contributed to the development of their clinical and innovative thinking skills.

4 Discussion

4.1 The Impact of the Three-Stage Blended Teaching Model on Learning Outcomes

This study successfully applied the three-stage blended teaching model—comprising online knowledge acquisition, large-class teaching for skill development, and flipped classroom for innovative thinking—using the Learning Pass smart education platform. The integration of online and offline learning offered new methods for the reform of the Medical Microbiology curriculum. In the online knowledge acquisition phase, students had access to multimedia resources, such as high-definition microbial images and 3D animations, which enhanced their engagement and improved comprehension of abstract concepts. This phase enabled self-directed learning, allowing students to learn at their own pace and establish a preliminary knowledge framework.

In the large-class teaching phase, interactive techniques like case analysis and laboratory practice were employed. These methods helped bridge the gap between theoretical knowledge and practical application, sparking interest and fostering critical thinking. Laboratory sessions provided hands-on experience, allowing students to translate

theoretical concepts into essential microbiological skills. Additionally, teacher-student interaction was enhanced, promoting deeper learning through real-time feedback and discussion. This phase effectively developed students' clinical reasoning and practical skills, which are essential in their future medical practice.

4.2 Fostering Innovation and Collaboration through the Flipped Classroom

The flipped classroom phase allowed students to take a more active role in their learning. Through group discussions and project-based learning, students explored advanced topics in medical microbiology, proposed solutions to real-world challenges, and engaged in collaborative learning. This phase not only fostered innovation and problem-solving skills but also enhanced communication and teamwork—crucial competencies for medical professionals. The shift from a traditional teacher-centered model to a student-driven approach promoted critical thinking and deeper exploration of the subject matter.

Results from this study indicated that 92% of students believed the blended teaching model improved their self-directed learning abilities and increased their interest in the subject. Furthermore, over 87% of students reported that the model helped develop their clinical reasoning and innovative thinking skills. These findings highlight the model's capacity to motivate students and improve their learning experience. Additionally, 90% of students agreed that the model helped eliminate knowledge gaps, while statistical analysis showed that the research group significantly outperformed the control group ($P < 0.05$). This underscores the effectiveness of the model in transforming theoretical knowledge into practical application, aligning with the goals of smart education.

In conclusion, the three-stage blended teaching model demonstrated substantial effectiveness in improving teaching quality and developing students' comprehensive skills. Its emphasis on active, practice-oriented learning provides a promising framework for future medical education reforms. The success of this model in Medical Microbiology can offer valuable insights for other courses, contributing

to a more personalized and efficient learning experience in medical education.

5. Conclusion

The three-stage blended teaching model significantly enhanced the quality and effectiveness of the medical microbiology course, promoting student engagement and improving self-directed learning, practical skills, and innovation. This model has shown great potential for broader applications in other basic medical courses, offering valuable insights for education reform in clinical medicine. However, continuous refinement is necessary as we experiment and optimize teaching methods to better meet the evolving demands of smart education. With ongoing exploration, this model can foster higher-quality educational outcomes, contribute to scientific research, and strengthen the field of microbiology.

Funding Projects

Henan Province Medical Education Research Project (Exploration and Reform of the “Three-Fusion” Teaching Model for Medical Microbiology Courses under the New Medical Education Context, WJLX2024199); Teaching Reform Research Project of Pingdingshan University (Exploration of a Three-Stage Hybrid Teaching Model for Basic Medical Courses in Clinical Medicine under the Context of Smart Education, 2023-JY42); “Ideological and Political Education” Project for the “Medical Microbiology and Parasitology” Course at Pingdingshan University.

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Research on the Pathways for Enhancing Innovation and Entrepreneurship Competencies of Medical Students under the Background of “New Medical Science”

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ARTICLE INFO

Article history

Received: 15 October 2024

Accepted: 23 October 2024

Published Online: 30 December 2024

Keywords:

New Medical Science

Medical Education

Innovation and Entrepreneurship

Interdisciplinary Integration

Interdisciplinary Talent

ABSTRACT

This study explores the innovation and entrepreneurship education model in medical education under the background of “New Medical Science,” aiming to cultivate interdisciplinary talents that can meet the future healthcare needs. With the advancement of the national innovation strategy, “New Medical Science” emphasizes not only the transmission of professional knowledge but also the development of interdisciplinary integration and innovation capabilities to address the rapid changes in medical technology. A survey was conducted to assess the innovation and entrepreneurship competencies of medical students at Pingdingshan University. The results show that students have a high level of awareness and participation in innovation and entrepreneurship education, yet there is a need to strengthen the integration of skill enhancement with professional knowledge. Based on the survey findings and theoretical foundations of innovation and entrepreneurship, the paper proposes pathways to enhance medical students’ innovation and entrepreneurship abilities, focusing on strengthening faculty development, improving the curriculum system, promoting the integration of specialty and entrepreneurship, and optimizing educational models. These efforts aim to cultivate medical professionals with stronger innovation and practical capabilities, contributing to the realization of the “Healthy China” strategy.

1. Introduction

In 2019, the Ministry of Education of China launched the “Six Excellence and One Top-Notch” initiative 2.0, which introduced the “Four New Construction” framework^[1]. In the same year, the Ministry of Education issued the “Opinions on Deepening Undergraduate Education and Teaching Reform to Fully Improve Talent Cultivation Quality,” which emphasized the construction of new engineering, new medical, new agricultural, and new liberal arts disciplines as leading factors for optimizing and ad-

justing university programs to enhance the quality of education^[2]. The concept of “New Medical Science” emerged alongside the development of medical fields and the national innovation strategy. It is an educational reform model aimed at cultivating high-quality, interdisciplinary medical professionals who can meet future healthcare needs. Under the “Big Health” philosophy, “New Medical Science” not only emphasizes the transmission of professional knowledge but also advocates for interdisciplinary integration and the cultivation of innovation capabilities in medical students to address the challenges posed by rapid

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medical technological advancements.

In 2016, the State Council of China issued the “National Innovation-Driven Development Strategy Outline,” which clearly set the development goals for China to become a leading innovative nation by 2030 and a global leader in scientific and technological innovation by 2050^[3]. The cultivation of innovation and entrepreneurship talent has become a core component of the country’s innovation-driven development strategy.

In higher medical education, innovation and entrepreneurship education provides medical students with more practical opportunities and space for development, making it a key direction in advancing the reform of medical education. The innovation and entrepreneurship abilities of medical students can enhance their capacity to cope with clinical and technological changes, improve the quality of medical services, and drive the development of the health industry, thus contributing to the realization of the “Healthy China” strategy. To promote the cultivation of innovation-driven medical talent and to enhance the ability of medical schools to serve the “Healthy China” initiative, this study investigates the cultivation of innovation and entrepreneurship talents in medical schools under the background of “New Medical Science.”

2. Medical Education Reform under the Background of “New Medical Science”

2.1 The Connotation and Characteristics of “New Medical Science”

“New Medical Science” is a key initiative in China’s medical education reform, emerging in the context of the integration of modern medicine and the technological revolution. Its essence lies in the innovation of medical education models and the deep integration of disciplines. The development of “New Medical Science” can be traced back to the national innovation-driven strategy. By combining various disciplines such as technology, information technology, and engineering, it drives the transformation of medical education from the traditional disease treatment model to the “Big Health” concept. In this process, medical education is no longer limited to the transmission of knowledge; rather, it emphasizes the cultivation of students’ innovative capabilities, interdisciplinary thinking, and comprehensive skills.

The characteristics of “New Medical Science” are primarily reflected in three aspects^[4]:

Interdisciplinarity: With the global advancements in artificial intelligence, big data, the Internet of Things, Industry 4.0, and the life sciences revolution (Life Sciences 3.0), the modern medical model faces significant trans-

formations. Medicine is transitioning from a biomedical model to one that integrates multiple disciplines. Fields such as medical engineering, medical humanities, and medical physics are converging. Innovations such as surgical robots, big data precision medicine, 3D-printed organs, bioinformatics and molecular medicine, and translational medicine all stem from the intersection of multiple disciplines with traditional medicine.

Cross-boundary: In the context of informationization and intelligence, to meet the needs of industry integration and future development, it is essential to break traditional industry boundaries and foster cross-disciplinary collaboration and innovation. This characteristic drives reforms in medical education, aligning with technological innovations and integrating new technologies such as automation, artificial intelligence, and big data analytics into the talent development system, with the goal of training medical leaders who can thrive across industries.

Innovation: This is both a fundamental requirement of social development and the “Healthy China” initiative and a true reflection of the value of “New Medical Science.” Faced with the rapid development of new technologies and industries in healthcare, medical education must proactively adapt and plan ahead. Through innovation in technology, industry, and particularly talent training models, China aims to gain a leading position in the global healthcare sector, driving major breakthroughs in core medical technologies and cultivating high-level innovative talents capable of solving frontier issues in life sciences.

2.2 Innovation and Entrepreneurship Requirements in Medical Education

Modern medical education is no longer content with cultivating healthcare professionals who only possess basic clinical skills. It now requires students to develop innovative thinking and entrepreneurial abilities to meet the increasingly complex healthcare needs and the challenges posed by rapid technological advancements. Innovation capability is not only key to solving medical problems but also a driving force for technological progress in the healthcare industry. Entrepreneurial capability enables medical students to better identify market demands and promote the transformation and upgrading of medical products or services in their future careers.

Under the background of “New Medical Science,” the requirements for innovation and entrepreneurship capabilities in medical education have become even more prominent. First, students must master an interdisciplinary knowledge system and be able to innovate by combining knowledge from fields such as medicine, technology, and management. Second, “New Medical Science” demands

that students have the ability to identify problems and propose innovative solutions in real clinical and research environments, which calls for enhanced practical involvement in innovation projects. Moreover, the cultivation of entrepreneurial abilities should not be limited to market analysis and business model development but should also equip students with the ability to translate technology into practical applications to better serve the healthcare industry and public health needs.

2.3 Challenges and Opportunities Brought by “New Medical Science”

The introduction of “New Medical Science” has not only driven the transformation of medical education but also brought both challenges and opportunities. The challenge of interdisciplinary knowledge integration is particularly prominent. In the traditional medical education system, disciplinary boundaries were clearly defined. However, “New Medical Science” requires breaking these boundaries and integrating engineering, information technology, management, and other fields with medicine. This raises higher demands on medical students, who must master core knowledge from multiple disciplines within a limited timeframe and adapt to a learning model based on interdisciplinary integration. Additionally, the shortage of faculty and the integration of teaching resources pose practical challenges in advancing “New Medical Science.”

However, “New Medical Science” also offers unprecedented opportunities for medical students in terms of innovation and entrepreneurship. With the application of cutting-edge technologies such as artificial intelligence, gene editing, and robotic surgery in medicine, students are exposed to more innovative fields and broader career paths. Through the “specialty + innovation and entrepreneurship” training model, medical students can not only propose innovative solutions in research and clinical work but also drive the application and transformation of technology through entrepreneurial practice. The teaching reforms in “New Medical Science” equip students with stronger practical abilities and innovative thinking, enabling them to play an active role in the transformation of the healthcare industry and contribute to the realization of the “Healthy China” strategy.

3. Theoretical Foundations of Innovation and Entrepreneurship Competencies for Medical Students

3.1 Constructivist Theory

Constructivist theory emphasizes that learners actively construct their own knowledge systems through interac-

tion with their environment. In innovation and entrepreneurship education, this theory advocates for guiding students to independently explore and practice innovation by solving real-world problems and tasks, thereby gradually building the knowledge and skills related to innovation and entrepreneurship^[5]. This learning model focuses on medical students’ practice in real-world contexts, enabling them to integrate theoretical knowledge with practical applications.

3.2 Action Learning Theory

Action learning is a process in which learning occurs through solving real problems, emphasizing learning through action and improving through reflection^[6]. In medical education, action learning theory encourages medical students to accumulate experience by participating in innovative activities during clinical practice and research projects, thereby enhancing their innovation and entrepreneurship capabilities through teamwork. This theory is particularly suited for developing students’ adaptability and decision-making skills when faced with complex medical problems.

3.3 Innovation Diffusion Theory

Innovation diffusion theory studies how innovations spread within social groups, revealing the dissemination patterns of new technologies and methods among medical students and in the healthcare industry. Understanding this diffusion process helps medical students identify market demands and promotes the application of new technologies in innovation and entrepreneurship^[7].

3.4 Situated Learning Theory

Situated learning theory emphasizes learning in authentic contexts, that is, enhancing knowledge mastery through practice and contextual experiences. Through contextualized learning experiences such as medical simulations, entrepreneurship training, and clinical practice, medical students’ innovation and entrepreneurship abilities can be developed and improved^[8].

4. The Current Status of Innovation and Entrepreneurship Among Medical Students at Pingdingshan University

4.1 Research Design

A survey was conducted using a questionnaire to assess the innovation and entrepreneurship abilities of medical students at Pingdingshan University. Based on existing literature^[9], a questionnaire development team was formed

to design the “Survey on the Current Status of Innovation and Entrepreneurship Among Medical Students.” The questionnaire was divided into five sections: basic information about medical students, awareness of innovation and entrepreneurship, development of innovation and entrepreneurship abilities, construction of innovation and entrepreneurship platforms, and students’ expectations for innovation and entrepreneurship.

4.2 Distribution and Collection of the Questionnaire

The questionnaire was created using the Wenjuanxing app and distributed with the assistance of the university’s Youth League Committee. The survey was open from March 1, 2024, to April 20, 2024, and a total of 1,012 valid responses were collected. The basic information of the respondents is as follows: in terms of gender, 765 were female (75.59%) and 247 were male (24.41%). In terms of academic year, 653 students were in their first or second year (64.53%), and 359 students were in their third year or higher (35.47%).

4.3 Questionnaire Results and Analysis

4.3.1 Effectiveness of Cultivating Innovation and Entrepreneurship Awareness

According to the survey results, 52.23% of medical students were relatively familiar with innovation and entrepreneurship, and 27.21% expressed interest in national policies supporting innovation and entrepreneurship for college students. 70.10% of medical students reported having ideas related to innovation and entrepreneurship, 53.76% preferred to voluntarily enroll in innovation and entrepreneurship courses, and 58.89% were willing to attend innovation and entrepreneurship lectures or related activities. This indicates that medical students are highly engaged in innovation and entrepreneurship education, with strong awareness and participation in relevant activities. It is recommended that future research on innovation and entrepreneurship education for medical students further focus on developing their competencies.

4.3.2 Demand for the Development of Innovation and Entrepreneurship Abilities

The data revealed that medical students’ participation in innovation and entrepreneurship activities was mainly concentrated in college innovation and entrepreneurship projects (42.35%), “Internet+” competitions (31.78%), and the “Challenge Cup” competition (27.22%). 36.58% of the students had participated in various levels of “Internet+” competitions. Students reported that the greatest benefits of participating in innovation and entrepreneur-

ship projects included improving interpersonal communication skills, enhancing independent learning ability, and increasing extracurricular knowledge. This suggests that innovation and entrepreneurship projects are effective ways to enhance students’ overall qualities.

4.3.3 Integration of Professional and Innovation Entrepreneurship Education

The survey results showed that 72.32% of medical students applied or partially applied their professional knowledge during innovation and entrepreneurship projects, 56.37% believed that innovation and entrepreneurship activities were helpful for their professional learning, and 72.87% indicated that professional courses provided support for carrying out innovation and entrepreneurship projects. This indicates a close connection between professional education and innovation entrepreneurship education in medical colleges. However, further integration of professional and innovation entrepreneurship education still requires strengthening.

4.3.4 Medical Students’ Choices and Preparation for Innovation and Entrepreneurship

The survey results revealed that 52.41% of medical students would choose innovation and entrepreneurship if they had no family burdens and sufficient financial resources. 19.70% of students stated they would consider entrepreneurship if employment prospects were not ideal. In the innovation and entrepreneurship process, 63.77% of students identified a lack of social connections as the main obstacle, while 54.64% cited insufficient funding. Regarding the qualities necessary for successful entrepreneurs, 67.22% of students believed that challenge spirit and professional knowledge were key. This shows that most medical students are rational when choosing innovation and entrepreneurship, preferring to take action once they are adequately prepared professionally. Lack of social connections, funding, and experience are the primary barriers to their entrepreneurial endeavors.

5. Pathways to Enhance Innovation and Entrepreneurship Education in Higher Education

With the advancement of medical education reform, there is an urgent need to address the awareness and capability development of medical students regarding innovation and entrepreneurship education. Based on the feedback from survey data, the deficiencies and expectations of medical students in innovation and entrepreneurship education have been clarified, presenting new challenges and opportunities for medical institutions to cultivate talent that meets the requirements of the New Medical Science framework.

Therefore, medical universities should actively construct an innovation and entrepreneurship education system that aligns with the Healthy China strategy.

5.1 Changing Educational Concepts and Building an Innovative, Interdisciplinary Faculty

In response to the demands of the New Medical Science talent training system, the shortage of high-quality innovation and entrepreneurship faculty, combined with the growing demand for such educators, has become a prominent issue. As such, developing a high-caliber, interdisciplinary faculty focused on innovation and entrepreneurship education has become a priority in the construction of New Medical Science^[10]. First, excellent teachers should be selected based on their strong professional ethics, innovation and entrepreneurship mindset, interdisciplinary background, advanced teaching philosophy, and dedication to their students. A teaching team focused on innovation and entrepreneurship should be established. In practice, it is important to strengthen communication and training on innovation and entrepreneurship experiences among faculty members to promote their self-improvement. Additionally, faculty should be encouraged to lead students in research projects focused on innovation, while also promoting the translation of research outcomes into practical applications. Furthermore, well-known scholars from industry could be invited to give lectures, inspiring students' awareness and passion for practical innovation, while improving their professional literacy and skills. Faculty should also be encouraged to utilize information technology to develop online courses for the New Medical Science, promoting the "Internet + New Medical Science" teaching model.

5.2 Improving the Curriculum System and Developing Demonstration Courses

Curriculum design is crucial to innovation and entrepreneurship education. Medical universities should establish a systematic curriculum for innovation and entrepreneurship education, integrating it with both general education and specialized courses. The curriculum should balance theory and practice, especially in medical disciplines, and cover a range of topics such as innovative thinking, entrepreneurship management, and market research.

In line with the needs of the New Medical Science framework, curriculum reform must also be implemented. First, traditional courses should include content related to comprehensive health services, integrating prevention, treatment, and rehabilitation education to create a knowl-

edge system for lifelong health services. Second, courses related to precision medicine, such as "Pharmacogenomics" and "Bioinformatics Analysis Techniques," should be introduced. Furthermore, the integration of precision medicine content into traditional courses should be explored, fostering students' precision medicine thinking and improving their ability for personalized diagnosis and evaluation. Additionally, innovative thinking training should be strengthened, reducing the emphasis on traditional confirmatory experiments and increasing innovative experiments related to disease treatment. Virtual simulations utilizing bioinformatics and big data technologies should also be incorporated into the curriculum^[11].

5.3 Integrating Innovation with Professional Education to Promote Cross-Disciplinary Integration

In medical education, the integration of professional education and innovation entrepreneurship education is particularly important. The New Medical Science framework requires that medical talents not only possess solid medical knowledge but also have the innovation and practical skills necessary to meet the increasingly complex medical environment and societal demands. To achieve this goal, universities should design interdisciplinary innovation and entrepreneurship courses and encourage students to participate in research projects and practical activities, thereby enhancing their innovation capabilities. Additionally, medical universities should collaborate with enterprises and research institutions to develop practical courses and internship projects, helping students transform theoretical knowledge into practical abilities. For example, high-level laboratory systems and interdisciplinary resources such as innovation laboratories, innovation projects, and incubation centers can be integrated to promote collaborative development between students, faculty, disciplines, and medical education teams^[12]. This approach allows students to accumulate experience through practical projects and cultivates their entrepreneurial awareness and teamwork skills.

5.4 Stimulating Innovation among Faculty and Students, Building a Diverse Educational Model

When developing an innovation and entrepreneurship education model, universities should fully consider the involvement and enthusiasm of both faculty and students. By reforming the faculty evaluation system, universities can encourage faculty to actively participate in innovation and entrepreneurship education, thus enhancing their sense of involvement and responsibility. Furthermore, the successful experiences of world-renowned institutions,

such as MIT and Stanford, can be referenced, and corresponding incentive mechanisms should be implemented to encourage faculty to incorporate their research outcomes and entrepreneurial experiences into classroom teaching.

For students, universities should establish a student-centered educational model, guided by the Outcome-Based Education (OBE) philosophy. By designing practical and feasible talent development programs^[13], universities can stimulate students' interest in learning and their curiosity, encouraging active participation in innovation and entrepreneurship education and fostering a positive interactive and collaborative atmosphere.

5.5 Enhancing Educational Platforms and Innovating Talent Development Mechanisms

In the context of technological change and the "Four New" educational background, medical universities must comprehensively enhance the effectiveness of their innovation and entrepreneurship education platforms, bridging the gaps between the educational chain, innovation chain, and industrial chain. This includes strengthening cooperation with enterprises and industry associations, establishing and improving university-enterprise cooperation mechanisms, and providing students with diversified practical opportunities and resource support through joint course development, scholarships, internship bases, and other forms of collaboration.

Moreover, medical universities should build a new form of innovation and entrepreneurship education that involves all participants throughout the entire process and in an all-encompassing manner. This will foster collaborative development across disciplines, innovate talent development mechanisms, and ensure the fulfillment of the goal to cultivate innovative, interdisciplinary talents. Focusing on student development and industry innovation needs, universities should promote multi-party cooperation between academia, industry, and research, and integrate innovation factors to improve the collaborative talent development mechanism for the medical field. This will contribute to cultivating innovative, interdisciplinary medical talents in the healthcare industry, and achieving an organic connection between the education chain, talent chain, and industry chain in the broader healthcare sector^[14]. Regular innovation and entrepreneurship activities, competitions, and seminars should be organized to encourage students to apply their knowledge in practice, enhancing their comprehensive qualities and practical abilities.

6. Conclusion

In the context of the "New Medical Science" frame-

work, the innovation and entrepreneurship education model in medical education holds significant theoretical and practical value. As medical technology advances and industry needs evolve, medical students must possess innovative thinking and entrepreneurial abilities to tackle complex healthcare challenges. According to the results of the survey, medical students exhibit high levels of engagement with innovation and entrepreneurship education, but there is still a need to strengthen their ability development and application of professional knowledge. Therefore, medical universities should actively construct an innovation and entrepreneurship education system that aligns with the requirements of the New Medical Science framework, change traditional educational concepts, enhance faculty capabilities, and provide diversified practical platforms to cultivate high-quality, interdisciplinary medical talents. This will contribute to the implementation of the national health strategy.

Fund Project

This work was supported by the Key Teaching Reform and Practice Project of Pingdingshan University in 2023, titled "Research and Practice on Innovation and Entrepreneurship Pathways for Medical Students under the New Medical Discipline Framework" (Project No. 2023-JYZD15).

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The Application of Narrative Education of Wisdom Classroom Model in Nursing Teaching

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ARTICLE INFO

Article history

Received: 15 October 2024

Accepted: 3 November 2024

Published Online: 30 December 2024

Keywords:

Wisdom classroom

Narrative education

Nursing teaching

Application effect

ABSTRACT

Objective: To evaluate the effect of narrative education in nursing teaching of wisdom classroom model. **Methods:** 60 general surgery nursing students were divided into groups, 30 nursing students in control class were taught in traditional teaching mode, and 30 nursing students in research class were taught in wisdom classroom mode. Compare the nursing teaching effect of two classes. **Results:** There was no significant difference in the scores of clinical nursing ability between the two classes before teaching, and the improvement was more obvious after different teaching modes, with statistical significance between the two groups ($p < 0.05$). After different teaching modes, the assessment results of nursing students in the research class were better in all aspects, and the difference between groups was obvious ($p < 0.05$). There was no significant difference in clinical thinking between the groups before teaching ($p > 0.05$), and the clinical thinking ability of the study group was improved after different teaching modes, and the difference between the groups was significant ($p < 0.05$). Compared with the two classes of nursing students' satisfaction with different teaching modes, the satisfaction of the research class was higher, with statistical significance ($p < 0.05$). **Conclusion:** The use of narrative education in wisdom classroom mode in nursing teaching can significantly improve the clinical nursing ability of nursing interns, exercise their clinical thinking, improve their assessment scores and teaching quality satisfaction, and is beneficial to the cultivation of excellent quality of humanistic care of nursing interns, and has a prospect of popularization and application.

1. Introduction

The development of nursing education in our country has tended to be mature, but the traditional teaching mode can not satisfy the pace of nursing education reform. No matter the traditional teaching method in school or the traditional teaching method in clinical practice, nursing students are taught rigid book knowledge and clinical skills. However, in today's advocating humanistic quality

education, it is particularly significant to cultivate the humanistic care ability of nursing students and improve their comprehensive quality. The emergence of narrative education just makes up for the shortcomings of traditional teaching mode, and brings different teaching experience to teachers and students through rich teaching forms, so that the content learned is more deeply rooted in people's hearts, and achieves the purpose of teaching and learning.

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Narrative education, as a new teaching mode, was first introduced into the field of nursing education by American nursing educator Diekelman in 1993^[1]. Now it has been widely utilized in nursing work and achieved good results^[2]. In 2022, a study in the United States showed that at least 69 of the 125 medical colleges surveyed took narrative education as a compulsory course^[3], which shows that narrative education has long been carried out in full swing in foreign countries. With the development and application of information technology, the Ministry of Education has issued a number of documents, emphasizing the use of information technology to carry out smart education, accelerate the process of education modernization, and realize the goal of national education informatization and education power^[4]. Supported by modern information technology, “wisdom classroom” is a new type of teaching classroom different from the traditional one, which is created by using various teaching resources according to pedagogical theories and subject characteristics in the teaching process to promote students’ active participation in the classroom, experience the happiness of learning and improve the teaching effect^[5]. With the help of information technology, “wisdom classroom” has various forms of teaching organization, abundant teaching resources, novel teaching methods, relaxed and interesting teaching atmosphere, and good teaching interaction, which can give full play to the principal role of students, cultivate students’ independent learning ability, enhance students’ learning participation, and thus improve teaching effect^[6]. Next, we will study the application effect of narrative education under the wisdom classroom model in nursing teaching in our country, hoping that this new nursing education idea and model can be paid attention to and applied by more nursing scholars to promote the further development of nursing education in our country.

2. Objects and methods

2.1 Research object

A total of 60 nursing students from September 2022 to June 2023 were selected as the study objects. According to different teaching modes, they were divided into control group and study group. Inclusion criteria : (1) General surgery nursing intern; (2) Voluntary participation in and completion of general surgery practice teaching activities, and informed consent. Exclusion criteria: (1) Those who have participated in wisdom classroom teaching before, or are participating in other similar researchers at the same time; (2) Those who can not complete the research due to their own reasons and quit midway. In the control group, there were 2 men and 28 women, respectively, with the

minimum age of 20 years and the maximum age of 22 years, and the mean age was (20.31±0.22) years. In the study group, there were 1 male and 29 female patients, respectively. The minimum age was 21 years and the maximum age was 22 years. The mean age was (20.32±0.21) years. There was no significant difference in the basic data between the two groups ($p < 0.05$).

2.2 Methods

2.2.1 Regular teaching in comparison class

The nursing students in the control group adopted the traditional teaching method, carried out the clinical teaching guidance according to the learning plan made in advance, and conducted the small lecture and teaching round once a week. Nursing students are required to preview and review the textbook content knowledge in advance. During class, they should actively answer the relevant questions raised by the teacher and make relevant notes; During the weekly implementation of small lectures, ward rounds and clinical teaching, representative general surgery nursing cases will be shown to students, and students will be organized to discuss and analyze nursing plans. Meanwhile, teachers should carefully answer relevant questions raised by students, and regularly summarize and give timely feedback.

2.2.2 Intelligent classroom narrative education of the research class

The nursing students in the research group were given narrative education of wisdom classroom teaching mode, which was divided into pre-class stage, mid-class stage and after-class stage.

The pre-class stage is mainly the stage of teacher’s lesson preparation and students’ independent learning. Teachers need to prepare lessons according to the teaching objectives and teaching content of the course. For example, relevant learning content and materials should be made into PPT and uploaded to the mobile teaching assistant or network teaching platform, and relevant topics should be published for study and discussion. Students can learn and summarize knowledge points by means of data reference, video learning and group discussion before class.

The middle stage of the class is mainly the stage of the teacher’s teaching and the students’ listening. Through pre-class preparation, during the teaching period, the teacher uses network technology to highlight the student-centered and themed teaching concept, and draws out the problems existing in pre-class preview and discussion during the teaching period, and cultivates students’

learning interest through various forms such as case explanation, video teaching and online class. And through group discussion to stimulate the enthusiasm of students to participate, so that it is easier for them to grasp the key and difficult points of the learning content.

Narrative education in the course is mainly carried out through the following ways. The first is the story form, which teaches the concept of disease, etiology, clinical manifestations, auxiliary examination, nursing diagnosis and related nursing measures. Through clinical narration, story reconstruction and other ways, teachers skillfully “contain” the above theoretical knowledge in the story, that is, use the story as the carrier to teach disease knowledge. For example, by telling the story of a classmate who vomited blood after the class reunion, “I” was confused about why he vomited blood (cause), worried about the danger of his life (clinical manifestations and prognosis) - sent to the hospital after treatment and turned the crisis safe (treatment and nursing measures), and the medical staff was concerned about the hospital when discharged (health guidance). By designing such a storyline, the knowledge of the disease is connected to “me”. Through the “I” story perspective, to learn and master nursing knowledge. The second is a form of art and literature, in which narrative experiences and stories are an important way for human beings to express and transmit experiences. Teachers may recommend medical films, TV dramas and literary works to students. Students’ enthusiasm for learning can be aroused through rich story plots and teachers’ interpretation from the perspective of professional courses. By watching videos, students can understand the physical state, life and pain of patients, and deepen their understanding of disease knowledge. The third is the reflection diary, which guides students to summarize what they have heard, done, thought and felt, that is, the internalization of knowledge. Reflection diary not only involves disease knowledge, but also personal thoughts and experiences. Teachers can learn about students’ learning experience from students’ reflection diary, which is not only conducive to the communication between teachers and students, but also conducive to teachers’ teaching adjustment according to the feedback of students. In addition, with the help of teaching assistants on the network platform, students can share pre-class presentations or the results of independent learning in class. For the knowledge points that have doubts, students can circle notes according to the content of the APP, and exchange questions with students or teachers, which helps to form a good atmosphere for independent learning and improve the learning effect. The participation and implementation of each session were evaluated according to the score weight

set by the teacher.

The after-school stage is the teaching effect evaluation stage. During the teaching period, the teacher implements the wisdom classroom, uses the network teaching platform and teaching assistant to evaluate the teaching effect by using information technology, so as to comprehensively understand the latest progress of students’ learning content in this chapter, understand the weak points of students’ mastery of knowledge, and provide references for the next class. The whole wisdom classroom teaching mode under the background of “Internet +” relies on mobile assistant APP or online platform. Meanwhile, in the student assessment system, individual self-assessment, classmate mutual assessment, group assessment and teacher comments can be set up in combination with systematic evaluation, and corresponding reward and punishment mechanism can be established to make the assessment more systematic and humanized. After the end of the classroom teaching, the teacher will focus on the students’ learning attitude, the shortcomings in the learning process and the learning direction, explain the nursing difficulties and relevant important content involved in the practice of general surgery for individual students, and guide them to carry out practical operations to ensure that they are proficient in the important knowledge of nursing practice. In addition, during the nursing practice, they will acquire the important knowledge. After the consent of the patient, the relevant clinical data and image data will be uploaded to the APP, so as to facilitate the students to further deepen their understanding of the nursing method of this kind of general surgery patients, and learn the corresponding nursing method or propose the corresponding innovative nursing plan.

2.3 Evaluation index

(1) Nursing students’ clinical practice ability was evaluated using the nursing mini-clinical exercise evaluation scale compiled by previous literature^[7], which consisted of 8 items, namely, overall evaluation, organizational effectiveness, health consultation, humanistic care, nursing consultation, nursing measures, nursing diagnosis and nursing physical examination. A 9-point scale was used for each entry, with 1-3 classified as unqualified, 4-6 as qualified, and 7-9 as excellent. The Cronbach’s coefficient of the scale was 0.780, indicating good reliability and validity. (2) The examination results are designed and organized by the researchers themselves: the examination contents include theoretical knowledge, practical operation, basic nursing, communication ability, and medical record writing. The total score of each is 10 points, and

the higher the score, the better the score.(3) The evaluative Thinking ability Scale (CTDI-CV) revised from previous literature [8] was used to evaluate the thinking ability of nursing students. The scale consists of 7 items, each consisting of 10 items, divided into 40 negative items (from strongly disagree to strongly agree) and 30 positive items (from strongly agree to strongly disagree). The scale ranges from 70 to 420 points, ≤120 points indicates negative critical thinking ability, 211-279 points indicates unclear meaning, ≥280 points indicates positive critical thinking ability, and >350 points indicates strong critical thinking tendency. The total score of a single item ranges from 10 to 60 points, ≤30 points indicates negative tendency, 31-39 points indicates unclear meaning, ≥40 points indicates positive tendency, and >50 points indicates strong positive tendency. Cronbach 'sa coefficient was 0.810, indicating good reliability and validity. (4) Clinical intern satisfaction questionnaire was used to evaluate nursing students' satisfaction [9]. The scale consists of 27 items in 5 dimensions, such as teaching effect, teaching content, practice environment, operation skills and management mode. Likert4 scale was used to score from very unsatisfied to very satisfied, ranging from 1 to 4 points. A higher score indicates a higher level of satisfaction. The Cronbach 'so coefficient of the questionnaire was 0.885, indicating good reliability and validity.

2.4 Statistical Analysis

SPSS24.0 software was used to analyze the data. The counting data were expressed as rate or component ratio, and the intergroup ratio was tested by x2. The measurement data were expressed as mean ± standard deviation. Paired t test was used for intra-group comparison and independent sample t test was used for inter-group comparison. P<0.05 was considered statistically significant.

3. Results

3.1 Comparison of clinical nursing ability between the two groups

Before teaching, there was no significant difference in nursing ability between the two groups, but after teaching, the improvement effect of nursing ability in the study group was significant, and the comparison between the two groups was statistically significant (p<0.05). See Table 1.

3.2 Comparison of assessment results between the two groups

After teaching, the assessment results of nursing students in the study group were better than those in the control group with conventional teaching mode, and the comparison between groups was statistically significant (p<0.05). See Table 2

3.3 Comparison of clinical thinking between the two groups

Before teaching, there was no significant difference in the total score of critical thinking ability between the two groups (P>0.05). After teaching, the total score of critical thinking ability of nursing students in the 2 groups was significantly increased, and the total score of the study group was higher than that of the control group, the difference was statistically significant (P<0.05). See Table 3.

3.4 Comparison of nursing students' satisfaction between the two groups

After teaching, the two groups of nursing students had little difference in satisfaction scores on practice environment and management mode, but higher satisfaction in teaching content, operational skills and teaching effect, with statistical significance (p<0.05). See Table 4

Table 1. Comparison of nursing ability between the two groups

group	time	Nursing consultation	Nursing physical examination	Nursing diagnosis	Nursing measures
Research group	Before teaching	5.18±1.50	5.11±1.59	5.05±1.48	5.06±1.30
	After teaching	7.09±1.33*	7.07±1.19*	7.11±1.23*	7.13±1.06*
Control group	Before teaching	5.02±1.45	5.15±1.80	5.13±1.45	4.98±1.41
	After teaching	6.31±1.34	6.32±1.30	6.40±1.36	6.70±1.21

group	time	Health consultation	Humanistic care	Organizational effectiveness	Overall evaluation
Research group	Before teaching	5.10±1.71	4.95±1.15	5.04±1.21	4.96±0.69
	After teaching	6.99±0.97*	7.34±0.92*	7.41±1.06*	7.06±0.56*
Control group	Before teaching	5.19±1.32	5.12±1.55	5.11±1.20	5.07±0.79
	After teaching	6.26±0.99	7.11±1.04	6.50±1.04	6.39±0.61

Note: * indicates that compared with control group, P<0.05

Table 2. Comparison of assessment results of nursing students

group	n	Theoretical knowledge	Medical record writing	Communication ability	Practical operation	Primary care
Research group	30	8.23±1.10	8.36±1.60	8.67±1.22	7.79±1.61	8.02±2.03
Control group	30	6.33±2.12	6.32±1.92	6.63±1.72	6.52±1.69	6.44±1.80
t	-	4.357	4.471	5.299	2.980	3.190
P	-	<0.05	<0.05	<0.05	<0.05	<0.05

Table 3. Comparison of clinical thinking of nursing students between the two groups

group	time	Search for truth	Open mind	Analytical ability	System capability
Research group	Before teaching	41.31±8.27	38.47±5.87	35.32±4.70	34.37±5.36
	After teaching	45.33±6.53*	40.86±6.20*	38.15±7.81*	40.52±7.79*
Control group	Before teaching	38.92±7.73	39.57±6.49	34.13±6.72	35.54±5.63
	After teaching	41.27±8.09	38.47±5.88	35.53±4.62	35.34±7.02

group	time	self-confidence	Thirst for knowledge	Cognitive familiarity	Total points
Research group	Before teaching	31.70±7.22	32.32±4.74	43.62±7.97	257.03±28.52
	After teaching	37.59±9.53*	38.67±8.55*	45.47±6.83*	286.53±40.66*
Control group	Before teaching	34.57±6.86	34.12±7.22	41.47±7.27	258.21±33.40
	After teaching	32.71±6.90	34.54±6.63	38.66±8.48	256.32±38.48

Note: * indicates that compared with control group, P<0.05

Table 4. Comparison of nursing students' satisfaction between the two groups

group	n	Practice environment	Management mode	Teaching content	Operational skill	Teaching effect
Research group	30	3.40±0.46	3.33±0.42	3.51±0.45	3.59±0.34	3.41±0.40
Control group	30	3.36±0.45	3.29±0.71	3.10±0.27	3.05±0.52	2.97±0.46
t	-	0.341	0.266	4.384	4.766	3.953
P	-	>0.05	>0.05	<0.05	<0.05	<0.05

4. Discussion

4.1 Application effect of narrative education

4.1.1 Improve humanistic care and empathy

Narrative education is a kind of teaching method, through creating a teaching environment in line with the situation, and explaining, analyzing and re-deconstructing the narrative materials, to achieve the purpose of improving the quality education of nursing students. Humanistic nursing and empathy are the core parts of nursing students' personal quality and an important entry point to establish a good nursery-patient relationship. They can be used to perceive the emotions of others, understand the spiritual world of others, and provide caring services to patients to make them feel social support and emotions^[10]. Narrative education can hide the intention of humanistic care and empathy literacy in vivid stories, and present narrative scripts through the intelligent classroom platform to provide nursing students with perceptible story situations, thus triggering their thinking, prompting them to feel the real nursing scene, perceiving the inner thoughts of patients in the interactive experience of the scene, and

stimulating their true feelings. Make them feel the true meaning of humanistic care, and then produce psychological identity. The problems existing in clinical practice are introduced to nursing students, and narrative education is carried out through stories related to them, so as to arouse nursing students' thinking, stimulate their empathy and improve their humanistic literacy. This teaching method is able to enhance learners' emotional intelligence and enable them to better understand patients' emotional states, thus providing more humane and personalized care.

4.1.2 Innovate teaching forms to improve teaching quality

The research indicates that the application of multi-form teaching methods and teaching resources in nursing teaching can improve the professional theoretical level and operational level of nursing students, and strengthen the identity of nursing students to teaching methods, so as to obtain higher satisfaction with teaching quality. In the process of nursing teaching, intelligent classroom is established by means of Internet platform and other forms, and narrative scenario simulation teaching is carried out,

which enriches the teaching form and makes it easier for students to understand abstract nursing knowledge, thus enhancing the enthusiasm and initiative of nursing students in learning and making classroom teaching lively and interesting^[11]. Traditional nursing teaching pays more attention to the imparts of knowledge points and teaching results, ignoring the emotional experience of nursing students and the training of clinical thinking. Through the development of narrative education, nursing students can deeply understand the emotional experience of the service objects, deepen their understanding of nursing work, and apply the knowledge to analyze and solve the problems they face, so as to achieve the expected teaching effect^[12]. The typical clinical cases provided in the “wisdom classroom” teaching can help students apply theoretical knowledge to solve clinical practical problems, organically combine theoretical knowledge with clinical practice, create clinical nursing scenarios for nursing students, and enable students to experience clinical nursing scenarios immersive in class, improve learning interest and enthusiasm. The “wisdom classroom” teaching has laid a good foundation for students to engage in clinical nursing work in the future, and cultivated high-end nursing talents suitable for the development needs of modern clinical nursing.

4.1.3 Deepen nursing students’ understanding of nursing work

Nursing work involves a wide range of contents, a large number of service objects, the situation is more complicated, and the corresponding problems are also more. Because nursing students have not systematically accepted the situational teaching with practical significance, they can not understand nursing work well. For example, in nurse-patient communication, patients may ignore the feelings of nursing students due to illness or emotional factors, and nursing students may not understand their own work, have a sense of loss, show taciturn, inattention and other situations, and even have certain wavering about their future career development^[13]. Therefore, nursing education should be strengthened during school study. Role-playing of narrative education can strengthen nursing students’ subjective feelings, improve their cognitive level of practical work, stimulate empathy for patients and their families, give them more humanistic care, and make patients feel cared for, supported, and not lonely. It is helpful to build harmonious nurse-patient relationship.

4.1.4 Cultivating nursing students’ narrative ability is conducive to nurse-patient communication

In clinical work, nurses have the most contact with patients, and it is easier to detect the mental changes and

needs of patients. Conflicts between nurses and patients sometimes occur because the nurse does not understand and respond well to the patient. If the narrative ability of nursing students can be cultivated, nursing students can realize effective communication between nurses and patients in nursing practice in the future. Through communication, nurses can find the needs and difficulties of patients in time and constantly reflect on their nursing behaviors, which will greatly promote the development of nurse-patient relationship in a better direction. Therefore, it is a general trend to cultivate the narrative ability of nursing students and clinical nurses, but at present, there is no standardized teaching mode for this problem in China, which requires relevant researchers to increase research efforts and build a teaching mode for cultivating the narrative ability of nursing staff as soon as possible.

4.1.5 Simplify the complex to improve teaching efficiency

Nursing involves many concepts and theories, and teachers will get half the result with twice the effort by using traditional teaching methods. The teaching goal of nursing is to realize the transformation of “theoretical knowledge” - “thinking activity” - “concrete behavior”, that is, the application of knowledge and skills. For example, when describing the “manifestations of asphyxia” in the care of patients with massive hemoptysis, the text description in the book is “manifested in the process of massive hemoptysis, the sudden reduction or termination of hemoptysis, shortness of breath, chest tightness, restlessness or tension, fear, sweating, blue face, and severe consciousness disorders.” Through the use of narrative education, by playing “elevator accident”, students can see the people trapped inside from breathing difficulties to suffocation, and can easily “imprint” the performance of suffocation in students’ minds. Therefore, through film and television works, narrative education can simplify the complex, get twice the result with half the effort, and significantly improve the teaching efficiency.

4.1.6 Exercise nursing students’ practical ability of clinical nursing

Narrative education method is applied to clinical teaching to help students accumulate clinical experience and lessons, improve nursing interest and comprehensive quality of nursing students. In the clinical teaching of undergraduate nursing interns, nursing students are required to watch and read relevant movies or literary works, and are encouraged to communicate with patients and write reflective diaries. After three weeks, assessment and evaluation are carried out. This narrative teaching method has improved nursing students’ interest in learning and greatly

improved their theoretical knowledge and clinical skills. On the basis of traditional teaching methods, narrative education method is added to implement narrative education strategy for nursing undergraduates who enter the operating room for practice, and the corresponding clinical narrative materials are told to nursing students according to different stages of practice, so as to cultivate the caring ability and practical operation ability of interns.

4.2 Application strategies of narrative education

4.2.1 Select appropriate materials to design lesson plans

Before class, teachers select materials suitable for the teaching theme, provide important knowledge points of the course, and let students collect relevant content by themselves and recall their life experiences and stories. According to these materials, teachers can design teaching programs on the basis of these materials, so that students can deepen their understanding of the subject^[14].

4.2.2 Establish a nursing narrative education team

The application of different courses requires different materials. Therefore, to carry out narrative education, it is necessary to collect, organize and summarize materials. Therefore, it is necessary to establish a nursing narrative education team. Regarding the application form and effect of narrative education, we should carefully study and explore from the perspectives of teachers' teaching and students' learning, strive to practice, and pursue better teaching process and results^[15].

4.2.3 Introduction of themes to create nursing situations

The teacher draws out the question through the guidance language, and renders the atmosphere of the class through the language in a timely manner, so that the students can quickly enter the state. By playing pictures and videos, appreciating literary works or telling stories, the materials can be presented, and students can role-play specific situations to create situations similar to the real world, so that students have a more profound experience.

4.2.4 Teachers and students discuss and exchange views

After presenting the material in different ways, the teacher sets questions for the students to ask and guides the students to think. Students are encouraged to ask questions and state their opinions. Students can express their opinions and debate freely, and teachers can participate in discussions when appropriate. The collision of thinking between students can deepen their existing understanding and promote the generation of new thinking^[16]. Moreover, the implementation of narrative education requires

teachers to prepare narrative materials in advance. In the process of narration, teachers need to design appropriate narrative methods, narrative discourse, and give narrative materials with personal emotion and value orientation; It is necessary to design and lay out a narrative environment of equality, cooperation, mutual trust and mutual respect. Therefore, narrative education gives teachers new teaching ideas; Narration education enriches teachers' teaching experience and improves their teaching level. In the process of data collection and literature review, the teachers' scientific research ability has been exercised.

4.2.5 Summarize and share self-reflection

After students think and discuss, teachers should guide students to combine their own actual experience with the teaching theme, self-reflect, and share everyone's thoughts and insights. Teachers should make use of clinical practice opportunities to guide students to apply the knowledge and ability acquired in narrative education to real clinical nursing work.

4.2.6 Creating an educational mode conforming to the nursing characteristics of our country

The development of narrative education in our country has just started, the narrative materials are not extensive and fresh, lack of creativity, and mainly rely on western art works. In the past nursing narrative education, teachers used foreign literary works for reference. Due to the different cultural background and ideology, students sometimes could not understand the profound meaning of these materials, which led to the failure of teaching purpose. Therefore, in the future, we should combine the characteristics of our culture and nursing disciplines, and establish a resource base of nursing narrative materials with Chinese characteristics. In addition, the teacher construction and teaching evaluation system of nursing narrative education are still not perfect, which requires nursing researchers to learn from foreign experience and create teachers and quality evaluation tools that meet the needs of our society.

To sum up, the use of narrative education in wisdom classroom mode in nursing teaching can significantly improve the clinical nursing ability of nursing interns, exercise their clinical thinking, improve their assessment scores and teaching quality satisfaction, and contribute to the cultivation of excellent quality of humanistic care of nursing interns. In order to promote the further development of information technology in nursing education, And train high-quality nursing professionals to meet the needs of modern nursing.

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Design Framework and Practice of STEM Interdisciplinary Project-based Teaching Activities Based on OBE Concept

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ARTICLE INFO

Article history

Received: 15 October 2024

Accepted: 23 October 2024

Published Online: 30 December 2024

Keywords:

STEM

Interdisciplinary study

Project-based teaching

Design framework

ABSTRACT

Interdisciplinary learning is the core feature of STEM education. Interdisciplinary course and the cultivation of comprehensive practical ability have become one of the hot spots in today's educational reform. The practical approach of STEM education points to the comprehensive application of interdisciplinary knowledge. Based on STEM, this paper adopts the teaching mode based on STEM to design the framework of STEM interdisciplinary project-based teaching activities, which is applied in the course of "Primary School Information Technology Activities and Competition Topics" to lay a foundation for cultivating interdisciplinary excellent primary school general teachers with "integration of specialties and abilities".

1. Introduction

Interdisciplinary learning is the core feature of STEM education. Interdisciplinary course teaching and the cultivation of comprehensive practical ability have become one of the hot spots in today's educational reform. In 2016, the Ministry of Education of China clearly stated in the *13th Five-Year Plan of Educational Informatization* that qualified areas should actively explore the application of information technology in new educational models such as "creating space for all", interdisciplinary learning and maker education. In 2017, the Ministry of Education issued the *Science Curriculum Standard for Compulsory Education Primary Schools*, which advocated interdis-

ciplinary learning and suggested that teachers could try STEM education in teaching practice. In July, 2020, the Ministry of Education issued the *Guiding Standards for Training Courses for Primary and Secondary School Teachers*, which incorporated STEM courses and development into the theme of teachers' cultural knowledge learning and training, highlighting the important position of STEM education. *The 2022 edition of the Curriculum Standard of the Ministry of Education* strengthens the comprehensiveness and practicality of the curriculum, promotes the reform of education methods, and focuses on cultivating students' core literacy. Especially in the compulsory stage of "Information Technology" course clearly put forward the interdisciplinary teaching theme,

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and cultivating a new generation of high-quality STEM teachers is the key to practice STEM education concept and implement STEM project-based teaching design and practice. In this paper, through the construction of STEM interdisciplinary project-based teaching activities design, the application and practice of training professional courses for general normal students are analyzed, and high-quality teachers with interdisciplinary teaching ability are cultivated.

Design of STEM Interdisciplinary Project-based Teaching Framework

The current interdisciplinary mode is quite different from the previous traditional single-discipline training mode, especially the form of knowledge has gradually changed from single to integration. From the perspective of “purpose-means”, interdisciplinary curriculum aims at obtaining interdisciplinary thinking, takes interdisciplinary concepts and methods as means, and takes solving real problems as intermediary.

In this study, interdisciplinary refers to the practical activities of integration, learning, practice and application of information technology and science education based on STEM and multidisciplinary in primary schools. By means of interdisciplinary concepts and methods, interdisciplinary curriculum design is carried out by using information technology and skills, and the problem of integration of training specialties and abilities of general teachers in primary education majors is solved.

The practical approach of STEM education points to the comprehensive application of interdisciplinary knowledge. In the curriculum design, the teaching mode based on STEM is adopted to design the subject curriculum, and the interdisciplinary teaching process of “learning-practice-application” is constructed from the aspects of teaching objectives, teaching contents, teaching processes and teaching evaluation, and the inquiry teaching activities are constructed in a project-driven way.

In the process of implementing knowledge transfer in practice through project-driven learning, students are progressively promoted to learn curriculum knowledge (Lego Robot, Scratch Creative Programming, etc.) at three levels of “cognition-internalization-practice”, which provides support for the development of primary school mathematics, primary school Chinese, primary school English and other courses (which are determined according to students’ career planning), and promotes the traditional teaching classroom to student-centered participatory teaching. After the course, the teaching effect of the course is fed back by the student evaluation form for project evaluation and feedback.

To design and implement STEM interdisciplinary course teaching, we should consider the systematicness of subject knowledge, the rationality of solving practical core-driven problems, and the integration degree between project implementation and subject knowledge penetration, so as to finally realize the mutual integration and support between the systematicness of the overall knowledge structure and the learning contents contained in various problems. This study puts forward STEM interdisciplinary project-based teaching activity design framework, around the four aspects of teaching objectives to achieve, carry out eight-step project-based teaching, from the learning layer to the application layer step by step.

2.1 Problem introduction

According to the teaching content, teachers build a situation based on real application, so that students can understand what kind of situation they will study and explore. Giving students the role or identity of future teachers is helpful to improve students’ enthusiasm and initiative in learning.

2.2 Set goals

This part is designed around the three-dimensional goal of knowledge, emotion and values in order to let students know the effect to be achieved after the implementation of the project before entering the project, the setting of each project goal is set around the teaching content of this part.

2.3 Project task

Project tasks start from the teaching tasks to be achieved in the course and the scientific knowledge that students should master, and select topics from the perspective of practical application, so as to help students establish the relationship between subject knowledge and real application, focus on core-driven problems, and the core-driven problems designed by teaching should cover multiple dimensions. The problem involves the knowledge principle related to the field of study, which can stimulate students’ motivation and encourage them to explore and learn. Its structure should be open and real, so as to help students produce ideas in the existing knowledge field. It is convenient for students to disassemble the core driving problems and lay the foundation for the next step of learning.

2.4 Information analysis

According to the project task, the process of students participating in project learning is actually learning

In the process of students' independent scientific inquiry, students are guided to analyze themselves in this link, so that students can analyze the subject knowledge involved in completing the project tasks, the key technologies and experiences in solving problems, and what knowledge they have mastered and what knowledge points need to be acquired when completing the project learning.

2.5 Make a plan

The student-centered inquiry teaching activity of the project is that students form a learning team and formulate an implementation plan according to the project tasks on the basis of fully understanding the project objectives and self-learning analysis. This part is the general guidance and program of the project implementation link.

2.6 Project implementation

Project implementation is a process in which students are the mainstay and teachers guide students to practice. This part is a link in which theory and practice are combined and real hands-on operation is carried out.

2.7 Outcome evaluation

Results evaluation is mainly carried out from multiple angles, such as students' self-satisfaction in completing projects, mutual evaluation among group members and groups, and teacher evaluation. Through multiple evaluations, students can be helped to improve their awareness and feedback on self-learning and enhance their sense of self-efficacy.

2.8 Effectst

The setting of this link allows students to summarize and reflect on the contents that need to be improved in the project itself, so as to make corrections and feedback and iterate through the curriculum development project.

3. Practice of STEM Interdisciplinary Project-based Teaching Activities

3.1 Basic situation of activity practice

In practice, STEM interdisciplinary project-based teaching activity design framework is applied to the teaching of *Information Technology Activities and Competition in Primary Schools*, which involves 181 students in 6 classes of 19 grades. Through the method of question-

naires to students before and after class survey, the current situation and needs of students survey and analysis, targeted to carry out teaching work.

Taking interdisciplinary as the breakthrough point, taking scientific and technological knowledge as the means (scientific skills include scratch programming technology, Lego robot, Misch, Maker, etc.), setting curriculum content, carrying out skill knowledge teaching in the form of project-driven, carrying out practical drills with interdisciplinary comprehensive teaching application, and combining with students' career planning needs, finally completing STEM-based interdisciplinary teaching case development of primary school mathematics, Chinese, English, science, art, sound and other related courses, enhancing students' interdisciplinary innovative teaching ability.

3.2 Activity implementation process

The implementation process of the activity starts with solving the problem of fixed-point parking, completes the learning of programming knowledge of Lego robot knowledge, and completes the project learning by using the comprehensive application of mathematics, engineering, science and technology in STEM, which is transferred to the teaching of primary school mathematics curriculum and develops interdisciplinary teaching cases. As shown in Table 1:

3.3 Activity effect and reflection

In order to test the effect of STEM interdisciplinary project-based teaching activities, in the research process, the classroom effect is evaluated by the learners' learning and feeling as the evaluation lever, and the pre-class and after-class questionnaires are used to evaluate and test. The pre-class questionnaires are arranged after the first class, and the learners have an initial comprehensive understanding of the curriculum objectives, contents, requirements and introduction. After-class questionnaires are conducted after the students finish this course. By comparing the data of the questionnaires before and after class, STEM interdisciplinary project-based teaching activities have better improved the students' effect. Do you know anything about this course? Are you afraid of difficulties in this course? The results of 181 students who participated in the survey are shown in Figure 4. At first, the students did not know much about this course and were afraid of learning difficulties.

Table 1. Design of fixed-point parking project and teaching case

Project: fixed-point parking project and teaching case design

(1) Introduce problems and constructing project scenarios	<p>Introduce fixed-point parking from life, and work with students to determine the practical problems to be solved in the project. Interdisciplinary knowledge: Mathematics, learn to use mathematical thinking and tools (ruler) to solve problems in engineering; Engineering, building a fixed-point parking project for cars, and carrying out practice with reasonable division of labor; Technology, using LEGO technology to solve core problems, complete the production and testing of the project.</p>
(2) Determine the goal and explore the effectiveness of the project	<p>Knowledge: Learn the basic theoretical knowledge of Lego and apply it to practice; Learn the interdisciplinary teaching design of STEM and master the significance of the application of measurement in the project Skills: Able to build the car structure according to the requirements to ensure normal operation; Be able to program and control the operation and parking of the car, transform and transfer what you have learned, and design teaching cases Literacy: Comprehensive application and interdisciplinary innovation ability</p>
(3) Project tasks, focusing on core-driven issues	<p>How to use STEM interdisciplinary knowledge to complete the project of solving fixed-point parking and develop and write teaching cases? LEGO hardware and programming environment and meter ruler, which need to stop at fixed points and transform into STEM interdisciplinary teaching cases</p>
(4) Information analysis	<p>Known question: How to measure? What are the functions of the circumference of wheels? Knowledge about the distance of primary school mathematics Question to know: How to apply Lego programming software? How to construct the structure of the car. How to use what you have learned to develop STEM interdisciplinary teaching projects.</p>
(5) Make a plan of autonomous learning, that is, what should I do	<p>Make overall design methods; Build car hardware; Write software; Test project; Evaluate intergroup; Improvement and promotion</p>
(6) Project implementation	<p>Guide the students to decide the fixed-point parking scheme of the car by using mathematical knowledge without sensors Build the hardware structure of the car according to the scheme Write a program, which mainly sets the driving mode and power of the motor, and determines the running parameters of the electrical connection by calculating the circumference of the wheel and dividing the total distance by the circumference of the wheel Complete the whole design by testing and correcting the parameters Transform the results and develop teaching cases</p>
(7) Achievement evaluation, multi-evaluation of the project	<p>By demonstrating my own project achievements and teaching cases, make personal evaluation * 25% + group mutual evaluation * 25% + teacher evaluation * 20% + user evaluation * 30%, and make overall evaluation on the project effect.</p>
(8) Summarize and reflect on the problems encountered in the project and the improvement methods	<p>After completing the practical project application, it is transformed into STEM interdisciplinary project-based teaching case design</p>

4. Conclusion

“STEM interdisciplinary project-based teaching activity framework, combine subject teaching with professional development, improve students’ ability to solve

problems and comprehensive application of interdisciplinary knowledge, and truly apply what they have learned. Exploratory teaching activities are being implemented in a project-driven way, and the progressive learning of subject knowledge is realized, which is applied in the course

of” *Primary School Information Technology Activities and Competition Topics* “, laying a foundation for cultivating interdisciplinary excellent primary school general teachers with” integration of specialties and abilities “.

Fund Project

Exploration and Practice of Interdisciplinary Teaching Mode in the Course of Information Technology Activities and Competition in Primary Schools, BUU, JJ2021Z001

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The Impact of AIGC on the Design Process of Cultural and Creative Education Products and Its Management Implications

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ARTICLE INFO

Article history

Received: 1 December 2024

Accepted: 18 December 2024

Published Online: 30 December 2024

Keywords:

Educational Management

Cultural and Creative Education Products AIGC

Cultural and Creative Education Products

Design Process

Educational Management

Data Analysis

ABSTRACT

Cultural and creative education products play a crucial role in modern education, as they can enhance students' creativity and cultural understanding. In the field of cultural and creative product development, Artificial Intelligence Generated Content (AIGC) has not yet been maturely applied, while data-driven design methods can achieve personalized and efficient design outputs, thus facilitating the creative generation and rapid iteration of AIGC. This study aims to explore the application of AIGC in the development of cultural and creative education products, and to form a future-oriented design process transformation in combination with rapid output of data analysis. By building a database of cultural elements and user preferences related to educational aspects in cultural and creative education products, training the AIGC system using machine learning technology, and submitting the design drafts formed in the near term to designers for further optimization, the product is finally subjected to user feedback and market testing, with products that are highly accepted by users as the final output. The research results show that the use of AIGC can not only promote innovation in cultural and creative education products, improve design efficiency and product diversity, but also inspire more creative inspiration for designers. The advantage of data analysis further enhances the accuracy of product development and market response speed, achieving effective transformation of the design process. Moreover, this research provides valuable references for educational management in terms of resource allocation and curriculum design.

1. Introduction

AIGC is both a category of content classified from the perspective of content producers and a method of content production. It involves generating text, images, music, videos, etc., automatically or semi-automatically through artificial intelligence, gradually changing the landscape of cultural and creative product development. With rapid progress in fields such as deep learning, natural language

processing, and computer vision, AIGC technology has achieved significant accomplishments in text generation, image creation, music production, and video generation. Especially in cultural and creative product development, AIGC not only provides designers with innovative design tools, accelerating the generation and iteration of creative drafts, but also further broadens new paths for cultural dissemination.

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2. Application of AIGC in Cultural and Creative Product Development

Introducing AIGC technology into the development process of cultural and creative products covers a wide database of cultural elements and user preferences, precise training of the AIGC system, and the use of this system for the preliminary generation and subsequent optimization of design drafts. This process not only significantly improves the efficiency and personalization of design work but also injects deeper levels of innovation and diversity into the development of cultural and creative products. Through these operations, the automation and semi-automation of the design process are realized, not only improving design efficiency but also promoting the generation of personalized design products, reflecting the intelligent transformation of the design process. At the same time, it further broadens the development boundaries of the cultural and creative industries, bringing fundamental changes to traditional design methods.

2.1 Building a Database of Cultural Elements and User Preferences

At the initial stage of cultural and creative product development, building a database containing rich cultural elements and user preferences is key. This database can collect data from multiple channels, including historical documents, artworks, popular culture, and user research data. The cultural elements part focuses on recording representative symbols, patterns, colors, shapes, etc., while the user preferences part is based on market research, collecting the likes and needs of different user groups for cultural products. The database construction method usually involves data mining and machine learning technologies to ensure the accuracy and diversity of the data. Moreover, by regularly updating and maintaining the database, the AIGC system can capture the latest cultural trends and changes in user preferences.

2.2 Training and Application of the AIGC System

After building the database of cultural elements and user preferences, the next step is to use these data to train the AIGC system. This process usually involves choosing the right machine learning model, such as deep learning networks, and then training these models with the collected data. The training goal is to enable the AIGC system to understand different cultural elements and user preferences and learn how to integrate these elements into creative designs. The practical application of the AIGC system widely covers various fields of cultural and creative products, including but not limited to the creation of visual

artworks, the design of personalized goods, and the generation of interactive media content. In these applications, the AIGC system can not only quickly generate a large number of design drafts but also learn and optimize itself based on user feedback, further improving design quality and innovation.

2.3 Generation and Optimization of Design Drafts

After the AIGC system generates preliminary design drafts, these drafts usually need to go through manual review and optimization. Designers play a crucial role in this process, based on their professional knowledge and experience, as well as their understanding of the target market, to adjust the details, correct the style, and deepen the cultural elements of the AIGC-generated drafts. The optimization process also includes user testing, collecting feedback from the target user group on the drafts, which is used to further adjust the design. In addition, designers and market analysts can use user feedback data to update the user preference database, allowing the AIGC system to more accurately meet user needs in future design tasks.

3. Data Analysis and Design Process Transformation

3.1 Application of Data Analysis in Creative Generation

The application of data analysis in the design process, especially in the creative generation stage, provides designers with a rich source of creative inspiration by deeply mining data on user preferences, market trends, and cultural elements. By analyzing a large amount of user data through algorithms, subtle changes in user needs can be identified, and future design trends can be predicted, thereby guiding the direction of creative design. In addition, data analysis can also help the design team assess the potential impact of different design solutions, choosing more attractive or innovative design solutions for iteration and optimization through comparative analysis.

3.2 Panoramic Transformation of Cultural and Creative Design Process

In the rapidly changing creative field, technological progress is not only an innovation of tools and methods but also a profound transformation of design thinking and creative methods. The combination of data analysis and Artificial Intelligence Generated Content (AIGC) technology reshapes the landscape of cultural and creative product development, constructing a more efficient, personalized, and innovative design process (as shown in Figure 1).

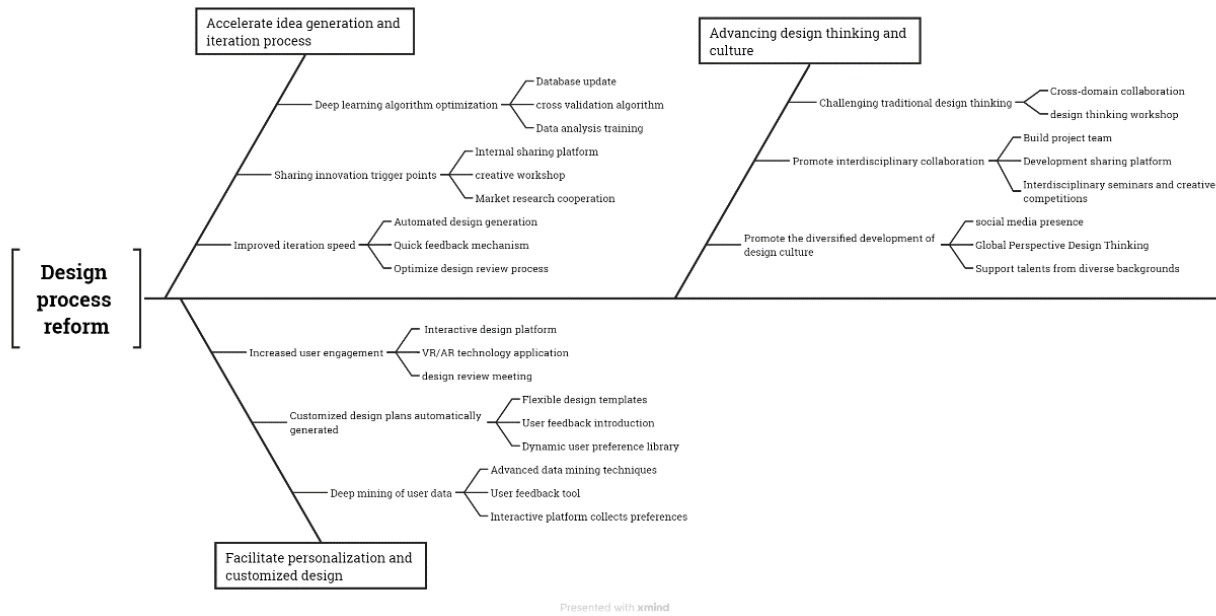


Figure 1. Cultural and Creative Product Design Process Changes

(1) Accelerate the creative generation and iteration process

By utilizing deep learning algorithms to analyze historical data, market trends, and user behavior, data analysis can reveal hidden user needs and preferences, providing designers with new creative triggers. These insights prompt designers to think from multiple perspectives, inspiring innovative design thinking. Combined with AIGC technology, a large number of design variants can be generated in a very short time, significantly improving the speed and accuracy of iteration.

(2) Promote personalized and customized design

The application of data analysis makes personalized design for specific market segments and individual users possible. By deeply analyzing user data, the design team can accurately capture the unique needs and preferences of each user, and AIGC technology generates personalized custom design solutions based on this information, enhancing user engagement and satisfaction, forming a more interactive and participatory design process.

(3) Drive the advancement of design thinking and culture

Data analysis and AIGC technology challenge traditional design thinking models together, prompting designers to explore a data-driven creative process. This new design thinking model not only values intuition and experience but also emphasizes the importance of data insights and technological support. In addition, this transformation promotes interdisciplinary cooperation, such as close collaboration between data scientists, AI engineers,

and designers, bringing new perspectives and solutions to design problems and pushing design culture towards diversification and inclusiveness.

This study explores the integration of Artificial Intelligence Generated Content (AIGC) technology and data analysis in cultural and creative product development, demonstrating how this technology combination can drive innovation in the design process. By establishing a database covering a wide range of cultural elements and user preferences, and applying machine learning technology to train the AIGC system, the effectiveness of AIGC technology in improving design efficiency, accelerating the creative generation and iteration process, and promoting personalized and customized design development is further demonstrated. This finding emphasizes the importance of combining AIGC technology and data analysis to promote the advancement of design thinking and cultural innovation, providing a new development path for cultural and creative product development and challenging traditional design methods. As AI technology continues to advance, AIGC will play an increasingly critical role in cultural and creative product development. Therefore, further exploration is needed on how to effectively integrate these technologies, strengthen user participation, and promote interdisciplinary cooperation to drive innovative development in the cultural and creative industry.

4. Conclusion

In conclusion, this study on the application of AIGC in cultural and creative education product design process

transformation holds significant implications for the field of education. It highlights the potential of integrating advanced technologies with educational practices to enhance learning experiences. As educational institutions strive to adapt to the digital age, understanding such design process transformations becomes crucial for effective curriculum development and resource management. Future research should focus on further exploring the long-term impact of AIGC on students' learning outcomes and how educational management can be optimized to fully leverage these technological advancements. This will ensure that cultural and creative education products not only meet the aesthetic and functional requirements but also contribute to the holistic development of students in an increasingly technology-driven educational landscape.

Fund Project

2024 University Teachers Innovation Fund Project: Research on Decoding and Differentiated Innovation Strategies of Dunhuang Cultural and Creative Symbols under IP Cross-border Collaboration Background; 2023 Northwest Normal University "Course Ideological and Political Education" Demonstration Construction Project: Demonstration

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Innovative Research on Curriculum Design of Intangible Cultural Heritage Skill Activation and Art Practice

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ARTICLE INFO

Article history

Received: 30 October 2024

Accepted: 8 November 2024

Published Online: 30 December 2024

Keywords:

Intangible cultural heritage education

Documentary film making

Arts curriculum design

cultural adaptation

Innovation dissemination

Toulmin model

Symbolic interaction

Zhuma culture

ABSTRACT

This study takes as a case study the Zhuma culture of the ancient city of Yongning in Beijing to explore the crucial role of documentaries in intangible cultural heritage (ICH) education. As an audiovisual medium, documentaries can convey the core values of intangible cultural heritage skills through multisensory narrative methods, enhancing the depth and breadth of cultural heritage. Based on cultural adaptation theory and innovation diffusion theory, this paper proposes an innovative framework for incorporating documentaries into the design of arts education curricula, promoting the integration of traditional skills and contemporary artistic expressions through modern audiovisual technology. Combining symbolic interaction theory and Toulmin's argumentation model, this paper shows how to strengthen students' cognitive and critical thinking skills regarding the connotations of intangible cultural heritage through argumentation structures. The paper concludes that documentaries not only provide a practical pathway for the modern inheritance of intangible cultural heritage skills, but also offer effective theoretical support for innovation and curriculum design development in higher arts education.

1. Introduction

In the context of the rapid development of artificial intelligence and digital technology, the reorganization of classrooms to introduce advanced teaching methods has become an important issue. Curriculum design plays a decisive role in this transformation process, not only influencing the speed of students' absorption of professional content, but also the adaptability of teacher-student interaction. The case of "Art Practice Course - Taking Zhuma Culture in the ancient city of Yongning as an example" shows that curriculum design depends on both

technological optimization and its cultural foundations: art teaching centers, learning party construction and caring for intangible cultural heritage. In recent years, with the development of new-quality productive forces, building a powerful country in higher education from the perspective of new-quality productive forces must pay attention to cultural heritage and innovation^[2]. This study aims to provide practical insights and explore how to promote the activation of intangible cultural heritage competencies through digital transformation and provide an effective curriculum design solution for the specialization in digital media art majors in colleges and universities.

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2. Activation of intangible cultural heritage competencies and curriculum innovation

2.1 The combination of intangible cultural heritage and audiovisual art

The transmission of Intangible cultural heritage is a complex cultural project that requires multiple ways to ensure its continuation in modern society. In domestic and foreign research, the protection of intangible cultural heritage focuses mainly on cultural policies, legal protections, and cultural education. Here, the discussion is mainly from the perspective of combining intangible cultural heritage and the audio-visual art form of documentary filmmaking.

Audio-visual art plays a crucial role in the inheritance of intangible cultural heritage. Through the combination of sight and hearing, it can more intuitively convey the cultural connotations of intangible cultural heritage skills and promote their activation and inheritance in modern society. Audiovisual art can fully show the intrinsic value of intangible cultural heritage skills through narrative structure and symbol construction, making the transmission of its cultural connotations intuitive. For example, "The Power of Inheritance," which won the China Documentary Association's "Best Intangible Cultural Heritage Documentary" award in 2021, focuses on intangible cultural heritage projects in different regions of China. The documentary reflects the interaction and dialogue between heirs, audiences and production teams. Through cooperation with different platforms, it realizes cross-border marketing and dissemination of intangible cultural heritage IPs, fully showing the intrinsic value of intangible cultural heritage skills. The intervention of film and television art provides new means for the protection of intangible cultural heritage competencies, presenting them to the public in a more vivid form. For example, "The Temperature of Crafts," which won the "Best Humanities Documentary" award at the International Documentary Film Festival (IDFA) in 2022, records the cultural connotations and emotional values behind crafts through international cooperation and cross-cultural exchanges in different countries. The delicate language of the lens and emotional storytelling make intangible cultural heritage skills come alive. Audiovisual artworks not only record the details of intangible cultural heritage skills, but also integrate traditional skills into the modern context through artistic processing and narrative functions, promoting the activation and legacy of intangible cultural heritage. For example, "Traces of Time," which won "Best Documentary" at the China TV Golden Eagle Award in 2023, records the inheritance process of multiple intangible cultural heritage projects in

China. This documentary adopts a multi-angle and multi-level narrative method, excavates the depth of content and value of intangible cultural heritage, and provides spiritual comfort and cultural nourishment to the audience through delicate images and emotional narratives, allowing traditional skills to be reconstructed and activated in the modern context.

2.2 The application of documentaries in intangible cultural heritage education

Documentaries play a bridging role in intangible cultural heritage arts education. Through visual storytelling and actual recording, they can deeply convey cultural connotations and enhance audiences' cultural identity and activation of intangible cultural heritage skills. Documentaries capture the details of intangible cultural heritage through visual storytelling, enabling audiences to gain a deeper understanding of cultural context and heritage. For example, in Garcia's (2019) research, documentaries influence cultural identity through narrative strategies and promote students' understanding of intangible cultural heritage^[10]. Documentaries strike a balance between art and authenticity, have both entertainment and educational significance, and inspire public interest in traditional skills. For example, the production of "A Bite of China" not only attracts a large number of viewers with its vivid visual representation and rich informational content, but also enhances their attention to traditional Chinese food culture and the skills behind it. Documentaries enhance the perceptibility of culture through the strategy of amplifying individual experience and subjective memory and are suitable for application to intangible cultural heritage inheritance. Thompson (2022), for example, analyzed how to use documentaries to promote education and cultural heritage. Through the expression of individual experience, audiences can perceive more deeply the humanistic emotions and historical depth contained in intangible cultural heritage^[11].

It is not difficult to understand the multiple values of documentaries in the dissemination and education of intangible cultural heritage. They not only provide an exhibition platform for traditional skills, but also offer new opportunities for audiences to deeply understand and participate in traditional culture.

3. Case study: The integration and practice of Zhuma culture in the ancient city of Yongning, Beijing, and the design of art education curriculum

As an important means of cultural heritage, art edu-

cation has a wide range of applications in modern society. Its main goal is to stimulate students' creativity and cultural identity. The American model of K-12 design education particularly emphasizes the stimulation of students' creativity in daily life through problem-solving and life-oriented teaching methods. This model is similar in goals and methods to the Intangible Cultural Heritage Skills Activation teaching model in China.

The Zhuma Culture Intangible Cultural Heritage Skills Activation Course in the ancient city of Yongning, Beijing, is a basic course^[3] with comprehensive and practical features. It is also a specific practice of this educational model. This project uses documentaries as a means of presenting traditional skills in a modern form, greatly enhancing students' understanding and ability to express intangible cultural heritage skills. Taking the documentary "Singing While Walking" as an example, this film records the process of inheriting Zhuma culture skills from the perspective of college students, showing the deep cultural connotations and emotional values of Zhuma culture. Unlike traditional recording methods, students are not just passive observers, but experience and participate in the process of inheriting intangible cultural heritage skills through interaction and filming. In the film, the boundaries between fiction, documentary and experimentation are blurred. There is a shift from external documentary to the presentation of "psychological reality" reflecting the inner world of the main creators^[1]. This practical education method offers new possibilities for the activation of intangible cultural heritage skills by combining traditional culture with modern film and television technology to form an effective interdisciplinary teaching practice.

In terms of curriculum design, the argumentative structure based on Toulmin's theory can effectively guide students' creation of documentaries.

3.1 Defining the thesis statement

At the beginning of the course, teachers should clearly define the central thesis of the documentary. For example, discuss how documentaries convey specific cultural or social information through visual storytelling. For example, the social value of Zhuma culture helps students establish the central picture of cultural heritage.

3.2 Provide evidence

Collect relevant cases and data as supporting evidence. Specific documentaries can be selected as objects of analysis to discuss how they use specific visual and auditory elements to strengthen the thesis. Using symbolic interaction theory, analyze the symbolic significance of Zhuma's

intangible cultural heritage and its impact on students' understanding. Through field evidence, such as the details of skills and the historical background of heirs, students can thoroughly explore the cultural connotations of intangible cultural heritage skills. As knowledge diplomacy in action, it promotes mutual water learning among civilizations. Respecting cultural and group differences as an inherent requirement, it establishes a culture of future-oriented higher arts education based on global common interests and social justice, thus contributing to the building of a community with a shared future for humanity^[4].

3.3 Establish assurance

Explain why this evidence can support the thesis. Discuss the unique advantages of documentaries in terms of cultural dissemination, authenticity and emotional resonance. Analyze successful cases of film and television education on intangible cultural heritage skills abroad. For example, the works of French filmmaker Agnès Varda highlight the interaction between individuals and society, culture and identity. Varda shows the integration of cultural self-reflection and modern society through the documentary form. This personalized and individual expression provides new narrative strategies for film and television of intangible cultural heritage skills. By learning Varda's works, students can more freely express their personal understanding and re-creation of culture, thus enhancing their ability of cultural expression in documentaries.

3.4 Supports and refutations

Gather additional supporting materials, such as academic literature or expert opinions, and consider possible counterarguments. For example, discuss the balance between the representation of reality and the artistic elaboration of documentary filmmaking. Guide students to question the challenges of traditional skills in modern society. This process stimulates students' innovative thinking and enables them to add modern elements in creation, promoting the innovative development of intangible cultural heritage skills.

3.5 Review and synthesize

Adapt the thesis or method based on student feedback or class discussions to ensure content coherence and logic. Summarize the learning outcomes of the course and emphasize how Toulmin's theory helps students gain a deeper understanding of the narrative structure of documentaries.

Through these steps, students can not only master the application of Toulmin theory, but also improve their

critical thinking skills in analyzing documentaries, better understanding and evaluating film and television works.

Finally, the wide application of digital technology offers new opportunities for the dissemination of intangible cultural heritage skills and also places higher quality requirements. With the development of technologies such as virtual reality and augmented reality, the forms of documentary filmmaking are gradually being transformed.

4. Research findings and discussions: Integration and innovation of documentaries and intangible cultural heritage skills

As an important tool for intangible cultural heritage (ICH) education, documentaries promote students' knowledge and inheritance of traditional skills. Through the creation and teaching practice of documentaries, Zhuma culture is reinterpreted in modern arts education. In the process of creation, students not only enhance their understanding of intangible cultural heritage skills, but also inject new vitality into traditional skills through innovative means. Documentaries provide a way of expressing intangible cultural heritage skills in the modern context, effectively realizing cultural activation and dissemination.

The process of participating in the creation of documentaries strengthens students' cultural identity and capacity for innovative expression. For example, by studying the traditional work "Zhaojun coming out of the border," students reinterpret the image of Wang Zhaojun in different historical and cultural contexts and explore the cultural expression of women in different periods. Although the epidemic has hindered the filming of new documentaries, this discussion has promoted students' reflection on traditional culture. The creation of documentaries helps students cultivate critical thinking and innovativeness in the interaction between audiovisual language and cultural symbols, and increases their confidence and identity in Zhuma culture.

Documentaries are not only a means of displaying intangible cultural heritage skills, but also an important practical tool of arts education. By combining theory and practice, documentaries provide students with rich learning experiences and promote innovation and development in arts education. In the future, with the development of digital technology, the application of documentaries in intangible cultural heritage culture will continue to expand, providing more opportunities for the inheritance and sustainable development of intangible cultural heritage skills.

5. Conclusions and recommendations

Taking Zhuma culture in the ancient city of Yongning

in Beijing as an example, this study thoroughly discusses the activation of intangible cultural heritage competencies and its innovative application in art practice curriculum design based on Toulmin's argumentative model, and then provides a new path for art education. By analyzing the role of documentaries in the legacy of Zhuma culture, the paper proposes curricular design strategies to promote innovation and development in arts education.

First, the study discusses the key role and influence of documentaries in intangible cultural heritage education, especially in the context of Zhuma intangible cultural heritage culture heritage in the ancient city of Yongning, Beijing. Through the activation process of audiovisual art, this article reveals how documentaries inherit, deconstruct and reconstruct intangible cultural heritage in modern society. This not only expands the methods of dissemination of Zhuma culture, but also shows its cultural adaptation and innovative expression in the contemporary context.

Second, on the basis of cultural adaptation theory, innovation diffusion theory and symbolic interaction theory, this paper proposes specific strategies for the application of documentaries to the design of arts education programs. These strategies emphasize the transmission of the core values of Zhuma culture through professional practice courses and artistic expressions, giving it new vitality in modern society. This kind of design not only enriches the content of arts education, but also provides strong support for the sustainable development of intangible heritage culture.

Finally, this paper provides a teaching method and practical case based on Toulmin's theory for film and television art education. This teaching method based on the argumentative structure not only helps cultivate students' critical thinking, but also stimulates their capacity for innovation in artistic creation, thus promoting the continuous innovation and development of art education.

In conclusion, this study not only provides new ideas for the inheritance and activation of intangible heritage culture, but also opens a new direction for the design and innovation of the arts education curriculum. Future research can further explore the application of documentaries to other intangible cultural heritages and expand their potential and value in arts education.

Fund Project

This research result is one of the phase results of the scientific research project "Report on the Development of New Media Artistic Creation" with contract number Jing Lian Yi (2023) 89. It is also one of the phase results of the teaching and research project with project number JJ2022Y046 "Integrated Project-Based." It is also one of the phase results of the teaching and research project with project number JJ2022Y046 "Integrated

Project-Based” for curriculum exploration and research. At the same time, it is the result of the 2023 “Morning Star” undergraduate student innovation and entrepreneurship project “Yongning Ancient City Cultural Exhibition.”

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A Study of Students' Informal Digital Learning of Foreign Language in the Context of Digital Transformation of Vocational Education

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ARTICLE INFO

Article history

Received: 7 November 2024

Accepted: 15 November 2024

Published Online: 30 December 2024

Keywords:

IDLFL

HVC students

Learning effectiveness of foreign language

Coping strategies

Digital learning resources

ABSTRACT

Against the backdrop of the digital transformation of vocational education, informal digital learning of foreign language (hereinafter referred to as IDLFL) is an emerging learning model with significant potential for enabling individualized and autonomous learning and improving workplace English proficiency among Higher Vocational Colleges (hereinafter referred to as HVC) students. This study explores how Chinese foreign language teachers in HVC perceive and understand HVC students' IDLFL. Primary data are collected through questionnaires and interviews, and qualitative analysis is conducted based on grounded theory to reveal effective ways to improve the foreign language learning outcomes of HVC students through IDLFL and the corresponding strategies that HVC language teachers should adopt. However, this study also emphasizes the need to be wary of overstating the impact and role of IDLFL in teaching practice.

In the wave of globalization, the mastery of foreign language by HVC students has become the key to enhance their career competitiveness. Learning foreign language not only enriches their vocational literacy and broadens their horizons of career development, but also is crucial to understanding international industry dynamics and grasping technological development trends. It also helps to deepen the understanding of multiculturalism, cultivate a tolerant mindset, and shape high-quality skilled talents with an international outlook.

With the rapid development of digital technology, IDLFL, with its flexibility, convenience, personalization and rich resources, provides a new learning platform for HVC students. This learning mode not only meets the learning habits of contemporary students, but also provides them with a broader learning space and a personalized learning

path. This study, from the perspective of HVC teachers, explores HVC students' awareness of IDLFL in the context of digital transformation of vocational education, and the impact of informal digital learning on students' learning effectiveness of foreign language.

1. Introduction

In the digital era, the deep integration of foreign language teaching in vocational education with digital technology has shown unprecedented vitality. HVC students in China can now conveniently access diversified digital foreign language learning resources such as microclasses, MOOCs, electronic textbooks and virtual simulation courses outside the classroom through mobile devices such as smartphones, tablet PCs or personal computers. These resources not only support the specialized training

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of language skills such as listening, speaking, reading and writing, but also promote the cultivation of comprehensive competence and the development of intercultural communicative competence oriented to practical work tasks. This kind of IDLFL complements traditional classroom learning and greatly enhances students' independent learning ability.

However, there are differences in students' and teachers' attitudes and perceptions of IDLFL, and these differences may have a significant impact on students' learning effectiveness of foreign language. Through online questionnaires and in-depth interviews, this study explores the multidimensional understanding of Chinese students' IDLFL, including its advantages, potential impacts, practical applications, and challenges from the perspective of foreign language teachers in HVC, with the aims of deepening the understanding of IDLFL in the field of foreign language education of vocational education and exploring its potential application in teaching practice, so as to guide teachers to develop more precise and effective teaching strategies and stimulate students' independent learning ability, and ultimately achieve the purpose of improving students' foreign language proficiency.

2. Literature review on Digital foreign language learning

With the rapid progress of digital technology, learning foreign language by digital means has become an inevitable trend. In recent years, there is no lack of research on students' digital learning by Chinese and foreign scholars. In the Chinese related literature, there are a large number of studies on mobile learning of foreign language based on WeChat public platform. Liu Lijun's study^[1] showed that as a supplement to English classroom teaching, the establishment of a second classroom with the help of the WeChat platform had a positive impact on college students' English learning emotions. Zhao Ying and He Kexiang^[2] conducted a study on three dimensions of the number of interactions, the design of activities, and the cultural environment in cross-cultural communication when using WeChat, to explore the effective ways of the depth of interaction. Ma Junbo and Ouyang Huhua^[3] found that WeChat voice chatting significantly promoted the development of vocabulary accuracy in spoken English. In addition, Luo Yixin^[4] analyzed the problems and obstacles in college students' mobile learning and put forward corresponding measures and suggestions. Xi Jing, Wang Jianhua and Zhang Haizhu's research^[5] on the influencing factors of college students' mobile learning of foreign language confirmed that mobile learning of foreign language could effectively promote learners' linguistic intelligence.

Qiu Xiaochun^[6] analyzed the connotation of mobile learning of foreign language and constructed a framework of evaluation indexes for the quality of mobile learning of foreign language. Meanwhile, Cheng Di, Cai Minjun and Zhao Xinyuan's research^[7] showed that teachers' teaching support had an important influence on students' online learning behavior.

In the English literature, Guangxiang Leon Liu and Yongliang Wang's study^[8] revealed the internal and external factors affecting teachers' attitudes and willingness towards IDLFL, which provided a reference for designing and adapting relevant training programs for foreign language teaching and foreign language teacher. Magdeline M. Temban and Tan Kim Hua^[9] used a mixed-methods research approach to study the safety of YouTube as an online learning platform for informal learning. Scholars such as Soyoof A.^[10] searched for IDLFL-related literature published between 1980 and 2019 in eight core databases such as Web of Science, and found that these literature explored the use of digital technology in informal foreign language learning environments. Soyoof A. emphasized that the application of digital technology in informal foreign language learning environments had a positive effect on improving foreign language learners' linguistic competence, affective and cultural literacy, and digital literacy, etc. He also put forward suggestions to further improve the diversity of research methodology, research objects, and research content.

In summary, it is evident that the national and international literature on teachers' perceptions, support and guidance for students' IDLFL is not well researched.

3. Research design

3.1 Research questions

This study, from the perspective of foreign language teachers in HVC, explores HVC students' attitudes towards IDLFL and analyzes their experiences and strategies in integrating digital learning resources and tools into their teaching practices, to support students' effective learning in IDLFL and to provide a theoretical basis and recommendations for improving foreign language teaching methods in vocational education. This study focuses on the following key research questions:

- (1) How do foreign language teachers in HVC perceive and understand their students' IDLFL?
- (2) What are the challenges and difficulties brought by IDLFL for foreign language teachers in HVC?

3.2 Research tools

In this study, data related to HVC foreign language

teachers' perceptions of their students' IDLFL are collected through an online questionnaire and semi-structured interviews.

The questionnaire is self-designed and consists of 47 questions covering teachers' attitudes, perceptions and practices of IDLFL among students. The questionnaire is distributed through the 'Questionnaire Star' platform. 175 valid responses are collected.

Purposive sampling is used to invite seven teachers for semi-structured interviews. Before the interviews, an interview outline is designed based on the research objectives and questionnaire results to ensure that the basic direction and purpose of the interviews are to be achieved while gaining a more in-depth understanding of the views, attitudes and behaviors of the interviewed teachers, as well as to provide more qualitative data for this study.

3.3 Data coding

Based on grounded theory, this study uses Nvivo 14 software to code and analyze the interview data. To ensure clarity and consistency of coding, the entire process is carried out by a single coder, which facilitates timely adjustments and optimization to ensure consistency of coding. To improve the accuracy and reliability of the coding, the coder conducts continuous review and validation.

4. Findings

4.1 Advantages of IDLFL

The interviewed teachers highly recognize the advantages of IDLFL and elaborate on its eight distinguishing features. These features include personalization, interactivity, facilitation, friendliness, flexibility, autonomy, pertinence and richness of resources. Specifically, teachers believe that IDLFL can meet the personalized needs of different learners and provide rich and diverse learning resources. During the learning process, it promotes interaction and collaboration among learners, which helps to improve the learning effect. At the same time, user-friendly interface of digital resources and flexible learning methods make the learning process more enjoyable and efficient. Most importantly, it can give learners greater autonomy and make learning more targeted, thus better meeting learners' personalized development needs.

4.2 Impact of IDLFL on self-directed learning abilities and learning outcomes

The teachers interviewed generally agree that IDLFL has a significant positive impact on promoting students' self-directed learning abilities and enhancing learning out-

comes under specific conditions. These conditions cover students' personal attributes, appropriateness of course contents, effective guidance from teachers, and richness of learning resources. First, students need to show a high degree of self-motivation, initiative and concentration, have a clear understanding of the learning objectives, and be willing to use digital tools for foreign language learning. Second, the difficulty of the course contents should be moderate and match the actual level of the students in order to stimulate their interest in learning. Furthermore, the role of teachers is also critical, as they need to encourage students to engage in digital learning outside the classroom, provide timely guidance, and assess students' IDLE. Finally, rich and easily accessible digital learning resources can greatly facilitate students' learning process.

This study further finds that when the four elements involving course contents, students, resources and teachers are properly arranged, IDLFL can greatly stimulate students' interest in learning, and bring fun to foreign language learning. Therefore, IDLFL then generates positive impacts in many ways. It helps to cultivate students' learning awareness and competence, stimulate students' initiative and participation, and improve their competence in listening, speaking, reading and writing. It also contributes to improving students' capability of practical application, time management, self-reflection and self-assessment.

4.3 Acceptance of IDLFL by students

In exploring students' acceptance of IDLFL, most teachers interviewed are optimistic, noting that students are naturally curious about new things and are quite proficient in digital skills. However, some teachers also raise their concerns that only a few students would actively engage in digital learning resources and tools if not explicitly instructed by their teachers; and that although students can easily access online classes and use digital tools, there is still a question mark as to whether such a way of learning is truly effective. Results of the questionnaire reveal the fact that about one-third of the teachers had reservations about whether their students would really embrace IDLFL.

4.4 Challenges and difficulties

When discussing the effectiveness of IDLFL, the teachers interviewed raise key challenges and dilemmas involving students, teachers and schools. These challenges not only reveal the current dilemmas faced by the field of higher vocational education in promoting and applying IDLFL, but also provide us with valuable clues to deepen

our research and optimize our strategies. Specifically, we cannot help but wonder: Are students sufficiently empowered to effectively implement IDLFL? Do teachers possess sufficient digital literacy and resources support to guide students to successfully engage in this new learning mode?

The teachers interviewed suggest that the greatest difficulty lies in stimulating students' interest, followed by developing digital literacy and competence, guidance and assessment, and screening resources.

5. Discussions

5.1 Challenges and strategies for students

The core of the efficient implementation of IDLFL is that students need to demonstrate a high degree of autonomy and self-discipline. However, the reality is that some HVC students lack the awareness and ability of self-directed learning, have difficulty in effectively planning and managing their learning time and progress, and tend to get lost in the vast digital learning resources. In order to effectively address this challenge, teachers should take on the role of a guide to help students learn independently by means of using digital tools, and focus on developing their plan-making and time management skills.

Specifically, teachers should clarify the goals and methods of independent learning outside the class, instruct students on how to make efficient use of fragmented time for learning, and continuously monitor their digital learning process to ensure the effective use of learning resources. This includes regularly assessing students' learning progress, providing personalized feedback and suggestions, and promptly answering questions encountered by students in the learning process.

In addition, teachers can also make use of modern communication tools, such as WeChat groups, to show students' learning achievements, which can not only enhance students' self-confidence and sense of achievement, but also promote learning exchanges and interactions within the classroom and create a positive learning atmosphere. Through these measures, teachers will be able to effectively improve the implementation of IDLFL and provide strong support for students' language learning.

5.2 Challenges and strategies for teachers

As the trend of digitalization of foreign language learning becomes increasingly significant, how should teachers in HVC proactively embrace and effectively respond to this shift with positive attitudes and practical strategies? In this regard, the teachers interviewed propose the following strategies.

First of all, teachers should hold an open and enterprising attitude and positively embrace digital changes. Facing digital foreign language learning, teachers must take the initiative to update their teaching concepts and deeply realize the revolutionary significance of digital learning in foreign language teaching. By actively learning and mastering various online teaching platforms, digital tools and applications, teachers should design innovative and effective digital teaching activities. In addition, they should continue to participate in professional training, seminars and other activities to continuously improve their digital teaching ability to cope with the requirements of the era of education informatization.

Secondly, teachers should implement refined management and diversified assessment strategies. In the informal digital foreign language learning environment, the direct supervision mode of traditional classroom is difficult to apply, and learning assessment also faces new challenges. To this end, teachers should design high-quality pre-class and post-class learning tasks and adopt diversified assessment methods, taking into account the learning objectives and students' actual situations. At the same time, they should make use of the learning data and analysis tools provided by digital platforms to track students' learning progress and performance in real time and provide them with accurate and personalized learning guidance.

Finally, teachers should focus on resource screening and matching to ensure the quality and efficiency of learning content. With the increasing abundance of digital learning resources, it has become a major challenge to screen out content that meets students' needs and is of high quality. To this end, teachers should have a high degree of information literacy and screening ability, and learn about the latest teaching resources and teaching methods by consulting professional websites and participating in academic seminars. Simultaneously, taking into account the characteristics of students' learning situation, they should select interesting and practical learning contents to stimulate students' interest and enthusiasm in learning and enhance the learning outcome.

6. Conclusion

Through questionnaires and semi-structured interviews, this study reaches out to a group of HVC foreign language teachers to collect and analyze their perceptions and practical experiences of IDLFL. The data are systematically coded and analyzed using the professional qualitative analysis software Nvivo14, aiming to uncover effective ways to promote IDLFL to enhance the foreign language learning effect of HVC students and to explore strategies for HVC foreign language teachers to cope with digital

foreign language learning.

The results of the data analysis show that HVC teachers generally recognize the advantages of IDLFL in enhancing students' learning outcomes and autonomy, while also focusing on students' acceptance of IDLFL, the need to integrate IDLFL into teaching and learning, as well as the challenges and difficulties encountered in the implementation of IDLFL.

For HVC students, the key to achieving efficient independent learning through digital means outside the classroom is to overcome doubts and resistance to digital learning, and actively accept and adapt to this new mode. They need to increase their autonomy and self-discipline, and manage their study time effectively to maximize the benefits of IDLFL. Teachers, on the other hand, need to change their traditional teaching concepts and continue to learn in order to improve their digital competence and literacy. At the same time, they need to establish a good interactive relationship with their students, gain a deep understanding of their learning needs and difficulties, and provide personalized learning guidance. In addition, teachers need to carefully select high-quality digital teaching resources, supervise students' digital learning process, and scientifically assess learning outcomes. However, we should also rationally look at the role of IDLFL, which as a useful supplement and auxiliary tool for formal learning in the classroom, needs to be combined with other teaching tools to jointly promote students' learning development.

By implementing the strategies mentioned above, teachers will be able to respond more flexibly to the challenges posed by digital foreign language learning, and help students have a richer and more interesting learning experience and achieve more significant learning outcomes.

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Visualization Analysis and Reflection on Research Hotspots and Trends in Pathophysiology Teaching

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ARTICLE INFO

Article history

Received: 8 November 2024

Accepted: 25 November 2024

Published Online: 30 December 2024

Keywords:

Teaching of pathophysiology

Research hotspots

Trend visualization analysis

ABSTRACT

Pathophysiology is a science that deeply explores the occurrence and development of diseases, studies the mechanisms behind the final results, and integrates knowledge from multiple disciplines such as physiology, biochemistry, and immunology. The core lies in revealing the pathological and physiological changes during the disease process and analyzing the fundamental principles. In the medical education system, pathophysiology is an integral part of the foundational curriculum, serving as a bridge between basic medicine and clinical medicine. By studying pathophysiology, students can comprehensively understand the initial causes of diseases, pathological processes, and functional metabolic changes of the body under disease conditions. This discipline is also committed to cultivating students' systematic thinking, critical analysis skills, and problem-solving abilities, comprehensively enhancing their overall quality, making them more competitive and adaptable in the medical field.

1. Introduction

Against the backdrop of rapid medical development, the teaching strategies and content of pathophysiology are constantly being updated and improved. Medical education is facing unprecedented challenges and opportunities, and how to cultivate medical talents with innovative consciousness and practical ability has become a focus of attention in the education industry. The rapid development of information technology, multimedia, network platforms, and virtual reality technology provides new paths for innovative teaching models in pathophysiology. The integration of pathophysiology with other disciplines is becoming increasingly close, and curriculum integration has become an important direction for teaching reform. Breaking down disciplinary barriers and organically integrating knowledge from pathophysiology and related dis-

ciplines enables students to establish a complete knowledge framework and improve learning outcomes during the learning process. Systematically analyze the current focus and trends in pathophysiology teaching research, provide direction for future teaching innovation and curriculum system construction, improve education quality, and cultivate excellent medical professionals.

2. Analysis of the Current Status of Teaching and Research in Pathophysiology

2.1 Evolution of teaching methods and models

In recent years, the teaching methods of pathophysiology have changed to cater to the rapid development of medical education and meet the diverse needs of students. In traditional teaching, the focus of pathophysiology is

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on classroom lectures and textbook learning. While rote learning ensures systematic knowledge transmission, it neglects students' initiative and innovative potential. With the continuous updating of educational concepts, educators in pathophysiology have begun to explore diverse teaching strategies^[1]. Especially with the rapid development of information technology, the teaching mode of online platforms has become increasingly popular, breaking the traditional limitations of time and space and increasing students' autonomy in learning. Through online platforms, teachers can easily publish teaching resources and assign homework, while students can independently arrange their study time, submit homework, participate in discussions, and provide feedback on their learning experience, improving teaching efficiency and enhancing students' self-learning and teamwork abilities. Emerging teaching models such as flipped classrooms and micro courses are gradually being applied in the teaching of pathophysiology. Flipped classroom moves classroom lectures to before class, encouraging students to self-study through videos and literature. In class, it focuses on interactive discussions and case analysis, improving students' participation and learning effectiveness. Micro courses are presented in the form of short videos, providing in-depth explanations of specific knowledge points for students to quickly master. Blended learning is a new attempt to combine online and offline teaching, providing teachers with accurate teaching feedback and flexible adjustment of teaching strategies through real-time interaction and data analysis^[2].

2.2 Quantitative analysis of teaching research literature

With the deepening of medical education reform, the research on pathophysiology teaching has attracted the attention of scholars, and related research results continue to emerge. Enrich the teaching theory of pathophysiology and provide reference for practical teaching. The research involves multiple aspects such as teaching methods, teaching models, and teaching evaluations, optimizing traditional teaching methods and exploring new teaching models based on problems, case studies, and simulation teaching. Teaching evaluation has also become a new focus of research, by establishing a scientific and comprehensive evaluation system to objectively evaluate the teaching achievements of pathophysiology^[3]. It is worth noting that research on pathophysiology teaching has expanded from internal research within a single school or institution to cross school and cross regional cooperation and exchange, promoting in-depth research on pathophysiology teaching and facilitating the sharing and optimization

of teaching resources^[4].

2.3 Hotspot clustering networks and trends in teaching research

Through cluster analysis of research hotspots in pathophysiology teaching, it can be foreseen that with the continuous development of information technology and the updating of educational concepts, researchers will continue to explore more efficient, flexible, and diverse teaching methods and models to adapt to the rapid development of medical education and the diversification of student needs. With the improvement of the quality of medical education and the improvement of the evaluation system, teaching evaluation and feedback will be given more attention, and teaching strategies will be adjusted in a timely manner to meet students' learning needs and achieve the goal of improving teaching quality. Interdisciplinary integration and cross disciplinary research have also become new trends in the teaching and research of pathophysiology. With the close integration of medicine with other disciplines, the teaching of pathophysiology will also undergo in-depth interdisciplinary research, expanding students' knowledge horizons and achieving the goal of cultivating comprehensive qualities and innovative abilities^[5].

3. Hot spot analysis of teaching and research in pathophysiology

3.1 Application of flipped classroom and micro lessons

Flipped classroom subverts the traditional teaching process, characterized by transferring classroom lectures to pre class, allowing students to learn independently through watching videos and reading materials. In the teaching of pathophysiology, the application of flipped classroom helps students deepen their understanding of complex pathophysiological processes, enhance their learning enthusiasm and participation. Not only does it enhance students' self-learning ability, but it also exercises teamwork and communication skills, laying the foundation for continuing education. Micro courses, as concise instructional videos, focus on explaining specific knowledge points or skills, presented in a clear and concise manner. In the study of pathophysiology, micro courses provide students with convenient and efficient learning resources, allowing them to choose appropriate content based on their personal progress and interests, and deepen their understanding of pathophysiology knowledge^[6]. Micro courses also provide teachers with rich teaching materials to help design and implement more targeted teaching plans.

3.2 Integration of Rain Classroom and Ideological and Political Education

Rain Classroom, as a blended learning model combining online and offline teaching, provides teachers with accurate teaching feedback and improves the teaching effectiveness of pathophysiology through real-time interaction and data analysis. Rain Classroom simplifies the teaching management process, such as homework release and grade statistics, to reduce the workload of teachers. Integrating ideological and political education into the teaching of pathophysiology, cultivating students' correct values and professional ethics^[7]. By combining the professional knowledge of pathophysiology with ideological and political education content, teachers can guide students to explore issues such as medical ethics and humanistic care, enhance their sense of social responsibility and professional ethics. Improving students' comprehensive quality also injects new vitality and depth into medical education.

3.3 Development and Teaching Application of Pathological Techniques

Modern pathological techniques include multiple fields such as conventional pathology, immunohistochemistry, molecular pathology, etc., providing support for accurate diagnosis, treatment, and prognosis evaluation of diseases. Introducing the latest pathological technology research results in the teaching process of pathophysiology can help students gain a deeper understanding of the pathological and physiological mechanisms of diseases. By combining experimental teaching with case analysis, teachers can guide students to master the pathogenesis and clinical manifestations of diseases, improve experimental skills and clinical thinking. The innovation of pathological technology has also brought new teaching methods for pathophysiology teaching, such as virtual simulation experiments, remote teaching, etc., enriching teaching content, enhancing students' learning interest and teaching effectiveness^[8].

4. Exploration of the Trends in Teaching and Research of Pathophysiology

4.1 Cross school cooperation and resource sharing

In the wave of globalization, the richness of educational resources is increasing day by day, and cooperation and resource sharing among different universities also exist in the field of teaching and research in pathophysiology. Accelerating the sharing of high-quality teaching resources, including an excellent team of teachers, advanced teaching facilities, and diverse teaching cases, not only

improves the teaching level, but also deepens academic exchanges and research cooperation, providing impetus for the deep exploration and sustainable development of the discipline of pathophysiology. In terms of resource exchange, the application of digital technology provides strong technical support for cross university cooperation. By establishing a pathological physiology teaching resource database and online teaching platform, digital, networked, and intelligent management of resources can be achieved, facilitating teachers and students to access the required teaching resources anytime and anywhere^[9], and providing interactive communication, online Q&A, and homework submission functions, enriching teaching methods and learning experiences.

4.2 Personalized teaching and precision teaching

With the updating of educational concepts and the rapid advancement of technology, personalized and precise teaching strategies have been valued in the research of pathophysiology teaching. Personalized teaching focuses on students' individual needs and learning differences, tailoring teaching plans to fully stimulate students' learning enthusiasm and potential. In the teaching of pathophysiology, teachers can develop personalized teaching plans and provide targeted guidance based on students' learning styles, interests, and basic knowledge. Precision teaching is based on personalized teaching, using technologies such as big data and artificial intelligence to monitor and evaluate students' learning process in real time, accurately grasp students' learning status and effectiveness, help teachers identify and solve students' learning problems in a timely manner, flexibly adjust teaching strategies, and ensure that each student can achieve the best learning outcomes^[10].

4.3 The combination of pathophysiology and artificial intelligence

The rapid development of artificial intelligence technology has brought new opportunities and challenges to the teaching of pathophysiology. Pathophysiology teaching is entering a new era of greater intelligence, efficiency, and precision through the combination of artificial intelligence technology. Constructing a knowledge graph of pathophysiology provides students with more comprehensive and systematic learning resources. Using artificial intelligence for remote teaching and online Q&A breaks through traditional time and space limitations, providing teachers and students with more convenient and flexible learning paths. The combination of pathophysiology and artificial intelligence promotes in-depth research in

pathophysiology. Through the analysis and mining of big data, new disease mechanisms and treatment methods are revealed, making important contributions to the progress of medical science. Artificial intelligence technology also provides an intelligent evaluation system for teaching pathophysiology, helping teachers objectively and comprehensively evaluate students' learning outcomes.

5. Trends and prospects

5.1 Summarize the hotspots and trends in teaching and research of pathophysiology

With the continuous development of biological science, computer science, and image processing technology, emerging technologies such as digital pathology, optical coherence tomography (OCT), and molecular pathology are gradually integrating into the field of pathological examination to improve the accuracy and efficiency of pathological diagnosis. The application of artificial intelligence in the fields of pathology and physiology is becoming increasingly widespread, especially in the field of pathological image recognition technology. By intelligently analyzing digital slice images, it provides accurate diagnostic assistance for doctors. In terms of personalized medicine within hospitals, pathophysiology provides theoretical support for predicting disease progression and developing personalized treatment plans through in-depth research on the mechanisms of disease formation and progression. Molecular pathology plays an indispensable role in tumor treatment. For example, HER-2 gene amplification plays a guiding role in targeted treatment of breast cancer and gastric cancer, laying a solid foundation for precision medicine. The interdisciplinary cooperation between pathophysiology, basic medicine, clinical medicine, and other disciplines is becoming increasingly close, jointly promoting the progress of medical science. In the fields of disease prevention and control, as well as new drug development, cooperation between pathophysiology and public health, pharmacy, and other areas is becoming increasingly common. The combination of pathophysiology and artificial intelligence is not only to meet future educational needs, but also to construct effective educational methods.

5.2 Suggestions for future teaching reform in pathophysiology

The teaching content of pathophysiology should keep up with the forefront of disciplinary development, constantly update and expand, including cellular and molecular pathophysiology, the latest diagnostic technologies, etc. We need to increase the reform of experimental courses

and exercise students' abilities in scientific research exploration and innovative thinking through practical operations. Encourage students to actively participate in scientific research and closely integrate theoretical knowledge with practical operations. Using digital technologies such as virtual reality (VR) and augmented reality (AR), create a pathological simulation environment to help students intuitively understand the structure and function of human pathology. Establish an online learning platform and resource library, providing flexible and diverse learning methods. Teachers can set up interactive activities in the classroom, such as real-time testing, online discussions, etc., to enhance students' classroom participation. Establish an effective learning feedback mechanism, timely understand students' learning status, and adjust teaching strategies in a timely manner.

6. Conclusion

In today's rapidly developing information technology, pathophysiology teaching will place greater emphasis on technology driven teaching innovation, utilizing technologies such as big data and artificial intelligence to optimize teaching processes and evaluation systems. Through international exchanges and cooperation, advanced teaching concepts and methods are introduced to comprehensively improve the teaching level of pathophysiology in China. In the future, pathophysiology teaching will pay more attention to meeting students' personalized and customized learning needs. By analyzing students' learning data and preferences, customized learning paths and resources will be provided for each student. Pathophysiology teaching will also strengthen the cross integration with disciplines such as public health, pharmacy, biotechnology, etc., to jointly promote innovation in the medical field. Looking ahead, the teaching of pathophysiology will demonstrate trends such as technological integration, personalized medicine, and interdisciplinary collaboration. In the face of these trends and challenges, it is necessary to maintain mastery of new knowledge and technologies to adapt to the constantly changing environment and enhance one's competitiveness.

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A Study on Effective Strategies for Improving English Writing and Teaching to College Students

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ARTICLE INFO

Article history

Received: 9 November 2024

Accepted: 15 November 2024

Published Online: 30 December 2024

Keywords:

University students

English writing

Teaching strategies

Personalised instruction

Practical activities

ABSTRACT

This paper studies how to effectively improve the English writing skills of college students. It introduces the importance of English writing skills and the current situation, and finds that college students generally have problems such as insufficient vocabulary and frequent grammatical errors; it analyses the advantages and disadvantages of traditional and modern teaching methods, with the traditional method focusing too much on the form, while the modern method may neglect the consolidation of basic knowledge and personalized needs. Effective strategies for university students are proposed, including classroom teaching, personalised instruction and practical activities. In classroom teaching, writing tasks with practical application scenarios are designed and diversified teaching methods are used. In personalised instruction, students' needs are understood and targeted instruction is provided. In practical activities, diverse writing tasks are designed and effective feedback mechanisms are established. Finally, the contributions of the study and future research directions are summarised.

1. Introduction

In the age of globalisation, English has long become an important language for international communication. Therefore, mastering English writing skills has become more and more important for college students. English writing is not only a way to express thoughts and opinions, but also a way to show academic level and professional quality. At present, the English writing level of college students is generally problematic. They have problems such as insufficient vocabulary, frequent grammatical errors and confusing logical structure. These problems will not only affect their academic performance, but also their future career development. Therefore, it is of

great significance to study how to teach college students English writing skills effectively. Many teachers and researchers have begun to explore how to improve college students' English writing skills. However, the teaching effect in practice is not satisfactory. In traditional teaching methods, teachers usually focus on teaching grammar rules and imitating model texts, while ignoring practice and personalised instruction. In modern teaching methods, methods such as task-based teaching and cooperative learning emphasise practice and communication, and may also neglect the consolidation of basic knowledge and the satisfaction of individualised needs. It is particularly important to provide effective strategies for teaching English writing skills to college students.

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2. The Importance and Current Situation of English Writing Skills

2.1 The Importance of English Writing Skills

In today's era of globalisation, English has become an important language for international communication. Mastering good English writing skills is of great significance to college students. English writing is an effective way to express thoughts and opinions. Through writing, students can organise their thoughts clearly, express their opinions and communicate effectively with others. At the same time, English writing is a way to demonstrate academic and professional qualities. Whether in academia or in the workplace, good English writing ability is one of the important criteria for assessing one's ability and professionalism. In addition, English writing develops students' critical, logical and creative thinking skills, which has a positive impact on their comprehensive development.

(II) The current situation of college students' English writing skills

At present, there is a general problem with the English writing skills of college students. On the one hand, many students lack sufficient vocabulary and grammatical knowledge, leading to frequent vocabulary and grammatical errors in their writing. On the other hand, many students have difficulties in writing organisation and logical structure, resulting in a lack of organisation and coherence in their writing. In addition, some students suffer from a poor understanding of the writing task and a lack of argumentative and expressive skills.

These problems not only affect students' academic performance, but also have a negative impact on their future career development. In the academic field, good English writing skills are essential for publishing papers, participating in academic seminars and applying for scholarships. In the workplace, good English writing skills are the key to writing reports, communicating and demonstrating professional competence. Therefore, it is urgent and important to improve college students' English writing skills, and effective teaching strategies and methods are needed to help students overcome writing problems and improve their writing skills.

II. Advantages and disadvantages of existing teaching methods

2.2 Advantages and Disadvantages of Traditional Teaching Methods

Traditional English writing teaching methods focus on teaching grammar rules and imitating model texts, which can help students master basic grammar knowledge and

writing skills to a certain extent. By teaching grammar rules, students can understand the basic laws of English grammar and thus reduce the occurrence of grammatical errors. At the same time, by imitating model texts, students can learn some common expressions and writing skills to improve their writing ability. However, the traditional method has some disadvantages. On the one hand, the traditional method may make students fall into rote memorisation, focusing only on the memorisation of grammar rules and the mechanical operation of imitating model texts, while neglecting the cultivation of practical application and creative thinking. Such teaching methods tend to make students lack independent thinking and creativity, resulting in a lack of individuality and uniqueness in their writing. On the other hand, the traditional method lacks interactive and practical aspects, making it difficult to truly improve students' writing ability. Students just passively receive knowledge without the opportunity to communicate and practice, and cannot really understand and master the writing skills.

2.3 Advantages and disadvantages of modern teaching methods

Modern English writing teaching methods emphasise task-based teaching and cooperative learning, focusing on practice and communication, and this method also has its advantages and disadvantages. On the one hand, task-based teaching can combine writing tasks with real-life application scenarios so that students can improve their writing skills in practice. By solving real problems and completing practical tasks, students can better understand and master writing skills and develop critical and creative thinking skills. First of all, cooperative learning can promote interaction and communication among students and stimulate their interest and enthusiasm in learning. Students can learn from each other, help each other and improve their writing together. Secondly, too much focus on practice and communication may neglect the consolidation of basic knowledge and the satisfaction of individual needs. Students may improve their writing skills quickly in practice, but they are deficient in basic knowledge. On the other hand, modern approaches require a high level of teacher and student engagement, with teachers needing to design appropriate tasks and organise effective collaborative learning activities, and students needing to be actively involved and co-operative. This places certain demands on the ability and quality of teachers and students.

To sum up, traditional teaching methods focus on grammar rules and imitation of model texts, which help students master basic knowledge and writing skills, but tend to neglect practice and individual needs. Modern teaching

methods emphasize task-based teaching and cooperative learning, focusing on practice and communication, which can cultivate students' creative thinking and cooperative ability, but are prone to neglect the consolidation of basic knowledge and personalised guidance. Therefore, traditional and modern methods can be used comprehensively in teaching to give full play to their advantages while avoiding their shortcomings in order to improve college students' English writing skills.

3. Effective Strategies for Teaching English Writing Skills to College Students

3.1 Classroom Teaching Strategies

3.1.1 Design of Teaching Content

In teaching English writing to college students, the design of teaching content should take into account grammar, vocabulary, sentence patterns and chapter structure. These basics are the cornerstones of writing. Students need to master correct grammar and rich vocabulary to construct accurate and fluent sentences. In addition, students need to learn different types of sentence patterns and chapter structures to improve the logic and coherence of their writing. In addition to the explanation of basic knowledge, the teaching content should also focus on practical application. Students need to learn common expressions, writing skills and argumentation methods to improve their writing ability. Teachers can demonstrate and guide students how to apply what they have learnt to practical writing through concrete examples and practical tasks. For example, teachers can provide students with some real writing situations and let them practice writing in a simulated environment so as to apply what they have learnt in practice.

3.1.2 Choice of teaching methods

The choice of teaching methods should be diversified to meet the learning needs and individual characteristics of different students. The traditional lecture method is a basic form of teaching, which helps students understand and master the relevant content by systematically introducing and explaining the knowledge points. In the teaching of grammar, vocabulary and other basic knowledge, the lecture method is an essential part. In addition to explanation, teaching methods can also include demonstration, discussion, interaction and so on. Through demonstration, teachers can show students examples of good writing so that they can learn by imitation and improve their writing skills. Discussion and interaction are effective ways to promote students' communication and co-operation, which can stimulate students' thinking and

passion and enhance their participation and learning. For example, teachers can organise group discussions for students to discuss a certain topic and share their views and experiences, so as to broaden their horizons and develop critical thinking.

3.2 Personalised guidance strategies

3.2.1 Analysis of students' needs

In personalised instruction, students' needs need to be analysed first. This can be done in a variety of ways, such as questionnaires, oral enquiry, essay assessment and so on. By knowing information about students' English level, writing ability, study habits and needs, it is possible to better tailor individualised teaching plans and guidance programmes to the students' actual situation.

The following aspects need to be considered when conducting a student needs analysis:

(1) English proficiency: to understand the students' English proficiency, including vocabulary, grammar mastery, reading comprehension, oral expression and other aspects. This can be done through tests or verbal enquiry, etc.

(2) Writing ability: to understand students' writing ability, including aspects such as verbal expression, argumentation and structural organisation. This can be achieved through essay assessment or oral enquiry, etc.

(3) Study habits: to understand students' study habits and preferences, including aspects such as study time, study styles, and subject preferences. This can be achieved through questionnaires or oral enquiry, etc.

(4) Needs analysis: to understand students' needs and expectations, including aspects such as which aspects they wish to improve and what level they wish to achieve. This can be achieved through questionnaires or oral enquiry, etc.

3.2.2 Selection of guidance methods

When personalised guidance is given, students need to be selected in a way that suits their actual situation. Different students have different needs and characteristics, so different guidance methods need to be used to meet their needs.

The following are some common ways of personalised instruction:

(1) Tiered teaching: For students with low English proficiency, tiered teaching can be used to group students according to their English proficiency and then provide them with targeted instruction for their specific problems. For example, for students with low vocabulary, more vocabulary exercises and memorisation methods can be provided; for students with low grammar mastery, more

grammar exercises and explanations can be provided.

(2) Independent thinking and innovation: For students with higher English proficiency, independent thinking and innovation can be used to encourage them to try different ways of writing and expression. For example, some open-ended writing tasks can be provided for students to give free play to create different works.

(3) Individualised guidance: Formulate individualised guidance plans for each student's specific situation. For example, for students with weak writing ability, more writing guidance and model essay analysis can be provided; for students with weak structural organisational ability, more chapter structure explanations and practical tasks can be provided.

(4) Interactive teaching: Adopt interactive teaching methods to encourage communication and cooperation among students. For example, activities such as group discussions and revising each other's compositions can be organised so that students can learn and make progress through interaction.

3.3 Strategies for Practical Activities

3.3.1 Setting of writing tasks

In the practical activities, we should pay attention to the setting of writing tasks. Writing tasks should be challenging and practical, and can stimulate students' learning interest and writing motivation by simulating real scenes and providing real materials. At the same time, different levels of difficulty and types of writing tasks should be set according to the actual situation of students to meet the needs of students at different levels.

3.3.2 Establishment of feedback mechanism

The establishment of feedback mechanism is also very important in practical activities. Give students timely feedback and guidance to help them find problems, correct mistakes and improve their writing ability. An effective feedback mechanism can be established through teacher evaluation, peer evaluation and self-evaluation to promote students' self-improvement and improvement. Personalised writing instruction is an important and complex task.

In carrying out personalised writing instruction, we need to analyse students' needs in depth and choose appropriate instruction methods in order to help students improve their English writing ability and achieve their personal learning goals. In the process of implementation, we need to take into account the students' English proficiency, writing ability, learning habits and needs in order to develop a personalised teaching plan and instruction programme. Such teaching plans and guidance programmes should be tailored to the characteristics and needs of each student, so they should be specific, actionable and targeted. At the same time, we should also focus on encouraging students to think independently and creatively, and promoting communication and co-operation among students through interactive teaching. This kind of interactive teaching can stimulate students' interest and enthusiasm in learning and help them better understand and master writing skills and methods. In this process, teachers should play the role of guide and supporter to help students overcome difficulties and challenges and stimulate their creativity and expression. In this way, students can express their ideas and opinions more confidently, improve their English writing skills and achieve their personal learning goals.

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Research on the Change Path of Ordinary High School From the Perspective of Transformational Leadership——Take the No. 4 High School of Xi’an High-tech Zone as an Example

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ARTICLE INFO

Article history

Received: 12 November 2024

Accepted: 20 November 2024

Published Online: 30 December 2024

Keywords:

Ordinary high school

Change

Leadership

Perspective

Motivation

Care

ABSTRACT

The Guiding Opinions of The General Office of the State Council on Promoting the Reform of ordinary high school education Mode in the New Era directly refers to the reform of ordinary high school education mode, making it a new era mission of ordinary high school education development. The reform of ordinary high school is a complex and purposeful event, and the process of reform needs to go through several stages, each stage is faced with unique tasks, contradictions and corresponding strategies of change. As a principal, he must be clear about the goal of the school towards the future, the specific problems he needs to face and the corresponding strategies, and how to promote the overall reform of the school. What is the path of change? The proposal of transformational leadership theory provides a new way of thinking for opening the new situation of school reform. How to learn from the transformational leadership theory to seek an endogenous road for the reform of ordinary high school in our country in the complex contemporary educational environment is an important issue worth educators to study.

1. The operational framework of the change path of ordinary high school from the perspective of transformational leadership

The process of transformational leadership is to attach importance to the construction and communication of vision, and lead the members of the organization to move towards the goal of change. School principals, as advocates, organizers and leaders of change, should pool their wisdom and use management techniques to gradually activate various functions of the school organization, stimulate the advantage potential of the school staff through intelligence, make the school platform bigger and strong-

er, and provide a broader career space for themselves and members of the organization. How can the principal lead the school to drive change throughout the school? Taking the No. 4 Senior High School of Xi’an High-tech Zone as an example, we set up a leadership behavior framework from the perspective of transformational leadership in ordinary high schools. Through this framework, based on the current situation of the school, school leaders integrate transformational leadership ideas to analyze, design and implement, promote the transformation of the organization and personnel, and finally achieve the goals in the vision. The school change practice based on transformational leadership is concreted into five basic strategies of

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vision motivation, intellectual stimulation, charismatic leadership, caring thinking, management and leadership technology, which can help school leaders grasp the complex changes that the school needs to go through in the constantly changing environment. The change path of the whole school is divided into three consecutive stages: primary survival development, intermediate characteristic development and advanced brand development. Each stage has different focus of change and experiences different change paths. The strategy of change belongs to the method of change, and the path of change belongs to the way of change. Both answer how schools should change from different dimensions.

Second, the basic strategy of ordinary high school reform from the perspective of transformational leadership

The homogeneous competition among schools is becoming increasingly fierce, and the drastic social transformation determines the numerous obstacles to the internal reform of schools. Principals should not only actively lead schools to meet the opportunities and challenges of the external environment, but also promote the school reform based on the theory of transformational leadership and the use of educational wisdom design.

2. Vision motivation, clear the direction of school change

School vision is the basic element of school education philosophy, and as the value guidance of school development goals, it can unite people, lead and unite faculty and staff towards the common goal, and promote the healthy development of the school. In the case that the school vision has not been widely recognized, the fourth Senior Middle School of Xi'an High-tech Zone actively absorbs the wisdom of the faculty and staff, and reaches a consensus with the faculty and parents of the whole school through a series of discussions and interviews: The school thoroughly implements the outline of the national and Shanghai Education reform and development plans, carries out education reform, and improves the vision of the school, focusing on the growth and development of every student in terms of educational purposes, stimulating the development potential of students, and promoting the active development of students. In terms of core values, the school should use the school spirit of "beyond self, the pursuit of excellence" to deepen and expand the school philosophy of "emphasizing learning, educating talents and taking the initiative to develop". Finally, the vision of the school is formed - to build the school into an experimental and demonstrative modern boarding high school

adapted to the international metropolis of Shanghai. Strive to develop experience, increase efficiency, improve quality and create characteristics in ten years, and build the school into a first-class suburban, leading Shanghai and well-known domestic demonstration high school, walking in the forefront of Xi'an experimental demonstration high school. After the principal and the staff reach a consensus on the school vision, they then explore the specific behaviors to realize the school vision. After several thorough discussions, the school Congress adopted the Action Program of the Fourth Senior High School in Xi'an High-tech Zone, which became the action guide for the teachers and students of the school to realize the vision of the school.

3. Intellectual stimulation, access to school change wisdom

Intellectual stimulation refers to a group of people through the form of special thematic meetings, on a particular issue, the participants communicate with each other, encourage each other, revise each other, complement each other, and brainstorm, thus producing a large number of new ideas of the collective divergence techniques. Intellectual stimulation here refers to the principal's encouragement of staff to come up with new ways to solve problems on the basis of questioning old ideas. In order to realize the school's vision, the Fourth Senior High School of Xi'an High-tech Zone takes "Practice research of suburban high school to stimulate students' development potential" as the lead, and carries out reforms in six directions: implementing "educating talents" and creating moral characteristics; Create the school characteristic curriculum, perfect the curriculum system; Focus on stimulating students' potential and deepening teaching reform; Pay attention to inheritance and innovation, deepen teaching reform; Advocate intelligent leadership to improve management efficiency; Emphasize project-driven, optimize education and research. For these measures, the principal does not rely on his own administrative authority and system to promote, but through moral education forums, academic forums, teaching evaluation activities, management experience exchange, project results display and other ways to constantly stimulate the thinking vitality of the management team and teachers, so that each person can use the ideas of others to stimulate their own inspiration, or gather the ideas of multiple people to produce new ideas. This way of obtaining the wisdom of change has created and achieved the reform and innovation of the Fourth Senior High School in Xi'an High-tech Zone.

4. Charismatic leadership, physical practice to lead the team

As the core of the school team, the principal must be good at establishing and maintaining a good relationship with the school team. Only by being good at understanding the emotions and needs of teachers and students and maintaining a stable and harmonious interpersonal relationship with teachers and students can he effectively manage the school. The principal takes the lead and fights in the front line. He should have a strong sense of responsibility, be good at learning, dare to be responsible, be forward-looking, optimistic, enthusiastic and humorous leadership charm. According to Bandura's social learning theory, people's work enthusiasm and enthusiasm are mutually infectious. The charm of principals will promote teachers to be more inclusive and harmonious, more enthusiastic and dedicated in their work, and they will respect colleagues more and be more willing to help colleagues, thus improving teachers' sense of organizational identity and generating a strong centripetal force and cohesion under pressure.

The principal of No. 4 Senior High School in Xi'an High-tech Zone insists on demonstrating the charisma of leadership with concrete actions, requires himself to keep learning, and actively participates in various activities of teachers and students, such as the first class, class meeting, staff sports meeting, students' art activities, students' concerts, etc. The vitality and enthusiasm of the principal has infected students and teachers. In the period of low quality of school education and teaching, the principal and everyone together to overcome difficulties, whether it is morning and evening self-study or classroom, you can see the principal "patrol" figure. When encountering problems, point out and give guidance in time. The principal's example and practice won everyone's respect. Let's face it: the charm of the principal far outweighs the power. Especially in ordinary high schools, the school circle is small, the activity platform is single, and the leaders' words and deeds will become the focus of public opinion and be widely copied. The power of example is infinite, and the leader's first example is very easy to stimulate the sense of worship of organization members, and add cohesive force to lead the team to make positive changes.

5. Caring thinking, enhance the cohesion of change

Caring is the appreciation, concern and empathy of teachers under the thinking of caring, and it is a kind of emotional expression under rational judgment. There are strong differences in the principal's care for teacher

groups, and the implementation of the group's differential care on the individual forms personalized care, that is, the principal on the basis of fully understanding and judging the personality of teachers, targeted appreciation of teachers' professional life and their families, or concern, or empathy, and both working and personal contact with teachers. Promote outsiders to become insiders, enhance teachers' trust in principals, and change teachers' working attitude. Through professional care, principals can stimulate teachers to develop to a higher professional level and promote teachers to balance the relationship between school interests and personal interests. The Fourth Senior High School of Xi'an High-tech Zone has established a "four-dimensional, four-tier and four-level" teacher development system for different teacher groups. The four-dimensional training system includes teacher ethics, teaching, educating and scientific research. Four layers, namely learning, practice, research, display development platform; For new teachers, young teachers, backbone teachers, and famous teachers, the four-step teacher team training project has been improved, namely, the three new, blue, famous teachers, and demonstration project. Every teacher can find the corresponding development platform and support, this kind of humanized professional care, so that teachers double professional happiness.

At the same time, the principal also pays attention to the practical difficulties of the teacher's family and life. Since 2022, the principal, in his busy work, insisted on writing a handwritten letter to each teacher on his birthday (teacher's work performance, the principal's work expectations for teachers, work wishes), and wrote a total of 250 letters. Such a personal letter must be based on the respect and trust of each teacher, or it will not be written at all. Many teachers are excited to receive heartfelt, touching, and realistic personal letters, and look forward to doing their work and receiving a personal letter from the principal next year. Through personal care, the principal promotes the mental health of the faculty and staff, and creates the empathetic thinking that both the principal and the teacher put themselves in each other's shoes. This kind of thinking is the psychological glue of school reform, which can promote mutual understanding, mutual tolerance, communication and cooperation between the two sides, reduce the resistance of school reform, improve the efficiency of school, and promote school reform.

6. Flat management and distributed leadership, enhance organizational effectiveness

Flat management originates from flat organization theory and is a decentralized management mode compared with the traditional centralized hierarchical organization

structure. The problem of bureaucratic organizational structure faced by the school urgently needs to be solved by flat organizational structure, so as to reduce the management level vertically and integrate the responsibilities of various departments horizontally, so as to flatten the overall organizational structure of the school. Therefore, the Fourth High School of Xi'an High-tech Zone adheres to the "four modernizations" management thought, that is, humanization, democratization, science and information; Establish "four consciousness", namely, consciousness of autonomy, consciousness of service, consciousness of innovation, consciousness of excellence; The school adopts the school-running strategy of "governing the school by virtue, strengthening the school by talents, invigorating the school by scientific research, establishing the school by quality, and enriching the school by culture". With the core of "participation, sharing and efficiency", the school implements the "center" and "ministerial" system under the flat management mode. By integrating resources, reducing the intermediate level, strengthening the service function, greatly optimizing the management resources, and improving the organizational efficiency. The principal of Xi'an High-tech Zone No. 4 Senior High School implements the grade distributed leadership management model, emphasizes the distribution of informal leaders, and classifies various grade management affairs according to projects to form various types of project teams. Every teacher with more research achievements or experience in a certain aspect can be the chief leader of the project team. Distributed projects include resource development, class management, process evaluation, comprehensive practical activities, characteristic curriculum construction, etc., implementing project-based management and forming a grade management matrix. Distributed leadership makes grades form a nested system organization, solves the problem of fixed authority caused by positional leadership and personal organizational relationship, stimulates the leadership vitality of grade group members, and enhances the organizational effectiveness of grade group.

Third, the transformation path of ordinary high schools from the perspective of transformational leadership

From the perspective of transformational theory, the change strategy provides methodological guidance for school reform and provides a starting point for the reform of school organization and personnel development. However, the specific reform method, direction and approach are also issues, and according to different school conditions, the change paths designed by different school principals will be different, and most school principals design change paths of different dimensions for the short-term development of schools. The principal of No. 4 Senior

High School in Xi'an High-tech Zone designed a stage change path for the long-term (10 years) development of the school. Primary stage (2 years) : Structural change - Intermediate stage (4 years) : Institutional change - Advanced stage (4 years) : cultural change. The three stages of the change path are from coping with external crisis to stimulating internal vitality, and then to shaping culture, which reflects the continuity of the change, forms a systematic change path structure, and produces expected positive functions: The Fourth Senior High School of Xi'an High-tech Zone has realized the purpose of change from survival development to characteristic development, and then to brand development.

7. Flat management and distributed leadership to enhance organizational effectiveness

Talcott Parsons' theory of structural functionalism holds that there is a "universal harmony" among the elements of various global structures, and that the internal prescriptivity of such structures determines the external manifestations of functions. Therefore, whether the various system structure elements of school education and teaching operation are harmonious or not directly affects the normal play of its kinetic energy and the resultant effect. At this stage, based on the perspective of transformational leadership, principals should enable the majority of teachers to calm down, carefully study the learning situation with all their body and mind, design, implement and reflect on their own educational and teaching behaviors according to the laws of education and the laws of students' physical and mental development, and effectively embark on the road of future-oriented educational practice. Taking the No. 4 Senior High School in Xi'an High-tech Zone as an example, the primary stage of school reform is the stage of survival and development, facing the contradiction between the people's expectations for high-quality education and the low teaching quality brought about by the rapid expansion of school scale in Fengxian Middle School. After careful discussion, the members of the principal organization team think that the key to solve this contradiction is to focus on the reform of the school structure. At this stage, the school starts from adjusting the structure and clarifying the function. First, adjust the structure of teachers and implement the teacher professional development plan. The school guides teachers to formulate independent development plans, so that the school and teachers have a common vision for professional development, and build a team of famous teachers with reasonable education structure and professional title structure, physical and mental health, and training standards. At the same time, the evaluation system of school

teachers should be improved, and the basic evaluation system and the developmental teacher evaluation system should be formulated, which cover many indicators such as curriculum teaching and moral education. The adjustment of teacher structure makes teachers realize the change from managing students to guiding students, and make clear their leading role in teaching and students' main role. The second is to adjust the curriculum teaching structure. Develop guided learning plan and optimize school-based resources of basic curriculum; To formulate the implementation standards of the basic course by grade, make the guide plan serialized and systematic, and make the guide plan better adapt to the students; Strengthen teaching routine management, optimize teaching links, and cultivate students' good habits. The adjustment of the curriculum teaching structure makes the curriculum teaching effectively promote the students' independent learning and active learning. The third is to adjust the school management structure. Adopting the flat management mode of the school, the "five centers" (administrative service center, curriculum teaching center, student service center, teacher service center, quality assurance and research and development center) and "three major departments" (Senior One, Senior two and Senior Three) have been established. The adjustment of school management structure makes the school organization realize the transformation from management function to service function. At this stage, based on the key contradictions of the school, the principal, as the power source of change, relies on the administrative power, top-down, and internal and external forces, and uses the leadership characteristics of the transformational principal of "unsatisfied with the status quo and constructive attitude" to seek the focus of change and drive the structural change of the school, so that the whole school can form a joint force and improve the teaching quality. It effectively solves the contradiction between the expansion of school scale and the low teaching quality, and guarantees the survival ability of the school.

8. The intermediate stage of change, focusing on mechanism change

The mechanism here refers to the micro-education mechanism. "Micro-education mechanism refers to starting from each component of education and fully mobilizing the enthusiasm of each component to play the role of education." The characteristic of this mechanism is to focus on each basic unit of education at a certain level or in a certain aspect, and to exert the overall function of education by mobilizing the initiative of each basic unit of education." From the perspective of transformational leadership, principals at the middle stage of change should

exert the academic influence of experts, promote and lead the professional development of teachers, establish some new mechanisms aimed at satisfying moral education construction, teacher development mechanism, curriculum construction, scientific research system, etc., in order to maximize the use and development of existing school resources and release the professional potential of teachers. Transform education. In the middle stage of the reform of No. 4 Senior High School in Xi'an High-tech Zone, in order to achieve the goal of transforming the school from the structural reform in the survival and development stage to the mechanism reform in the characteristic development stage, the principal actively explores the reform of the micro-education mechanism, focuses on the basic units of school education, mobilizes and stimulates the enthusiasm of these basic units, and tries to realize the reform on the basis of forming a joint force. To this end, the fourth Senior High School of Xi'an High-tech Zone aims to stimulate the enthusiasm of the school's moral education, curriculum, teaching, teachers, management, education and scientific research and other basic units, explore the specific educational role of each unit, and strive to give play to its overall educational function on the basis of forming a joint force, so that the school can realize the transformation to a comprehensive and high-quality development.

After four years of hard practice, the Fourth Senior High School of Xi'an High-tech Zone has made it clear that in the reform of micro-education mechanism, the role of basic units can be mainly reflected in the following aspects. First, the moral education mechanism from the optimization of resources to "education" moral education culture, to create a "full, comprehensive, full process" moral education system, forming the characteristics of school moral education. Second, the curriculum mechanism from comprehensive optimization to characteristics, perfect the curriculum system. Implement the curriculum concept of "for the lifelong development of every student" and "making the curriculum adapt to and lead the development of students", enhance curriculum leadership, implement the project of "High School students' innovative literacy Cultivation", improve the training mode of experimental classes, improve the educational connection between high school and middle school and even university, expand international exchanges and cooperation, and promote the excellent development of gifted students. Thirdly, the teaching mechanism should shift from focusing on impartation to stimulating potential, deepen reform, implement the teaching concept of "people-oriented", "teaching according to learning, teaching according to aptitude, teaching without teaching", explore the teaching mode of 223-4

guided learning system and the teacher-student relationship of tutorial system to stimulate students' development potential, and improve the effective teaching quality in the classroom. Fourth, the teacher mechanism from system consciousness to cultural consciousness, deepening the professional development of teachers. While focusing on the training of young teachers, we should pay attention to the group development of teachers at all levels and of all types, improve the hierarchical incentive and hierarchical teacher development mechanism, build a reasonable structure and full of vitality of dedicated, happy and professional teachers, and train a sufficient number of research-oriented and expert teachers. Fifth, the management mechanism from standardized management to intelligent leadership. Adhere to the "president responsibility system, the General Party branch plays the political core role, the faculty and staff congress and other party and mass organizations participate in management and supervision", expand the leadership and management path of "people-oriented, democratic, scientific and information", improve the leadership and management mechanism characterized by "participation, efficiency and sharing", and commit to the inheritance and development of culture. We will form a situation in which our words are fulfilled, our actions are backed by evidence, our culture is conscious, we are full of vitality, and we take the initiative to develop. Sixth, the scientific research mechanism is upgraded from experience to project-driven, and scientific research leadership is strengthened. Implement the strategy from experience upgrading to project-driven research to form a group of topics leading the development of the school; Create a strong scientific research culture and academic atmosphere, improve the management system supporting scientific research, increase the intensity of assessment and reward, and enhance the scientific research awareness and ability of teachers. Help teachers to improve their professional ability and educational realm in the root action research based on practical problem solving. At this stage, the principal, as the advocate, organizer and leader of the reform, takes the goal as the guidance, gathers wisdom, inspires the enthusiasm of basic units through intelligence, coordinates their respective roles, realizes the overall function of the school structure, ensures the smooth reform of micro-education mechanism, realizes the transformation from structural reform to institutional reform, and initially forms the characteristics of the school.

9. The advanced stage of change, focusing on cultural change

"Cultural change refers to the change in the core values of an organization's operation. It challenges the values

and beliefs rooted in the organizational system with the goal of generating a new organizational culture or enhancing the sense of belonging in the organization. Therefore, cultural change is called transformational change." School culture change refers to the formation of a set of shared values for school reform work by school members, which is the essential goal of school reform. A good school has a good culture, which is complementary to the restructuring of the school structure such as the relationship between procedures and rules. According to Michael Fulan, "Paying attention to organizational culture will make the restructuring of organizational structure more effective. There is an interdependent relationship between organizational structure change and cultural change." In the advanced stage of reform, principals can, from the perspective of transformational leadership, reorganize and integrate and innovate their long-established school-running ideas, school-running ideas and management systems, so that they can meet the needs of educational reform and development, and generate new educational and teaching ideas, educational concepts, educational habits, educational attitudes and educational behaviors. To realize the transformation from high-quality characteristic development to educational brand development. At this stage, the Fourth Senior High School of Xi'an High-tech Zone focuses on the cultural demands of teachers and students, making the "eight cultural goals" the shared values of school members, and making concerted efforts to explore the road of "education brand".

One is student culture: focus on choice and learning. Based on moral education psychological curriculum, explore the development mechanism of students' motivation, combined with grade community construction, explore the development mechanism of students' learning perseverance, combined with weekend excellent Jia plan, logical thinking training and other means, explore the development mechanism of students' learning ability. Enhance students' choice power, carry out career development planning, strengthen career development guidance, and improve students' choice orientation, choice ability and choice wisdom. Enhance students' intelligent choice level, explore the development of students' ability advantages, including activating students' advantageous intelligence, improving students' learning strategies and optimizing students' development mode, and improving their independent learning ability.

The second is teacher culture: advocating research power and individuation. Through the establishment of backbone teacher research community, the construction of modular school-based research courses, the optimization of teacher stepped structure series and so on to improve

teacher research ability. Guide teachers to develop their strengths and avoid their weaknesses, and gradually form a teacher's personalized style.

The third is the discipline culture: highlighting quality and uniqueness. According to the uniqueness of the discipline, curriculum standards and learning conditions, the teachers of the discipline teaching and research group build high-quality teaching resources, improve the teaching quality of the discipline, and form the discipline highland. Form a unique discipline concept, value goal and implementation strategy with discipline development in the discipline field, construct a relatively independent discipline development system and research methods, so that it has a unique language expression and thinking quality.

Fourth, curriculum culture: emphasis on selectivity and openness. The course structure of "classification by ability, classification by ambition and grouping by interest" should be constructed to form "package" courses suitable for students' different learning levels, different aspirations and different personality development. Strengthen the interconnection of curriculum resources, enrich the structure of school curriculum and the connotation of The Times, and smooth the application channels of teaching resources.

Fifth, teaching culture: reflecting growth and structure. Strengthen the teaching design of "modular teaching", the design of "guided learning plan" and the design of effective homework, and strive to build a classroom teaching ecology that is conducive to students' exploring the unknown, thinking positively and questioning questions. Formulate teaching structure and learning structure based on core literacy, focusing on the study of students' learning structure before, during and after class, explore the form of learning structure, and form students' learning style; Strengthen the research of discipline structure, module structure and unit structure, promote the research of interdisciplinary knowledge association structure, and promote the cultivation of discipline core literacy.

Sixth, technology and culture: highlighting life and modernization. Integrating technology into students' life and study is an important way of the current curriculum teaching reform. It is necessary to promote the combination of information technology teaching and life to improve students' learning interest and enthusiasm. Construction of general technology special teaching laboratory, to achieve digital learning and resources on demand push. It is necessary to improve teaching and learning methods through technology, deepen the practical research on the implementation of online class teaching, and make every effort to build the implementation form of "one body and two wings" class teaching.

Seventh, management culture: emphasizing refinement

and democratization. Build a democratic and decentralized governance structure and a sophisticated and efficient management model. It is necessary to promote flat, distributed, and balanced management, promote the shift of management focus, and enhance management efficiency through democratization. Adjust the school office system, middle-level organization and functional structure, promote the school middle-level cadre appointment and echelon construction, and form a deadministrative, student-oriented leadership pattern and management mode.

The eighth is ideological culture: show inclusiveness and advanced nature. Establish a culture of inclusiveness, seeking common ground while reserving differences and "harmony without difference". To enhance the value guidance and cultural guidance role of school running ideology in the development of schools, teachers and students, actively advocate the mainstream cultural thoughts and value orientation of schools, and promote the free and comprehensive development of teachers and students in the choice of knowledge, behavior and value.

At this stage, the principal starts from the essential goal of the school reform, leads the team to start from the cultural demands of the main body of the cultural change, condenses the cultural spirit of the school, builds a good cultural ecology of the school, and realizes the overall transformation of the school culture through the cultural changes in curriculum teaching, technology, management services and other aspects. Every measure and behavior of transformational leadership practice is a kind of "field" that influences people's hearts, inspires teachers and affects students' development. This field is the source of the common development of all members of the school. Based on the perspective of transformational leadership, Xi'an High-tech Zone No. 4 Senior High School has orderly promoted the school reform in three stages, namely structure and function, mechanism and demand, culture and value, through overall design, long-term planning and stage implementation. Through years of practice and efforts, Xi'an High-tech Zone No. 4 Senior High School has gradually formed the school spirit of "transcends self and pursues excellence". It gives birth to the school culture brand and the school reform path of "moral education and nourishing people and cultural people". In times of change, nothing changes. Under the theory of transformational leadership, school reform is a process of gradual change, not overnight. Each school has different organizational genes, internal needs, conditions and external environment, and the path of change is completely different, and the school has its own personality and unique experience. School reform must follow the internal logic of reform, study people's concepts and emotional factors in the process of reform, properly handle

the synergy between leadership style, school system and behavior culture and reform, promote the localization practice of transformational leadership, and continue to change the business, operation and management mode of the whole school. Build a culture that integrates environment, curriculum, teaching, learning, evaluation, management, development of teachers and students and school organization in an all-round way, promote the development of school quality characteristics, form a school reform path, and ultimately create a new school education ecology. The basic reform strategy and reform path of the Fourth Senior High School in Xi'an High-tech Zone under the guidance of reform goals can be used as a useful reference for the implementation of school reform in ordinary high school governance.

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How Do College Students Plan Their Future Career Direction under the Global Economic Turmoil

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ARTICLE INFO

Article history

Received: 1 November 2024

Accepted: 17 November 2024

Published Online: 30 December 2024

Keywords:

Global economic turmoil

Career planning

Emerging industries

ABSTRACT

Under the situation of global economic turmoil, the future career planning has become an important issue for college students to think about urgently. At present, the global economy is affected by multiple factors, and traditional industries are facing recession, while emerging industries are booming. In this context, how to choose a university major and plan the future career path has become a key issue. By analyzing the impact of economic turmoil on the career market, this paper discusses how future college students should pay attention to emerging industries and career trends when choosing university majors. At the same time, combined with factors such as digital transformation and globalization trend, the future career direction and skill requirements are clarified, so as to provide college students with planning ideas to deal with the complex economic situation.

1. Introduction

The turmoil of the global economy has profoundly affected the pattern of the professional market. The change of traditional industries, the emergence of emerging technologies, the collision of globalization and localization and other multiple factors interweave, which make college students need to be more cautious in facing the choice of university majors. College examination is not only a key step to your future career, but also choosing the right major is an important basis for your future career development. In such a complex economic background, how to correctly evaluate their own interests and advantages, and how to find development opportunities in the emerging industries, has become a topic that every college student needs to seriously consider.

2. Recognize the career changes of the global economic turmoil

2.1 The Decline of Traditional Industries and the Rise of Emerging Sectors

(1) Changes in Manufacturing and Energy Sectors

Global economic turbulence is reshaping the development trajectory of traditional industries, with manufacturing and energy sectors bearing the brunt. Many traditional manufacturing industries, hindered by lagging technological innovation, are gradually losing competitiveness. The rise of industrial automation and smart manufacturing is replacing low-skill jobs, particularly manual labor roles, with machines and automated systems. The energy sector is experiencing profound shifts as well. Careers related to

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fossil fuels are declining, while job opportunities in clean and renewable energy fields are on the rise. With the global promotion of renewable energy policies, industries like solar, wind, and hydrogen energy are in urgent need of technical experts and project management professionals. Energy sector workers who enhance their expertise in new energy technologies can look forward to broader career prospects^[1].

(2) Opportunities in Emerging Sectors: Information Technology, Artificial Intelligence, and the Green Economy

In contrast to the gradual decline of traditional industries, the rapid rise of emerging sectors like information technology, artificial intelligence, and the green economy presents abundant career opportunities. The rapid advancement of information technology has driven growth in fields such as data science, cybersecurity, and cloud computing, leading to an increasing demand for data analysts and cybersecurity engineers. Similarly, the demand for AI professionals has surged, with roles like machine learning engineers and natural language processing researchers becoming prevalent. Traditional industries are also increasingly adopting AI technologies to enhance efficiency and competitiveness, generating cross-industry applications of AI. The rise of the green economy has fostered career development in areas like environmental consulting and sustainable development management. Companies' emphasis on environmental sustainability has created demand for professionals like environmental engineers and sustainability consultants, offering rapid career growth opportunities. According to a 2023 report by McKinsey Global Institute, approximately 85% of jobs over the next decade have yet to be fully defined, highlighting the uncertainty and opportunity inherent in career choices and development. The importance of specialized skills and interdisciplinary abilities is becoming increasingly evident. The **World Economic Forum's "2023 Future of Jobs Report"** predicts that digitalization, AI, and green economic transformation will reshape the global job landscape. University students should focus on developing data analysis, digital literacy, cross-cultural communication, and problem-solving skills—core competencies for the future workforce. Data shows a rapid growth in demand for digital economy-related talent. According to data from the China Academy of Information and Communications Technology, the number of workers in China's digital economy is projected to reach 120 million by 2025, with an average annual growth rate of over 8%. This indicates that professionals with digital skills will enjoy vast career opportunities. The key to career planning lies in maintain-

ing learning agility, fostering interdisciplinary thinking, and cultivating lifelong learning abilities. According to the U.S. Department of Labor, in today's workplace, individuals need to update or rebuild their professional skills every 3-5 years on average, making lifelong learning an essential choice for career development.

2.2 The Impact of Digital Transformation on Career Development

(1) The Popularization of Remote Work and Flexible Work Arrangements

Amid global economic turbulence, digital transformation has progressively deepened its impact on career development. The widespread adoption of remote work and flexible work arrangements has significantly influenced employment models and career choices. Increasingly, companies are implementing remote work policies globally, broadening their talent pools and creating more cross-regional job opportunities. The proliferation of digital tools has greatly enhanced collaboration efficiency, enabling the smooth operation of remote work. As a result, companies now prioritize candidates' self-management capabilities and digital communication skills during recruitment. This shift in work modes has made roles such as writing, programming, and design—tasks that can be performed online—particularly advantageous in a remote work framework. Additionally, flexible work arrangements have freed career development from geographical constraints, fostering greater possibilities for cross-industry and cross-functional growth. According to the **51st Statistical Report on China's Internet Development** released by the China Internet Network Information Center (CNNIC), as of December 2022, China had 540 million online office users, accounting for 50.6% of all internet users. This trend not only expands companies' talent selection but also creates more cross-regional job opportunities. For example, in February 2022, Trip.com announced a hybrid work policy for its nearly 30,000 employees, allowing them to work remotely from home on Wednesdays and Fridays. This "3+2" hybrid work model made Trip.com the first major company in China to implement such an approach. This transition in work modes has significantly benefited online-capable roles like writing, programming, and design. Flexible work arrangements have also opened up more possibilities for cross-industry and cross-functional career growth.

(2) The Growing Importance of Digital Skills

Digital transformation has greatly amplified the importance of digital skills. An increasing number of jobs now require candidates to possess a certain level of digital pro-

iciency, even in traditional industries where digital literacy has become a fundamental skill. Abilities such as data analysis and information processing have become essential for career advancement. Mastery of these skills can significantly enhance an individual's competitiveness in the job market. Job seekers should gradually build their digital skillset by learning data analysis, basic programming, and cloud technology applications, laying a solid foundation for career growth. In roles such as financial management and marketing, professionals who can effectively use data tools for precise analysis and decision-making are particularly competitive. Moreover, advancements in automation technology have introduced new demands for process optimization and efficiency improvement, driving the upgrade of skills like data analysis and information processing. This underscores the increasing relevance of digital skills in future career development. For instance, the **2023 China Cloud Office Industry Research Report** by iiMedia Research projects that China's cloud office market will reach ¥33.01 billion in 2023, maintaining steady growth. This indicates a sustained increase in the demand for digital skills among businesses. Job seekers should continue to enhance their digital capabilities, using tools like data analysis, foundational programming, and cloud applications to bolster their career prospects. In fields such as financial management and marketing, those who can skillfully leverage data tools for precise decision-making stand out. The progression and widespread adoption of automation technologies have also created new requirements for process optimization and efficiency, further advancing the need for upgraded digital skills. As a result, digital competencies will remain a cornerstone of future career development^[2].

2.3 Balancing Globalization and Localization

(1) Intensified Competition in the Global Job Market

Global economic turbulence has heightened competition in the global job market, highlighting the importance of balancing globalization and localization in career development. In the context of globalization, markets in different countries and regions are increasingly interconnected, leading companies to place greater emphasis on cross-cultural communication and multilingual skills. The openness of the global job market gives candidates with international perspectives and multicultural fluency a significant edge. These individuals are highly competitive in multinational corporations and international organizations. Talent adept at adapting to diverse cultural environments can better navigate challenges in cross-border projects and excel in multicultural team collaboration. According

to Mercer's **2024 Global Talent Trends Report**, which surveyed over 12,200 respondents, many organizations are focused on enhancing talent competitiveness in a globalized environment. Candidates with international perspectives and multicultural understanding are especially valued in multinational companies and international organizations. Participation in international projects and cross-cultural exchange activities can strengthen individual competitiveness and lay a solid foundation for future career advancement. Thus, developing an international perspective and improving language proficiency are crucial. Engaging in global projects and cross-cultural exchanges is an effective way to enhance personal competitiveness and prepare for future career growth^[3].

(2) Advantages of Localized Career Opportunities

At the same time, the advantages of localized career opportunities remain significant. While globalization expands career choices, localized expertise is irreplaceable in certain fields. Many industries and roles require a deep understanding of local market needs, laws, regulations, and cultural practices. Professionals familiar with local markets are better equipped to adapt to market changes and respond quickly. Localized career opportunities are particularly critical in fields such as law, healthcare, and government. Professionals in these sectors must possess localized knowledge and resource integration capabilities to drive business effectively. In the context of combining globalization and localization, the focus of future career development will be on cultivating hybrid talent with both an international perspective and local adaptability. This will enable individuals to contribute more significantly to the globalization process. For example, 36Kr Global reported that Glints, a recruitment platform specializing in Southeast Asia, has developed regional hiring solutions tailored to corporate strategies and team-building requirements. This approach demonstrates that localized expertise and resource integration are essential for advancing related business initiatives.

3. Focusing on Future Career Trends

3.1 Career Prospects in STEM (Science, Technology, Engineering, Mathematics) Fields

The demand for talent in STEM fields is steadily increasing in the future job market, particularly in areas like artificial intelligence and data science. The rapid advancement of AI technologies has led to widespread applications of machine learning and deep learning, penetrating industries ranging from finance and healthcare to manufacturing. The growing demand for intelligent systems

and automation has created numerous high-skill positions, such as machine learning engineers and data analysts, who play a pivotal role in enabling companies to make data-driven decisions.

Data scientists, regarded as one of the most promising careers today, are in high demand not only in tech companies but also increasingly in traditional industries such as agriculture and education. Furthermore, as global cybersecurity threats continue to rise, cybersecurity has become a critical issue in the digital age. Businesses are actively seeking professionals who can safeguard data privacy and defend against cyberattacks, leading to a surge in demand for cybersecurity experts. When selecting university majors, students should prioritize STEM-related disciplines, particularly those offering cutting-edge technical skills. This focus can provide graduates with a competitive edge in the future global job market, allowing them to enter high-tech industries and secure stable career paths in a rapidly evolving economic environment.

3.2 Career Opportunities in Health and Life Sciences

The health and life sciences sector also demonstrates robust career opportunities, particularly against the backdrop of an aging global population and the rising demand in the healthcare and biotechnology industries. These industries not only provide essential services to society but also exhibit relative stability during times of economic turbulence. Pursuing health science-related disciplines, such as medicine, nursing, and biotechnology, offers a wide range of career possibilities. For example, as mental health issues become more prevalent, there is a rapidly growing demand for professionals such as counselors and clinical psychologists. These roles contribute to supporting vulnerable groups and advancing research to improve mental health treatment techniques. At the same time, the rapid development of biotechnology presents new possibilities for addressing global challenges, such as infectious disease prevention and cancer drug development. By choosing specialties in these fields, students can actively contribute to global health initiatives, drive progress through innovation and research, and gain opportunities to join the rapidly expanding life sciences industry^[4].

3.3 Career Opportunities in the Green Economy and Sustainable Development

Career opportunities in the green economy and sustainable development have become a critical focus in the era of globalization. With the escalating challenges of global climate change, environmental protection and

sustainability are now top priorities for governments and businesses worldwide. Choosing majors related to the green economy, such as renewable energy engineering and environmental science, can offer expansive career prospects. The renewable energy industry is rapidly rising, with the promotion of clean energy technologies like wind and solar power driving an increasing demand for skilled professionals in these fields. Additionally, the concept of a circular economy is gaining global traction, fostering innovation and implementation of environmentally friendly technologies. Governments are strengthening measures to control carbon emissions, and businesses are actively investing in green technologies to reduce their environmental impact. When considering career paths, it is essential to focus on areas closely linked to environmental protection and sustainable development. Professionals with expertise in environmental awareness and sustainability skills will not only be indispensable within their industries but also play a vital role in shaping a greener future on a global scale^[5].

By paying attention to trending careers in STEM, health and life sciences, and the green economy, individuals can better navigate the uncertainties of the global economy. The vast development potential and stable job prospects in these sectors provide clear guidance for future career planning. When making decisions about academic and career paths, it is crucial to consider societal and economic trends alongside personal interests and abilities to find a direction that aligns with both individual aspirations and societal needs.

4. Conclusion

In the face of global economic turbulence and uncertainty, university students need to focus their career planning on future trends and opportunities. The transformation of traditional industries, the rise of emerging technologies, and the interplay of globalization and localization provide new perspectives and challenges for career choices. Whether in STEM, health and life sciences, or the green economy and sustainable development, the future job market is increasingly open to highly skilled, interdisciplinary talent with a global outlook. When selecting a major, students should align their interests and strengths with industries that offer long-term growth potential. Enhancing digital capabilities, cross-cultural communication skills, and sustainability awareness will be crucial to standing out in the competitive global market. By understanding market dynamics and future career trends, university students can better navigate their career paths in a complex economic environment and lay a solid foundation for future success.

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Research on the Mechanical Analysis of Run-Up Speed in Pole Vaulting and the Application of Key Auxiliary Training Methods

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ARTICLE INFO

Article history

Received: 6 December 2024

Accepted: 16 December 2024

Published Online: 30 December 2024

Keywords:

Pole vault techniques

Run-up speed model

Training techniques

ABSTRACT

Analyzing from the perspective of physics mechanics, the pole vault is a project which transforms kinetic energy into elastic potential energy. The magnitude of kinetic energy depends on the vaulter's approaching speed, while the magnitude of elastic potential energy depends on height. Therefore, the run-up speed determines the vaulter's performance in pole vault to a certain extent. The horizontal speed of the pole-holding approach phase transitioning into vertical upward speed plays a crucial role in executing pole vault techniques, and the model of approaching speed establishes a theoretical foundation for vaulters to break through the pole limitation. In terms of specialized technical assistance in speed training, short-distance speed exercises are used in the approaching phase; in the swinging phase, gymnastic rings, single bar and suspension rope exercises are employed for suspension; in the stretch phase, trampoline exercises play an important role in rotation phase, etc.

1. Research Purpose and Significance

In the pole vault, run-up speed is not only the main factor for athletes to choose a high grip point and use a large poundage pole, but it is also an important driving force for the conversion of kinetic energy into potential energy after the human body leaves the ground. As the pole vault has evolved, speed has become a clear and distinctive characteristic of the event today.

It is hypothesized that under certain conditions, that is, the faster the run-up speed, jumping technique is reasonable, the more potential energy stored in the pole, when the pole deformation recovery, it can produce faster speed over the pole, pole pounds, athletes hold the pole higher, athletes are able to cross the crossbar higher. In the process of assisted descending of the pole, especially when

approaching the horizontal position, the weight of the pole held in the left hand is greater, in order to balance the weight of the pole, the athlete will appear to hold the pole forward or backward, deceleration, and assisted running is not fluent.

In order to balance the weight of the pole, the athlete will lean forward or backward with the pole, decelerate, and have a poor run. When the balance of the pole cannot be maintained, the athlete will give up the pole insertion jump and run. The problem of changing poles is also a way for athletes to get to a high level of performance.

The faster the run-up speed, the higher the technical requirements for the pole insertion. How to complete the pole-planting technique in a fast running situation? How to surpass the breakthrough after changing poles and low-

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ering the load after poles? In view of the above problems, the theoretical model of the run-up mechanics has been established to realise the breakthrough of assisted running speed conversion in pole vault, to help the athletes improve their grip height and use higher-poundage poles, enhancing their technical level and overcoming psychological barriers.

2. Technical characteristics of the assisted running phase and analysis of assisted running mechanics

2.1 Technical points of assisting running and psychological requirements of pole changing

Pole vault is a sport that kinetic energy is converted into elastic potential energy. The size of kinetic energy depends on the running speed of the athlete, and the size of elastic potential energy depends on the height of the grip, we can understand why the performance of pole vault is determined by the running speed and the height of the grip.

Athletes with pole size and grip height, relatively speaking, athletes with high stature, large stride length, slow stride frequency, assisted running distance is slightly longer; athletes with short stature, small stride length, fast stride frequency and good explosive power, assisted running distance is slightly shorter. Excellent athletes tend to use 16-20 steps to assist the running distance. Running rhythm is, from the first step gradually accelerate, help to reach the highest speed, run to the full two-thirds of the time, the last few steps rely on running inertia, focusing on the insertion point jump. Running technique is characterized by high knee running style and high center of gravity. The pole change specialization is a reflection of the technical progress, manifested in the increase of the running distance and the improvement of the grip point. Bigger poles and higher grip points require more speed and specialized techniques. Therefore, coaches accurately assess and remind athletes of the timing of the pole change. Athletes should have a strong will to change rods, be brave and decisive, and overcome the psychological requirements.

2.2 The establishment of mechanical analysis model of running speed with pole holding

Correct pole technique to close to the torso with the help of the body force to reduce the weight of the arms of the pole, together as one forward movement, pole swing in the controllable range, the swing is too large will not improve the speed of the running aid, but will affect the

speed of the running aid and rhythm.

From the mechanics of the discussion. This running technique is described as ‘accelerated’ running. It is characterized by the fact that when lowering the bar in the run, the gravity of the bar in the hands changes, which counteracts the speed of the run. In order not to lose speed, the athlete can use a faster run to maintain the direction of the bar and balance the weight of the bar. The theoretical basis for this is based on Newton’s second law of mechanics.

When the athlete is assisting in the run, (assuming this fastest speed is a steady speed) mechanics dictate that the force the athlete gives to the pole upward is constant and equal to the force of gravity of the pole. The forward force is variable. The magnitude of an object’s acceleration is proportional to the force acting on it, inversely proportional to the mass of the object and proportional to the inverse of the object’s mass, and the direction of acceleration is the same as the direction of the force exerted. If we say accelerate to a stable speed, this forward force can be no more, because maintain a uniform speed. It can be understood that the last few steps of the weight of the pole will have no effect on the speed of the athlete’s assisted running, the athlete can be highly concentrated on the insertion of the hole jump, and more actively and effectively play the speed of the assisted running. This is a very important technical point in the process of assisted running, is the technical theory that the athlete can use larger poles. As shown in Figure 1 below: according to the model, there is only one downward force at rest.

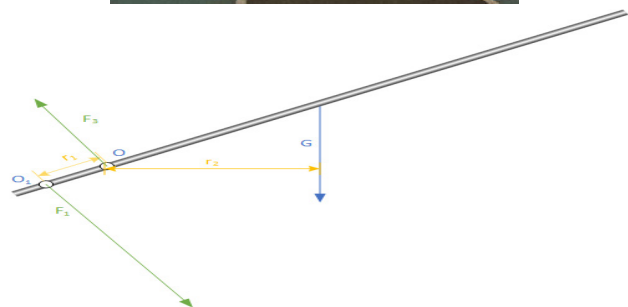
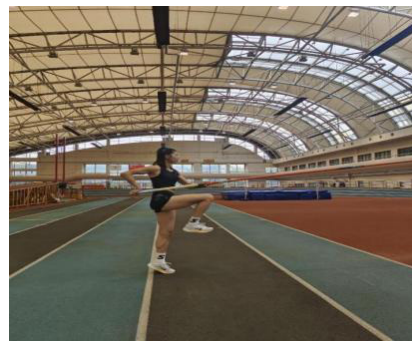


Figure 1. Mechanical analysis at rest

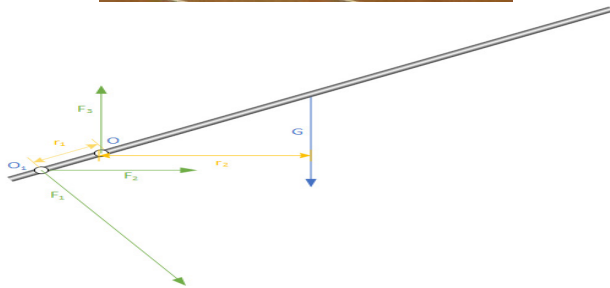


Figure 2. Mechanical analysis model of pole vault run-up

Figure 2: Analysis of the mechanical model during the run-up. During straight-line motion, as the athlete accelerates in the run-up, after the pole descends, the weight of the pole is the same as its weight when stationary. However, due to the pole's forward velocity, the force generated can exceed the weight of the pole, making it seem 'lighter'. As shown in Figure 2, the pole experiences both forward and downward forces, whereas when stationary, only the downward force is present. This demonstrates that weight, under the influence of velocity, can be decomposed into different forces.

The forces on the pole are shown above, G represents the force of gravity on the pole, and points O and O1 are the grip points of the athlete holding the pole. In the process of assisted running, the athlete's force on the pole can be decomposed into F1, F2, F3. F1, F3 is used to balance the pole's gravitational force G, and the force F2 accelerates the pole forward. According to Newton's second law formula

$$F2 = Ma$$

When the speed is increased to the highest, the acceleration a is 0, at this time $F2 = 0$, the athlete to pay the force to reach the minimum, that is, the feeling of lightening the pole.

In the process of lowering the pole, so that the combined force of F1 and F2 is F, there is a moment calculation formula

$$F * r1 = G * r2$$

The force arm $r2$ increases, while $r1$ remains unchanged, so F must increase, and at this time the athlete feels that the pole becomes heavier. The reason why the previously mentioned assisted running technique is used by most good athletes is that the method is based on the

mechanics above. According to this mechanical principle, the athlete in the process of assisted running to increase the speed of assisted running, break through the psychological barriers, on the basis of the theory to establish confidence, the athlete to replace the larger pole, can be based on this method to solve the concerns of changing the pole, to improve the level of athleticism. Can also be based on this theoretical basis, athletes in the absence of insertion holes on the runway for running practice with poles, only when the forward thrust, athletes can hold the poles to assist running speed to the limit.

2.3 Training methods for assisted running speed improvement

It is very difficult for athletes to break through the speed of assisted running with a pole. Technical action speed is built on the basis of technical proficiency and having solid basic skills. The last few steps of pole lifting, pole insertion speed awareness is formed in the early stages of training repeated training and continuous accumulation, the last few steps are completed in the state of automation. Therefore, the breakthrough in technical speed, to strengthen the basic pole vaulting technique accumulation and repeated, to strengthen the body's memory to achieve the automation of technical movements, so that there can be changes in the speed of movement and improve.

It has been proved in practice that the special speed of pole vaulting is dominated by short-distance pole-vaulting. For example, 20 meters of pole running between rows, 40 meters, 60 meters of pole speed training. In addition, the use of uphill pole-carrying running, timing running, also has obvious practical effects.

3. Technical Points of Pole Vaulting Stage

3.1 Pole vaulting technique and timing

Currently, the starting point of the world's best pole vaulters is mostly below the projection point of the grip point, which reduces the loss of momentum during the jump. If the take-off point is too far, it is disadvantageous to the advantage of run-up speed. There are two types of take-off directions: jumping forward and upward, and slightly forward and upward. The difference between the two lies in the take-off angle.

The timing of the pole planting take-off, as mentioned above, occurs during the last two steps of the run-up. When the pole is parallel to the ground, the second-to-last step prepares for the upward take-off, while the final step generates a noticeable explosive push-off from the ground. The higher the take-off center of gravity, the higher the pole is raised. The left arm should not be bent, as any bending

would reduce the energy transferred to the pole. To maximize the bending of the pole and store more potential energy, the athlete should use arm strength and the force connecting the shoulders and chest to support the pole forward and upward. This helps form an arch-like position with the body, increasing the swing speed of the body.

Top pole vaulters around the world place great emphasis on the technique of transitioning from the run-up to the swing of the body on the pole during take-off, because the better the technique is mastered during this phase, the more potential energy the pole can gain from the run-up, leading to a higher jump. Therefore, during each training period, great effort should be devoted to improving take-off technique and increasing the automation of the take-off movement.

3.2 Jumping angle and pole vaulting technique training methods

The jumping angle of pole vaulters is also affected by the height of the athlete's grip, the height of the athlete and the hardness of the pole. While focusing on the jumping angle, it is also important to consider the risks associated with a small jumping angle. When the athlete's jump angle is small, it needs fast running speed and stick insertion technique to match, when the speed is not enough, it will affect the forwardness of the stick, and the pursuit of the athlete's jump angle is risky for the athlete. Therefore, the jumping angle has reference significance, but it should be built on the good running speed and pole insertion technique.

Pole vaulting technique is the core of the complete technique, no matter what level of athletes you are at, special technique imitation throughout the sports career, which is successful experience sharing tips. Mimicry exercises: in situ top bar exercises, marching bar lifts, three-step marching insertion bar lifts, barbell lifts, and short-range insertion bar jumps. The final transition is to the specialized technique practice for conversion and mastery. The two should be carried out alternately to assist the athletes to master the special techniques to improve the level of special techniques.

4. Technical Points of Hanging and Pendulum Stage

4.1 Technical points of the hanging and pendulum stage

After the human body left the ground into the hanging and pendulum stage, this time need to pay attention to two points, the first point, the eyes do not look at the crossbar, consciously do the back to the inverted movement; the second point of attention, the right hand sticking to the pubic

symphysis joint cited, the shoulder downward pressure is also to promote the leg in the direction of stretching, close to the direction of the pole extension, with the help of the pole's direction of the rebound force of the body turn.

This kind of action with the nature of gymnastics, for beginners and intermediate athletes this technical link is not important, with the athletes mastered gymnastics technical skills have a lot to do. It is related to the gymnastic skills mastered.

4.2 Utilizing the pole rebound technique in the pendulum phase

How does the human body utilize the energy stored through the pole-bouncing? That is to shorten the radius of rotation of the human pole that is to increase the curvature of the pole. The curvature of the pole is not a goal to be pursued, the pole curvature is large, excessive bending which is dangerous for athletes, but also requires strong control ability, if the pole curvature is too large, it means that the athlete's upward rebound time is extended, and athletes need to be enough body control ability, if the athlete has completed the pendulum stretch, the pole is not yet bouncing straight, but also the phenomenon of touching off the crossbar. Not every rebound speed is exactly the same to, practice has proved that the human body only with the pole rebound speed is the same, in order to help the elasticity of the pole. Therefore, the swing radius and swing speed should be matched appropriately to maximize the use of pole elasticity.

4.3 Exercise method of hanging pendulum stretching stage

In order for athletes to better complete the technical aspects of the pendulum, different gymnastics techniques correspond to different pendulum phases.

In the basic training stage, the ground push bar turn imitation, the vault three-step bent bar pendulum turn, and the short-range pendulum technical exercises play an important role.

After jumping off the ground, important auxiliary exercises, bar big loop exercises. Its force is similar to the structure of athletes' swinging body force after jumping off the ground, and it is a good auxiliary exercise to train athletes to establish the speed of swinging body. The second one is the bar pendulum and other pendulum pendulum exercises. The bar pendulum exercise, the rope pendulum pendulum exercise, the ring pendulum pendulum exercise, these exercises are closer to the pendulum stretching phase technique. As a stretching stage, they are good auxiliary exercises. Third, trampoline exercises. Trampoline exercises are close to the stretching phase of

the pendulum with the straight pendulum under the body. This exercise is a good auxiliary exercise for the athlete to complete the inverted pendulum turn over the pole.

5. Technical Points of Turning, Crossing Pole and Landing

5.1 Technical Points of the Turning and Crossing Stage

Turning body is the end of stretching, forming an inverted posture facing the crossbar. The theory is that this link is an inertial force process, the human body's center of gravity trajectory has been determined, therefore, when the technical aspects of running, insertion points, swinging the body is not mastered, in the pole will be manifested. Ideal over-pole posture is an inverted position on the pole, the lead and turn is should not make any pause, and will be in the position of both hands directly downward push the pole, increase the upward momentum, help to increase the height of the leap.

In the course of practice, according to the technical and technological links, with which the special close to the auxiliary exercise method is most effective. Seemingly auxiliary exercises, but can prompt athletes to jump higher. In the stage of technical maturity should also be repeated over the pole jump to improve the specialized technology.

6. Conclusions and Suggestions

6.1 Conclusion

The complete technique of modern pole vaulting is characterized by speed and gymnastic exercises for the sport. The running technique is assisted by high knee assisted running with a large stride, high center of gravity, swing leg glaring off the ground and then positively folding the front pendulum, and the running technique of driving the front pendulum with hip force. Based on the analysis of the results of the study, the following conclusions were drawn:

(1) Assisted running speed is a key factor in using a large poundage pole and improving the grip point.

(2) According to the decomposition of forces, accelerating the running aid speed reduces the pole load after lowering the pole. Reduce speed loss.

(3) A reasonable way to utilize the elasticity of the pole is that the speed of the athlete's pendulum needs to be consistent with the speed of the pole bounce.

6.2 Suggestions

(1) Running with intensity and holding the bar for short

distances can improve the athlete's specialized assisted running speed.

(2) The bar big loop exercise's play a positive role in pendulum speed during the pendulum phase.

(3) Enhance the pendulum practice of multiple pendulums to improve the special control ability in the pendulum phase.

(4) Trampoline exercises have a positive effect on improving athletes' sense of rotation and aerial orientation.

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3. Attended Beijing Sport University from September 2001 to July 2008, completing both undergraduate and graduate studies.
4. Since August 2008, has been working in the Department of Physical Education at Renmin University of China. During her tenure, she has published more than 10 articles on track and field training, and participated in 3 research projects, one of which she served as the corresponding author. She also authored a monograph titled *Guidelines for Beginner Pole Vault Training*, which will be published in July 2024.

Survey on the General Academic Emotions of Educational Management Postgraduates——Taking Guangxi Minzu University as an Example

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ARTICLE INFO

Article history

Received: 30 October 2024

Accepted: 11 December 2024

Published Online: 30 December 2024

Keywords:

Academic emotions

Graduate studies

Educational management

ABSTRACT

The enrollment of education management majors has the characteristics of work experience requirements, limited employment directions, and a high proportion of adjustment students. A large number of educational management postgraduates who are in the reality of adjustment enrollment, pursuing postgraduate studies at an older age, and employment confusion have low levels of positive academic emotions and complex academic emotional problems. This study takes the educational management postgraduates at Guangxi Minzu University as an example to investigate their general academic emotions. The conclusion is that educational management postgraduates have lower positive and negative academic emotions than the general college student population; The first year of graduate school has a higher level of positive emotions and a lower level of negative emotions compared to the second year; Married students have higher levels of positive academic emotions and lower levels of negative academic emotions compared to unmarried students; There is no gender difference in academic emotions, but girls who are eager to enter marriage and have high levels of marriage and childbirth anxiety may have higher levels of negative academic emotions than boys and other girls; It is more practical to pay attention to students' positive academic emotions. Based on this, suggestions are made for the management of this major in the school.

1. Research background

1.1 Professional Characteristics

The education management major is a young interdisciplinary field, and it has certain particularities in the field of education. Its uniqueness is reflected in: firstly, the requirement for work experience. The Master's program in Educational Management requires at least three years of work experience, which means three years after graduating from undergraduate studies, in order to apply.

Therefore, master's students in this major are generally older. The second is the direction of employment. The education management major aims to cultivate talents in primary and secondary school education management. Participating in the primary and secondary school teacher establishment examination is the main employment path, but this major is not within the scope of subjects that can participate in the primary and secondary school teacher establishment examination. Students who want to participate in the primary and secondary school teacher estab-

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lishment examination need to register for undergraduate majors. However, students who study non primary and secondary school subjects such as business administration and news media in undergraduate majors are often rejected from most positions in most regions. Thirdly, a high proportion of student sources will be adjusted. There are no professional restrictions in the enrollment of postgraduates majoring in education management in most colleges and universities. Therefore, this major has become a popular major for adjustment. A high proportion of students in the master's class majoring in education management are transferred. Students studying this major because of adjustment generally do not know, like, or agree with this major.

1.2 Research Status

German psychologist Pekrun (2002) first defined academic emotions as "the emotional experiences that students experience throughout their entire learning process". Many studies have shown that factors such as professional identity and age have an impact on academic emotions. Firstly, regarding professional identity, Qin Panbo (2009) proposed that professional identity is the emotional acceptance and recognition that learners generate based on their cognitive understanding of their major, accompanied by positive external behaviors and a sense of appropriateness in their heart. Individuals with high professional identity can generate more positive emotions during the process of learning their.^{[1][8,12]} Zhao Jun pointed out that professional commitment refers to the attitude and willingness of college students to identify with, love their major, and be willing to study wholeheartedly. If the level of professional commitment of students is low, the degree of academic burnout is high.^[2] In addition, regarding age and grade, Zhang Shijing et al. proposed that senior college students have experienced years of learning, and their abilities and knowledge levels have risen to a certain level, with lower levels of boredom compared to the other three grades.^[3] Zhao Lianfang's research points out that there are grade differences in college students' academic emotions, with first-year students having the highest positive academic emotions. However, Li Jie's experiment showed that there was no significant grade difference in college students' academic emotions, which may be related to the majors studied by the participants.^[4] Tian Min pointed out that academic passion is a strong positive academic emotion, and freshmen have a higher level of academic passion. Older graduate students have stronger research abilities and are more likely to have harmonious academic passion.^[5] Overall, most research results indi-

cate that academic emotions change with factors such as professional identity and age, but the patterns of change presented by different studies vary.

The academic performance and academic emotions of graduate students are important indicators of the effectiveness of graduate student management and important references for the reform of graduate student management work, and academic emotions are the direct factors affecting academic performance. Based on professional characteristics and research status, it is speculated that a large number of education management master's students who are in the reality of adjusting enrollment, pursuing graduate studies at an older age, and facing employment confusion have lower levels of positive academic emotions in their daily academic lives, and have complex academic emotional problems, which have a negative impact on their studies. This study takes the Education Management major at Guangxi Minzu University as an example to investigate the general academic emotions of students majoring in Education Management, providing reference for the management and training of graduate students in the school's Education Management major.

2. Research Methods

2.1 Research Object

The survey subjects of this study are the level of interest and enthusiasm of master's students majoring in education management at Guangxi Minzu University in their studies. The Grade-2021 and Grade-2022 master's students majoring in education management were selected as participants, with 26 students in Grade-2021 and 41 students in Grade-2022. A total of 60 valid questionnaires were collected.

2.2 Research tools

The questionnaire used in this survey is the «General Academic Emotion Questionnaire for College Students (88 questions)» developed by Ma Huixia. The test adopts a 5-point scoring method. The alpha coefficient of the original questionnaire ranges from 0.641 to 0.887, and the test-retest reliability ranges from 0.563 to 0.866.^[6] There are a total of 79 questions after deletion. Conduct data analysis using SPSS version 27.0. As shown in Table 1, through reliability analysis, the alpha coefficient of positive academic emotions reached 0.915, and the alpha coefficient of negative academic emotions dimension reached 0.928, indicating a high level of reliability. Moreover, there is a high correlation between the factors of positive emotions dimension and negative emotions dimension.

Table 1. Reliability analysis of questionnaire content after deletion

dimension	Positive emotion Alpha=0.915		Negative emotions Alpha=0.928	
	Positive high arousal	Positive low arousal	Negative low arousal	Negative high arousal
correlation analysis	0.602 ~ 0.840		0.612 ~ 0.899	

3. Research results

3.1 Descriptive Statistics of Academic Emotions Among Educational Management Postgraduates

As shown in Table 2, among the 60 valid questionnaires collected, there were 34 respondents in the first year and 26 respondents in the second year; There are 26 people under the age of 27, 28 people over the age of 27 but under the age of 32, and 6 people over the age of 32; There are 14 married people and 46 unmarried people; There are 5 boys and 55 girls.

As shown in Table 3, the positive and negative emotional factors of students majoring in education and management are significantly lower than those of the original questionnaire norm group of college students, indicating that both positive and negative academic emotions of students majoring in education and management may be lower than those of ordinary college students. This is consistent with the previous speculation that students majoring in education and management have lower positive academic emotions. In addition, educational management postgraduates have lower levels of negative academic emotions compared to ordinary college students.

Table 2. Statistical description of personal background characteristics of educational management postgraduates

Grade	Age	Marriage	Gender
Study 1: 34 people	Under 27 years old: 26 people	Married: 14 people	Male: 5 people
Research 2: 26 people	27-32 years old: 28 people	Unmarried: 46 people	Female: 55 people
	Over 32 years old: 6 people		

Table 3. Comparison table of mean values between educational management postgraduates and norms(p=0.001)

	Factor	Cheerful	Excitement	Proud	Relax	Disappointment	Disgusted	Ashamed	Anxious	Angry
Original questionnaire on college student norms	average value	26.77	16.74	32.04	32.69	22.91	29.19	22.59	41.34	14.18
	standard deviation	3.59	3.19	4.69	5.60	6.29	7.99	4.76	10.19	3.42
educational management postgraduates	average value	24.22	16.42	29.10	31.17	22.87	25.75	20.15	28.00	13.75
	standard deviation	4.78	3.69	6.11	6.70	7.56	7.86	5.93	7.90	4.14
Independent sample analysis t-value		39.212***	34.478***	36.918***	36.02***	23.440***	25.362***	26.315***	27.455***	25.701***

3.2 Analysis of Differences in Personal Background Characteristics

(1) Grade differences in academic emotions among educational management postgraduates

According to Table 4, there are significant differences in the levels of positive and negative academic emotions among first-year and second year graduate students. Among them, first-year graduate students have higher levels of positive emotions and lower levels of negative emotions compared to second year graduate students.

Table 4. General academic emotions t-test of teaching and management majors in different grades and marital status(p=0.05)

	Positive emotions	Negative emotions
grade	T=2.802*, p=0.007	T=-2.287*, p=0.026
marriage	T=1.721, p=0.091	T=-1.109, p=0.272

(2) Differences in academic emotions among students majoring in education and management regarding marriage status

According to Table 4, the data shows that married stu-

dents may have higher levels of positive emotions and lower levels of negative emotions than unmarried students, but the difference in data is not significant. According to Table 2, since there are only 14 married individuals in the sample, the sample size is not large enough to conclude that marital status does not have a significant impact on academic emotions.

Most scholars believe that married graduate students have a high level of positive academic emotions. For example, Tian Min proposed that married graduate students have stronger research abilities and are more likely to have harmonious academic passion and positive academic emotions^[5]. The ideal age for marriage for graduate students is mostly between 26 and 29 years old, with 89.7% of female graduate students choosing to get married before the age of 30^[7]. 90% of graduate students indicate that if they can obtain employment, housing, childcare, and childcare support, they will get married and have children during their graduate studies. This shows that most graduate students are waiting to complete their major life events of marriage and childbirth, and those who have already entered the stage of marriage and childbirth are likely to focus on their studies without these concerns.^{[8]20} Of course, some scholars have pointed out that the marital and reproductive status has no significant impact on academic passion after studying the doctoral student population, and they also believe that this conclusion has reference significance for the master's student population.^[9]

This survey conducted one-on-one interviews with educational management postgraduates from the Grade-2022 of Minzu University. The interviewees are listed in Table 5, and the information obtained is as follows. Male students expect to have stable intimate relationships during their postgraduate studies, but still tend to prefer to get married after graduation and stable employment. On the other hand, female students mostly indicate that as long as the conditions are ripe, they should complete their marriage and childbearing tasks as soon as possible. That is to say, female students may have more worries about marriage than male students during their postgraduate studies, and the possibility of marriage issues affecting academic emotions is also greater.

Overall, this survey report shows that married students have higher levels of positive academic emotions and lower levels of negative academic emotions compared to unmarried students.

(3) Age differences in academic emotions among educational management postgraduates

According to Tables 6 and 7, in terms of positive academic emotions, as the age group increases, the level of positive academic emotions increases, and the difference reaches a significant level. Moreover, under the age of 32, the age difference in positive academic emotions becomes more pronounced. In terms of negative academic emotions, negative academic emotions increase with age, but the difference is not significant.

Table 5. Interviewees

Full name	Age	Gender	Marital status	Fertility status	Do marriage and childbirth issues affect academic emotions
Xiao * Cai	36 years old	female	married	Already nurtured	yes
Lu * xiao	30 years old	female	married	Not yet nurtured	yes
Wang *	28 years old	female	unmarried	Not yet nurtured	yes
Xiong * Min	27 years old	female	unmarried	Not yet nurtured	yes
Hou *	29 years old	female	unmarried	Not yet nurtured	yes
Duan * Ming	35 years old	male	unmarried	Not yet nurtured	yes
Wang *	27 years old	male	unmarried	Not yet nurtured	yes
Zhang * Jie	34 years old	male	unmarried	Not yet nurtured	yes

Table 6. F-test of emotional levels among three age groups of educational management postgraduates(p=0.05)

Positive emotions	Negative emotions
F=5.163**, p=0.009<0.05	F=1.756, p=0.182>0.05
There are differences among the three age groups	There is no difference among the three age groups
Levin statistic 0.324, p=0.724>0.05	
Homogeneity of variance	

Table 7. Multiple tests of positive emotions (LSD) among three age groups of educational management postgraduates (p=0.05)

Age	Age	Mean value difference	Standard error	Significance	analysis
< 27 years old	27-32	-3.6588*	1.2177*	0.004	those 27-32 is higher
<27 years old	>32 years old	-4.0897*	2.025*	0.048	those >32 years old is higher
27-32	> 32 years old	-0.4310*	2.0114	0.831	those >32 years old is higher

(4) Gender differences in academic emotions among educational management postgraduates

According to Table 2, there were only 5 male respondents among the valid questionnaires collected in this survey, and the sample size was too small, so gender statistical analysis was not conducted.

The research report by Zhang Shijing et al. shows that male college students have significantly higher levels of negative emotions than female college students, and higher levels of positive emotions than female college students. This is because female students mature psychologically earlier than male students, have more delicate emotions, richer inner experiences, are good at reflecting on themselves, restraining themselves, and are willing to explore the joy of learning. However, male students have slower emotional development than female students, and some male students are still in the late stages of puberty, with relatively weaker emotional regulation abilities^[3]; Li Jie also found in her research that boys have more negative academic emotions than girls, because girls are more willing to confide in friends or vent through crying compared to boys, while boys are not good at timely resolving negative emotions and carry greater social responsibility and role pressure.^[4] Zhang Xiaodan proposed that girls have significantly higher levels of positive arousal than boys^[10]. However, Tian Lan believes that male college students benefit from better leisure activities and have lower academic pressure than female students^[11]. Lin Lin et al. also suggest that male students have a higher level of academic passion than female students^[12]. Xu Xiancai's viewpoint on the diverse impact of gender on academic emotions is that academic emotions have the characteristics of diversity, situationality, dynamism, and individuality. Individuality includes two aspects: self-awareness and logical reasoning ability. Only when students' self-awareness is very interested in learning tasks, highly capable and confident, and they believe that what they are learning is valuable, will positive academic emotions be generated. Students with high logical reasoning ability experience the most academic emotions as happiness, while students with low logical reasoning ability report more anxiety and anger, and students with moderate logical reasoning ability report the most boredom.^[13]

Based on the research of others and the influence of marriage and age on academic emotions mentioned in this survey, the gender report on academic emotions in this survey shows that there is no gender difference in academic emotions among students majoring in education and management.

3.3 Regression Analysis of the Influence of Grade and Age on Academic Emotions among Educational Management Postgraduates

Because both the total scores of positive and negative emotions are continuous variables, the Pearson product difference correlation method was used to study the relationship between the two. After testing, it was found that $r=-0.216$ $P=0.097>0.05$, and there was no significant relationship between the two. That is to say, those with high levels of academic positive emotions did not necessarily have high levels of academic negative emotions.

Through the above analysis, it is understood that grade and age have an impact on emotional levels, but there is no significant relationship between positive and negative emotions. Therefore, further search for the strength of the relationship between grade and age on positive and emotional states.

(1) Construct an equation for predicting positive emotional variation

Assuming the equation is $Y=a_1x_1+a_2x_2+b$, where x_1 is grade, x_2 is age, and Y is positive emotional level. According to Table 8, after inspection, $F=7.33$, $p=0.001<0.05$, The linear relationship holds. According to the coefficient analysis in the table below, grade, age, and positive emotion level have significant predictive effects. The standardized regression equation can be constructed as $Y=-2.3x_1+3.5x_2$.

(2) Build an equation to predict the variation of negative emotions

Assuming the equation is $Y=a_1x_1+a_2x_2+b$, where x_1 is grade, x_2 is age, and Y is negative emotion level. According to Table 9, after testing, $F=3.29$, $p=0.044<0.05$, indicating a linear relationship. According to the coefficient analysis in the table below, grade level has a significant predictive effect on negative emotion level. The standard-

ized regression equation can be constructed as $Y=0.3x_1-0.1x_2$.

Comparing the positive academic emotion prediction equation $Y=-2.3x_1+3.5x_2$ (20.5% variation report) with the negative academic emotion prediction equation $Y=0.3x_1-$

$0.1x_2$ (10.3% variation report), the former is more valuable for studying the general academic emotions of students majoring in education and management. The relationship strength between grade and age on positive academic emotions is higher than that on negative academic emotions.

Table 8. Coefficient test for predicting positive emotion variation equation

	Non standardized coefficient		Standardization coefficient	t	Significance
	B	Standard error	Beta		
(Constant)	25.562	2.517		10.155	0.000
grade	-2.658	1.159	-0.278	-2.294	0.025
Age	2.185	0.884	0.300	2.473	0.016

Table 9. Coefficient test for predicting the variation equation of negative emotions

	Non standardized coefficient		Standardization coefficient	t	Significance
	B	Standard error	Beta		
(Constant)	19.969	3.372		5.922	0.000
grade	3.069	1.552	0.255	1.978	0.053
Age	-1.359	1.184	-0.148	-1.148	0.256

4. Conclusion and Suggestions

4.1 Conclusion

This study conducted a survey on the general academic emotions of Master’s students majoring in Education Management at Guangxi University for Nationalities through statistical quantitative analysis and supplementary interviews. The conclusions are as follows.

Firstly, compared to the general college student population, students majoring in education and management have lower levels of positive and negative academic emotions. This may be due to the fact that students majoring in education and management are older, more physically and mentally mature, and better at self-regulation^[4].

Secondly, in terms of grade level, there are significant differences in the levels of positive and negative academic emotions among first-year and second year graduate students. Among them, first-year graduate students have higher levels of positive emotions and lower levels of negative emotions compared to second year graduate students. The possible reason is that freshmen who return to campus from the workplace have a higher sense of novelty in campus life, and they have certain research pursuits and academic expectations. With the passage of time and the arrival of heavy learning tasks, these positive emotions gradually fade away. Meanwhile, as the relationship between classmates approaches, peer support is strengthened, which can help alleviate negative emotions such as anxiety and stress to some extent.

Thirdly, in terms of age, as the age group increases,

the level of positive academic emotions increases, and the difference reaches a significant level. Moreover, under the age of 32, the age difference in positive academic emotions becomes more pronounced. As age increases, negative academic emotions rise, but the difference is not significant. The possible reason is that enrolling at the age of 32 means graduating at the age of over 35, and in most regions, obtaining a master’s degree no longer allows one to take the civil service examination. Many 32 year old scholars, on the other hand, no longer face the pressure of civil service examinations and can purely devote themselves to scientific research and professional studies. Moreover, as one grows older, they increasingly realize the importance of learning and cherish the opportunity to regain learning. At the same time, it cannot be denied that job seeking pressure still exists in the future, and job seeking anxiety may also increase with age.

Fourthly, in terms of marital status, married students have higher levels of positive academic emotions and lower levels of negative academic emotions compared to unmarried students. The possible reason is that most of the education and management majors are female, and most female students hope to complete the important life event of marriage and childbirth as soon as possible. Those who have entered the stage of marriage and childbirth will be able to focus on their studies without worrying about this aspect. In addition, a stable family also provides emotional support for studying with peace of mind. This study also concluded that there is no gender difference in academic emotions among students majoring in education and management. However, it is expected that girls with

high levels of marriage and childbirth anxiety may have higher levels of negative academic emotions than boys and other girls.

Fifth, the strength of the relationship between grade and age on positive academic emotions is higher than that on negative academic emotions. Focusing on the factors that influence students' positive academic emotions, mobilizing their learning enthusiasm, and stimulating academic passion is of greater practical significance.

4.2 Suggestion

(1) Adhere to the principle of putting people first and pay attention to emotional states

In terms of management philosophy, more attention should be paid to the mental health level of students, and monitoring and caring for their academic emotions should be emphasized. The system of heart to heart talks should be utilized to provide feedback and tracking of students' urgent and difficult problems, especially in terms of career education and guidance. Consultation, internship observation, and diversified guidance should be provided in the employment prospect, and needs, platforms, and opportunities should be collected, developed, and created in the internship and job search to reduce negative academic emotions caused by difficulties in finding jobs due to older age and fewer professional positions. Students who are older and encounter major issues related to marriage and childbirth may have many questions and anxieties about academic changes such as taking leave or taking a leave of absence. The school should provide more humanistic care, patient communication, assistance in analysis, and rational persuasion.

(2) Reforming the curriculum system and strengthening professional characteristics

The professional courses have distinct characteristics and high applicability to the major, which helps students improve their professional identity. Since the autumn of Grade-2021, the education management major at Guangxi Minzu University has changed its duration from 2 years to 3 years. However, the curriculum system has not been reformed and improved yet. Currently, there are still not many courses that reflect the characteristics of this major in the master's program of education management at Guangxi University for Nationalities. The master's programs in education management at Nanjing Normal University include 《Comparative Education Economics and Management》 《Quantitative Research Methods in Education Management》 《Educational Leadership》 etc. while the master's program in education management at Donghua University of Technology includes 《Class Management》 etc. These

courses with distinct professional characteristics are lacking in Guangxi Minzu University. It is recommended to learn from other schools for talent cultivation. Program course content, Accelerate the reform of the curriculum system to strengthen professional characteristics and enhance students' professional identity.

(3) Activate activity mechanisms and stimulate academic passion

Quality club activities and leisure activities can help college students relieve stress, promote mental health, and enhance their interpersonal communication skills, thereby strengthening their sources of social support, improving their ability to adjust their emotions, and alleviating negative academic emotions. The school's Youth League Committee, School Research Committee and other relevant departments should develop activity content based on the characteristics of the Master of Education major, such as "Class Brand Building Internship Activity", "Primary and Secondary School Education Management Year Plan Planning Competition", "Education Management Internship Experience Exchange and Sharing Meeting/Internship Report Award" etc., to motivate students to study professional practice and improve their positive academic emotions through activities, thereby enhancing their academic self-efficacy^[4]. The school education development foundation and other relevant departments have established a certain proportion of education management major projects to support students' academic research activities, cultivate research creativity, and stimulate academic passion.

Project

Degree and Graduate Education Reform in Guangxi Topic: "Three Main, Three Learning, and Three Party Progress", Research and Practice on the Management Model of Education Master's Practice (JGY2022110).

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Research on the Practice of Psychological Health Education in Primary and Secondary Schools Based on the Theory of Teaching Process

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ARTICLE INFO

Article history

Received: 1 December 2024

Accepted: 12 December 2024

Published Online: 30 December 2024

Keywords:

Primary and secondary schools

Mental health education

Teaching process

ABSTRACT

With the increasing attention of society to adolescent mental health problems, mental health education in primary and secondary schools has become an important issue in the field of education. As one of the basic theories of pedagogy, the teaching process theory emphasizes the clarity of the goal, the controllability of the process and the evaluation feedback mechanism, which provides a new perspective and method for mental health education. This paper aims to analyze how to integrate the teaching process theory into the mental health education of primary and secondary schools through practical cases, optimize the mental health education process, and promote the overall improvement of students' psychological literacy.

1. Introduction

In April 2023, 17 departments such as the Ministry of Education issued a notice on the Comprehensive Reinforce and Improving the Special Action Scheme for the Mental Health Work of Students in the New Era (2023-2025), which pointed out that the promotion of the physical and mental health and all-round development of students is a major issue of concern to the Party Central Committee, the concern of the people and the concern of society.^[1]

With the increasing attention of society to the problem of adolescent mental health, mental health education in primary and secondary schools has become an important issue in the field of education. As one of the basic theories of pedagogy, the teaching process theory emphasizes the clarity of the goal, the controllability of the process and the evaluation and feedback mechanism, which provides a

new perspective and method for mental health education. This paper aims to explore how to integrate the teaching process theory into the mental health education of primary and secondary schools, optimize the process of mental health education, and promote the overall improvement of students' psychological quality.

2. Teaching Process Theory

2.1 The Definition of Teaching Process

To understand the teaching process, we must first understand what teaching is. Generally speaking, the concept of teaching can be understood from the broad and narrow levels. Broadly speaking, teaching is all the purposeful learning activities that the instructor guides the learner. The teacher here is mainly a teacher, but it

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can also be someone other than a teacher. The learner is mainly the student, but it can also be someone else. In a narrow sense, teaching refers to the learning activities that students are guided to carry out in school. Although it is mainly manifested within the scope of the classroom, with the expansion of the scope of the curriculum, the expansion of the form of teaching organization and the constant change of teaching purposes, the scope of teaching activities is not limited to the classroom.

Therefore, the teaching process is the development process of teaching activities, which is a unified process of students' understanding of the existing knowledge and experience of human beings under the guidance of teachers, transforming the subjective world, forming harmony and developing personality in communication practice activities.

2.2 The Essence of Teaching Process

2.2.1 The understanding of the teaching process

The cognition of teaching process originates from the cognition of the essence of teaching process in Pedagogy edited by former Soviet educator Kailov.^[2]The cognition theory refers to the process of students' knowledge of truth from ignorance to knowing, from knowing little to knowing much, so as to continuously improve students' ability in all aspects. Knowledge theory is based on the knowledge of various subjects that have been summarized by people before, and focuses on learning indirect experience. In school, teachers systematically guide and impart knowledge to students in a planned way.

2.2.2 The development of the teaching process

The development theory was put forward by the former Soviet Union educationalist Zankov. The development theory of teaching process holds that teaching is not only a process of cognition, but more importantly a process of promoting students' development. The ultimate goal of knowledge and skills formation is to promote students' development. To enable students to develop knowledge, skills, emotions, attitudes, values and other aspects, emphasizing that the real purpose of teaching is to promote the development of students' emotions, will quality and personality.^[3]

2.2.3 Practice of teaching process

The teaching process is an American pragmatist educator Dewey put forward that the practice theory of cognitive process mainly refers to three aspects: the educational process itself is one of the forms of human practice; In the narrow sense, the teaching process emphasizes that teachers carry out purposeful social transformation to students according to the requirements of social development. In

this respect, the teaching process is also a practical process; In the process of teaching, students master knowledge, form skills, and establish a correct outlook on life, values and world.^[4]

2.2.4 The discovery of teaching process

The discovery theory of teaching process is put forward by American psychologist Bruner, whose core point of view is to emphasize students' active inquiry and discovery process in teaching. He believes that teaching is not only about teachers teaching knowledge to students, but more importantly, it is about guiding students to explore, discover and construct knowledge through their own efforts.^[5]In this process, students are no longer passive recipients, but active participants and creators. Bruner emphasizes the importance of the learning process, including links such as acquiring new information, transforming knowledge and evaluating the learning process, aiming to promote students' understanding and mastery of the basic structure of the subject by discovering ways to learn, while cultivating their intuitive thinking, intrinsic motivation and ability of information extraction. This teaching method helps students develop the ability of independent learning and self-discovery, laying a solid foundation for lifelong learning.

The process of cognition is not only to know a knowledge point, but to be able to use knowledge; The process of development is the process of students' all-round development, including not only the development of intelligence, but also the development of non-intelligence, not only the development of knowledge and cognition, but also the development of other aspects; The practice process is a process of how to apply the knowledge to the real life after students learn and master the knowledge.^[6]

2.3 Critical Components of Teaching Process Theory

2.3.1 Goal setting

Goal setting is the starting point of the teaching process and the direction of the whole teaching activity. It clarifies the expected outcome of the teaching activity and provides clear direction for both teachers and students. The teaching goal should have expected, generative, concreteness and to wait for a characteristic, in order to monitor in the process of teaching and assessment.

2.3.2 Instructional design

Teaching design is a process of systematic planning of teaching activities according to teaching objectives and students' characteristics. It involves the selection and organization of teaching content, the application of teaching

methods and means, the allocation of teaching environment and resources and so on. In terms of teaching content, it is necessary to select teaching content suitable for students' cognitive level according to teaching objectives and course standard, and carry out reasonable organization and arrangement; In terms of teaching methods, it is necessary to choose appropriate teaching methods according to teaching content and students' characteristics, such as teaching method, discussion method, experiment method, case analysis method, etc., in order to stimulate students' learning interest and enthusiasm; In terms of teaching environment, it is necessary to create a teaching environment conducive to students' learning, including physical environment (such as classroom layout, teaching equipment, etc.) and psychological environment (such as learning atmosphere, teacher-student relationship, etc.); In terms of teaching resources, it is necessary to make full use of various teaching resources, such as textbooks, teaching AIDS, multimedia courseware, network resources, etc., in order to improve the teaching effect.

2.3.3 Implementation process

The implementation process is the specific implementation stage of instructional design, and it is also the process in which teachers and students interact and jointly achieve teaching goals. In the teaching process, teachers should pay attention to the following aspects: First, introduce new lessons: by creating situations, raising questions, etc., stimulate students' learning interest and thirst for knowledge; Second, teaching new knowledge: using appropriate teaching methods and means to impart new knowledge and new skills to students; Third, organize activities: guide students to participate in various teaching activities, such as discussion, experiment, exercise, etc., in order to consolidate the knowledge and improve the ability; The fourth is to pay attention to individual differences: pay attention to students' learning status and individual differences, and give timely guidance and help.

2.3.4 Evaluation and feedback

Evaluation feedback is an indispensable part of the teaching process, which provides teachers and students with the basis for improvement and optimization through the monitoring and evaluation of the teaching effect. The purpose of evaluation is not only to judge the realization of teaching objectives, but also to promote students' learning and development. The way of evaluation should include classroom performance evaluation, homework evaluation, examination evaluation and other forms, each evaluation method has its unique advantages and scope of application. The mechanism of feedback is that teachers

provide feedback to students in a timely manner, designated the strengths and weaknesses in their learning, and make specific suggestions for improvement. At the same time, teachers should adjust teaching strategies and methods according to the evaluation turned out to improve the teaching effect.

In the teaching process, goal setting, teaching design, implementation process and evaluation feedback are inter-related and interact with each other. In the teaching process of mental health education in primary and secondary schools, teachers should flexibly select and use these elements according to the teaching objectives and students' characteristics, so as to achieve the optimization of teaching effect.

3. The Application of Teaching Process Theory in Primary and Secondary School Mental Health Education and Practical Case Analysis

3.1 Setting of Teaching Objectives

The curriculum objectives of psychology courses in primary and secondary schools should be clear and systematic, and pay attention to operability and development.^[7] When designing curriculum objectives, teachers need to deeply understand the actual needs of students, and formulate specific requirements and standard according to the teaching purpose, content and the actual situation of students.^[8,9] In addition, curriculum objectives should be designed with students' positive and happy life construction as the design goal and respect teachers' practice rules. The curriculum objectives of psychology courses in primary and secondary schools can be designed from three dimensions: knowledge and skills, process and method, emotional attitude and values, and fully embody the educational concept of all-round development.

Case Study -- "It's Better to Talk -- Interpersonal Communication Activity Design for seventh Grade Students"^[10]

In this teaching plan design, the author formulated detailed three-dimensional goals according to the learning situation of seventh grade students: knowledge and skill goals -- to understand the negative impact of "violent" language in interpersonal communication, and to know the four steps of "speaking well"; Process and method goal -- to master the four steps of "speaking well" through step-by-step interpretation of the "toolkit" information and role-playing problem-solving situations; Emotions, Attitudes and values goals - By integrating the four steps of "speaking well" into practical problem solving, you can experience the positive emotional experience brought by this non-hurtful way of communication, establish correct

communication concepts, and improve your awareness and ability to solve problems.

3.2 The Design of Teaching Content

The content design of psychology courses in primary and secondary schools should comprehensively consider teaching content, teaching methods, teaching activities, teaching resources and other aspects, so as to ensure that the course can effectively promote students' mental health and all-round development.

Case Study -- "Finding Space in Time -- Time Management Psychological Counseling Activity Class for High School Students"^[11]

The design of this lesson refers to the content of "Finding 'space' in time" in the second year of high school (one volume) of Shandong Pictorial Publishing House's "Mental Health" to help students understand and learn scientific time management methods and improve learning efficiency. In the process of activities, follow the principle of group guidance, pay attention to the creation of situations, to help students in the interaction of learning, experience, perception. Through the "grasping time" introduced theme, mobilize the enthusiasm of students. In the case analysis section, students are asked to analyze and discuss the current situation of time management of their peers, reflect on some time management problems in their daily life and learning process, so as to understand whether there is still "space" in their time that can be used. Using the "magic time bottle" and the four-quadrant method of time management, the group discussed the methods of "efficient use of time" in the way of "brainstorming", so that students learned that it is a more efficient way to use time to solve the "important but not urgent" things.

3.3 The Process of Teaching Implementation

The implementation process of psychology course in primary and secondary schools is a systematic and coherent educational process, aiming at promoting the development of students' mental health and improving their psychological quality. This process mainly includes the introduction stage, the theme activity stage and the summary stage.^[12,13]

Case Study -- "My Emotions are My Master -- Emotional Counseling Psychology Class for Senior Primary School Students"^[14]

In the introduction stage, the author uses the game of "you play I guess" to introduce, through the warm-up game, to create a relaxed and safe psychological classroom atmosphere, stimulate students' interest, and lead out the theme of this lesson -- emotion. In the theme ex-

ploration stage, students through personal experience activities, guide students to understand emotions, experience emotions and distinguish emotions; Through the study of stories and cases, students understand that different thoughts on the same thing will lead to different emotions, and have a preliminary understanding of the ABC theory of emotions; By filling in the emotion weekly record, I can recall my emotions and pay attention to the changes of my emotions, so as to lay the groundwork for finding ways to transform emotions in the next step. Through sharing and communication, open your mind and find a suitable way to transform your negative emotions. In the summary stage, help students review the positive influence brought to them by this lesson, emphasize that when they encounter negative emotions, they should face them calmly and actively transform them. Happiness is up to their own decision.

3.4 Teaching Evaluation and Feedback

The evaluation and feedback of psychological courses in primary and secondary schools is an important part of mental health education, whose purpose is to comprehensively understand the learning effect of students in mental health courses, the teaching quality of teachers and the overall effect of the course, and make necessary adjustments and optimization accordingly. Therefore, teaching evaluation should follow certain purposes and principles:

Make clear the purpose of evaluation: teaching evaluation is to evaluate the psychological growth and change of students after learning mental health courses, understand the teaching effect and teaching quality of teachers, reflect the rationality and effectiveness of curriculum Settings, and provide a basis for subsequent curriculum improvement and teaching optimization.

Evaluation principles to be followed:

Developmental principle: pay attention to the dynamic process of students' psychological quality and personality development, with the goal of promoting students' all-round development.^[15]

Scientific principle: Use scientific and reasonable methods and tools for evaluation to ensure the objectivity and accuracy of the evaluation turned out.^[16]

Comprehensiveness principle: comprehensive consideration of various aspects of students' performance, including knowledge mastery, skill improvement, emotional attitude, etc.^[17]

Case Study -- "The pursuit of light, will eventually shine -- High school students" career planning "theme psychological lesson"^[18]

After the end of this lesson, the author carried out a detailed class evaluation and reflection:

In terms of topic selection, it meets the actual needs of high school students. Based on the turned out of the previous investigation (which shows that most high school students have little thinking about the future), the topic selection is appropriate based on the realistic needs of students.

In terms of curriculum, students can preliminarily perceive the close relationship between individual personality characteristics and career choice through the famous works and the characters portrayed in film and television works that they are familiar with. Then, through the cognition of themselves and the connection with the future, they can be linked, step by step, and closely follow the theme.

In terms of students, the whole activity, we can see that most of the students were touched, especially in the role play stage, most of the students showed their true feelings, and some students clearly said: "I will use the personality characteristics measured in the class today to choose their own career, I seem to see a year later when filling in the voluntary application of their own." This kind of change is gratifying, especially the change that can be implemented in specific behaviors is even more rare.

4. Conclusion

4.1 The Effect and Significance of the Teaching Process Theory in the Practice of Mental Health Education in Primary and Secondary Schools

The application of teaching process theory has greatly improved the effectiveness of mental health education in primary and secondary schools. It not only helps students to better grasp mental health knowledge in class, enhances self-regulation ability, but also promotes effective interaction between teachers and students and builds a positive learning atmosphere. At the same time, it also provides a systematic teaching framework for teachers, promotes the improvement of teachers' professional quality, and promotes the development of mental health education to a more scientific and humanized direction.

4.2 Prospect of Future Research

Future research should continue to explore and improve the specific application strategies of teaching process theory in mental health education, especially how to effectively penetrate mental health education in different disciplines. At the same time, the research should pay attention to the professional development of teachers and explore how to improve teachers' mental health education ability through training to better support students' mental growth and development. In addition, future research should also

consider the use of modern technological means, such as digital tools and online platforms, to enhance the effectiveness and accessibility of mental health education.

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Progress in the Application of Simulated Teaching in Diagnosis and Internal Medicine Teaching

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ARTICLE INFO

Article history

Received: 15 October 2024

Accepted: 30 December 2024

Published Online: 30 December 2024

Keywords:

Simulated teaching

Diagnostic science

Internal medicine teaching

Application Progress

ABSTRACT

With the rapid development of modern medical education, traditional teaching methods are unable to meet the needs and have obvious limitations. In this situation, simulation teaching, as an innovative teaching method, has gradually become a focus in the educational practice of diagnosis and internal medicine, demonstrating irreplaceable advantages. Simulated teaching is a teaching strategy that involves the careful design and guidance of a mentor, role-playing, entering a special context constructed by the mentor, using professional teaching equipment, and reproducing real medical scenes in a simulated environment. Simulation teaching, as an effective alternative method, has gradually become increasingly important in the field of medical education, receiving widespread attention and application, and has become an important way to solve current teaching problems.

1. Introduction

With the expansion of enrollment scale, schools are facing a dual shortage of teaching staff and facilities, resulting in a decrease in opportunities for students to practice and train on campus. Under the pressure of maintaining the efficiency of outpatient and inpatient services, hospitals often adopt conservative strategies for interns' outpatient internships, sometimes even not arranging them at all, which affects their participation in clinical diagnosis and treatment activities. The strict requirements of current laws and regulations make it difficult for teachers to fully demonstrate diagnostic skills during bedside teaching, and to easily allow students to practice, depriving interns of key opportunities for practical learning. Simulated teaching, with its characteristics, can reproduce the physiologi-

cal structure and function of the human body and analyze the clinical characteristics of patients. Control disease progression, provide a realistic training environment for medical students, and deepen their understanding and mastery of clinical skills. By arousing students' curiosity and utilizing various learning methods such as auditory and oral communication, we aim to deepen their memory and application of professional knowledge. Through simulated teaching, clinical skills such as consultation and physical examination can be practiced without contact with real patients, enhancing their practical abilities. Simulated teaching can also evaluate the communication skills and diagnostic techniques of medical students, provide timely feedback and guidance, and promote comprehensive growth.

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2. Types of simulated teaching

2.1 Virtual Reality (VR) Simulation

By utilizing virtual reality (VR) technology, a highly simulated computer simulation environment can be constructed, allowing participants to experience and interact in an immersive manner. Virtual reality technology, relying on high-performance computer graphics processing units (GPUs) and professional head mounted display devices, has successfully constructed highly simulated virtual environments, allowing users to experience an immersive experience as if traveling to a brand new virtual world. In the fields of diagnosis and internal medicine, this technology has brought revolutionary changes to medical education, especially showing great application prospects in surgical simulation training and ward management process simulation. Through virtual reality technology, medical students can practice repeatedly in simulated surgical scenarios, improve their surgical skills, and lay a solid foundation for future actual surgical operations, in pursuit of better treatment outcomes. This technology can also accurately simulate the ward environment, allowing learners to immerse themselves in the ward management process and effectively improve their practical operation and management level^[2-3].

2.2 Augmented Reality (AR) Simulation

Augmented reality (AR) technology achieves a perfect combination of virtual and real by overlaying virtual information on top of the real world. This technology captures real images through cameras and generates virtual content through computer processing. Augmented reality (AR) technology opens up avenues for technological innovation by overlaying virtual information in the real environment. Its application in the medical industry is particularly prominent, especially in remote medical consultation, surgical navigation, and customized medical plan planning, demonstrating significant potential and value. In medical education, especially in the teaching practice of diagnosis and internal medicine, AR technology plays a vivid and effective auxiliary teaching role, helping students to have a deeper understanding of the ideas and treatment steps of disease diagnosis. For example, through AR glasses, medical professionals can view and analyze patients' health data and imaging information in real time, conduct virtual examinations, and develop more accurate treatment plans. AR technology can also simulate the action process of drugs in the human body, visually demonstrating the effects and possible adverse reactions of drugs to doctors.

2.3 Standardized Patient (SP) Simulation

Standardized patients (SP) are normal individuals or patients who can simulate actual clinical problems through systematic training^[4]. They are able to accurately simulate the clinical symptoms and manifestations of actual patients. In the field of medical education, especially in the teaching activities of diagnosis and internal medicine, SP plays an indispensable role, mainly used for training key skills such as simulating clinical consultations and physical examinations. Through interaction with SP, medical students can learn various manifestations of diseases and their treatment methods in an approximately real medical scenario, thereby effectively improving their clinical operational skills. In addition, SP can provide fair evaluation of students' clinical skills and offer beneficial feedback, allowing students to continuously improve their clinical skills and promote the sustainable development of their professional skills.

2.4 Case Teaching and Problem Based Learning (PBL)

Although case-based teaching and problem-based learning (PBL) are not entirely within the scope of simulation teaching, they are often combined with simulation teaching in medical education. In the teaching process of diagnosis and internal medicine, case-based teaching method and problem-based learning (PBL) are two widely recognized and efficient teaching modes. The case teaching method encourages students to deepen their understanding and application of knowledge through the design of highly realistic clinical cases. On the other hand, the PBL method focuses on problems and stimulates students' self-learning, critical thinking, and problem-solving abilities through group discussions, thereby cultivating their clinical thinking and evidence-based medicine skills^[5-6].

3. The Application of Simulated Teaching in Diagnosis

3.1 Simulated medical history collection and physical examination

In diagnostic education, medical history collection and physical examination constitute the core content, and simulation teaching plays a significant role^[7-8]. By creating a simulated medical history collection scenario, students can practice how to systematically inquire about the patient's main symptoms, medical history, personal background, and family history, and comprehensively understand the patient's health status. Simulated physical examination

training helps students master the skills of detecting patients' vital signs, observing skin and mucosal conditions, learning lymph node examination, as well as practical operations such as abdominal palpation, lung percussion, and cardiopulmonary auscultation.

3.2 Simulate diagnostic thinking and decision-making process

Diagnostic thinking is the process in which doctors analyze, judge, and differentiate a patient's condition by synthesizing various information such as medical history, physical examination, and laboratory results. Simulated teaching involves designing various clinical scenarios and disease development models to allow students to experience real diagnostic thinking and decision-making processes. During this process, students need to practice disease analysis, develop diagnostic plans, choose examination methods, and develop treatment strategies based on examination results.

3.3 Application of Simulation Diagnostic Technology

With the development of medical technology, various advanced diagnostic techniques continue to emerge. Simulated teaching has value in teaching the operation process of technology, simulating the operation steps and result interpretation of imaging examinations such as electrocardiogram, echocardiogram, CT, MRI, as well as the sample collection, processing, and analysis process of laboratory examinations, so that students can familiarize themselves with relevant operations and precautions. Combining advanced technologies such as virtual reality (VR) and augmented reality (AR), simulate teaching to create a realistic operating environment, such as using VR technology to simulate surgical operation scenes or conducting virtual anatomy practice through AR technology, to enhance students' learning effectiveness and practical skills.

4. The Application of Simulated Teaching in Internal Medicine

4.1 Simulate the diagnosis and treatment of common diseases

Internal medicine covers a wide range of common diseases, including cardiovascular, respiratory, and digestive diseases. Simulation teaching method, as an effective teaching strategy, allows medical students to directly experience the typical manifestations of these diseases in a simulated environment and conduct preliminary diagnosis and treatment operations. Taking cardiovascular disease

simulation training as an example, students can use electrocardiogram and echocardiography equipment to diagnose diseases such as hypertension and coronary heart disease based on the patient's medical history and clinical manifestations. In the simulation of respiratory system diseases, students have the opportunity to simulate lung function tests and chest X-ray examinations to identify diseases such as COPD and asthma. Through simulation exercises, students can not only deepen their understanding of disease mechanisms and clinical characteristics, but also master relevant treatment techniques proficiently, laying a solid foundation for their future clinical internships and professional careers.

4.2 Comprehensive management of simulated complex diseases

Internal medicine also involves dealing with complex diseases involving multiple organs and systems, requiring comprehensive and integrated management. Simulated teaching provides a practical platform for students to explore comprehensive assessments of complex diseases and analyze customized treatment plans. The diseases involved in internal medicine are often complex and intricate, and treatment management requires interdisciplinary collaboration. In this context, assist students in mastering comprehensive management skills for dealing with these complex illnesses. Taking the simulated training of diabetes as an example, students need to simulate and formulate personalized nutrition plans, exercise prescriptions and drug treatment plans, with the aim of effectively regulating the blood sugar level of patients and preventing related complications. For simulated teaching of cardiovascular diseases, students need to simulate complex surgeries such as coronary angiography and heart bypass surgery, and comprehensively consider the patient's preoperative preparation, postoperative care, and long-term health management. Through simulation exercises, students can gain a deeper understanding of the essence and techniques of comprehensive management of complex diseases, thereby improving their abilities in clinical decision-making and interdisciplinary teamwork.

4.3 Simulated treatment and care of severe patients

In internal medicine education, the treatment and care of critically ill patients are important components of internal medicine. Simulated teaching can help students become familiar with and master the treatment process and nursing skills for critically ill patients. For example, in the simulation teaching of acute myocardial infarction, students need to simulate emergency coronary intervention

treatment, as well as perform emergency operations such as cardiopulmonary resuscitation and defibrillation. In simulated teaching of respiratory failure, students need to simulate respiratory support treatments such as mechanical ventilation and oxygen therapy, while also monitoring the patient's vital signs and administering medication. Through simulated teaching, students can better understand the treatment process and nursing skills of critically ill patients, improve their emergency response and teamwork abilities, and be fully prepared for future clinical practice.

5. Conclusion

The simulation teaching method has made breakthrough achievements in the educational practice of diagnosis and internal medicine, bringing revolutionary changes to medical education. By creating realistic or highly realistic clinical scenarios, we provide students with a safe and efficient practical platform to enhance their clinical skills and ability to cope with complex medical situations. In terms of diagnosis, not only does it help students proficiently master basic skills such as medical history collection, physical examination, and diagnostic reasoning, but it also strengthens students' deep understanding and application of disease diagnosis and treatment strategies by reproducing the diagnosis and treatment process of common and difficult diseases. It emphasizes the cultivation of students' communication skills and teamwork spirit, as well as effective interaction with patients and colleagues. In the education of internal medicine, simulation teaching simulates the handling of critically ill patients and high-risk clinical operations such as nursing, allowing students to accumulate experience in practical operations and enhance their ability to handle complex diseases and emergency situations. At the same time, simulation teaching also promotes innovation and development of teaching methods, making medical education more adaptable to the requirements of the times and the personalized development needs of students. With the rapid development of technology and the continuous progress of medical education, the application of simulation teaching in diagnosis and internal medicine will become more extensive and in-depth. Integrating advanced technologies such as virtual reality (VR) and augmented reality (AR) will enhance the sense of participation and interactivity in simulated

teaching, allowing students to learn and practice in a more realistic environment.

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