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A Study on Yunnan Folk Music Composers: Taking Xiaogeng Liu, Yong Chen, and Li Wan as Examples

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Abstract:

Yunnan, a mysterious and rich land in the southwest frontier of China, is home to 26 ethnic minorities. As the province with the widest distribution and most kinds of ethnic minorities in China, Yunnan is a treasure house of ethnic music and is known as the “ocean of ethnic music.” This province, full of multicultural colors, has always been a treasured place for many music creators to find inspiration and muse. Since the founding of New China, works based on Yunnan folk music have sprung up. On this red plateau, many talented composers are not only deeply rooted in Yunnan’s rich ethnic music soil, but also use Western and systematic creative techniques as tools to continuously explore and show the unique charm of Yunnan’s ethnic minority music. There are many musical works with Yunnan ethnic characteristics, which represent the life emotions, historical legends, and cultural characteristics of various ethnic minorities, and are treasures in Chinese ethnic music. This paper will take three Yunnan folk music composers—Xiaogeng Liu, Yong Chen, and Li Wan, and one of their representatives as examples to discuss their outstanding contributions in the creation of Yunnan folk music works.

Keywords:

Yunnan
Folk music
Composer
Xiaogeng Liu
Yong Chen
Li Wan

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1. Appreciation of Xiaogeng Liu and his representative works of folk music

1.1. Introduction of Xiaogeng Liu

Xiaogeng Liu was born in Luquan, Yunnan Province in 1955. He is a national first-class composer and professor. He is also a member of the Chinese Musicians Association, Vice Chairman of the Yunnan Musicians

Association, and honorary Dean of Music College of Yunnan Arts University. In 1978, he was admitted to the Music Department of Yunnan Arts University to study composition with Mr. Kuanren Zhao. He graduated in 1982 to teach. He studied conducting with the American conductor George McDox in 1992. From 1996 to 1997, he was invited by the Asian Arts Institute of the

Philippines to visit and exchange as a guest artist for one year^[1].

Liu's works cover almost all musical genres, including symphonies, instrumental music, national dance drama, dance music, solo singing, chorus, and so on. He is a prolific composer with an international perspective, who is good at integrating elements of Yunnan's ethnic minority music into modern musical forms, showing a unique artistic style and profound national cultural connotation. His instrumental music "Doub le Trapeze Achans shoot the sur" and dance music Fantasia in 2000 have been performed many times in the United States, Spain, Japan, and South Korea and received high praise^[2]. His large-scale national dance drama "Water-splashing Festival" won the Outstanding Drama Award of the 6th China Art Festival. The symphonic suite "Soul of the Mountain," "Impression of Shambhala," and "Lisu People" won the first prize in music works of new plays in Yunnan Province respectively. The vocal work "Dream Plateau" won the government's Top Ten Golden Song Awards. The solo work "Brother who backs the Sun" won the first prize in the National Voice of the Nation in 1990. The choral work "Leading the Yangtze River to Celebrate Together" was selected as the song of the third China Art Festival. The piano solo "Sani's Fantasia" was selected for the 1997 Hong Kong Piano Competition. The children's chorus "Mountain Boy" (with Li Wan) and "Sani's Spring Is There" won the National Radio New Song Writing Award in 1988 and 1989 respectively. The dance "Land" won the composer award in the National Minority Dance (single, double, and triple dance) Competition, and served as the music director and composer of the opening ceremony of the Fifth Traditional Minority Sports Games of the People's Republic of China^[3]. In 2010, the "Yunnan Echo - Xiaogeng Chorus Collection" published by the Central Conservatory of Music Publishing House includes 16 classic original and composed choral works by Liu. His choral works are often sung by domestic and international choirs, and Liu himself is also a well-known commissioned composer.

1.2. Appreciation of Xiaogeng Liu's representative mixed chorus "Tattoo"

1.2.1. Introduction to the work

Liu has been writing continuously for many years. In

recent years, he has mainly devoted himself to creating high-difficulty Yunnan-style choral works. In his choral works, he has properly applied the most preface artistic writing styles of contemporary times, such as instrumental, rhythmic, acoustical, timbral, electronic, symphonic, and behavioral. He integrates the native language genes of Yunnan ethnic minorities into his works. Here, we appreciate and analyze Liu's choral work "Tattoo"^[4].

This is a modern mixed chorus based on the special mother tongue (scripture) of the Dai region. It premiered at the opening ceremony of the 18th Asian Composers Union Congress. In 2019, Shenzhen Lily Choir won the championship of the World Chorus Competition with the simultaneous version of this song. It can be seen that the artistry and technology of the work are extremely difficult. Among them, the unique creative technique of "refining mother tongue" is derived from Liu's acquisition of Dai native language materials through years of in-depth field investigation, and then the re-composition of these materials after crushing them. Due to the difficulty of this chorus and percussion work itself, it has high technical requirements for the conductor and chorus members, so the transmission degree of the work is not high. Due to this, it will be easier to perform this work accurately, and it will also reflect the high standard of the choir^[5].

1.2.2. Background of the work

The story background of the song "Tattoo" comes from the "legend of the Songkran Festival." According to legend, a long time ago, the demon king occupied the beautiful Xishuangbanna, mutilated and poisoned the people, and took the seven princesses of Xishuangbanna as his wives. Among them, the most beautiful and intelligent seventh princess, Langmolida, found that the demon king could be killed by pulling out the blonde hair on his head. Thus, she pulled out the golden hair of the demon king, and at the moment the demon king's head fell, the evil fire erupted from his mouth. In order to extinguish the fire and completely destroy the demon king, the seventh princess held the head to her chest, and people could only keep spraying water on her. Finally, the evil fire was extinguished in the sixth month of the Dai calendar, and the custom of the Songkran Festival began^[6].

This chorus work describes the “tattoo” ceremony performed by Dai men in order to pray for the blessings of the gods and obtain the unlimited power to destroy the demon king. Most Dai people believe in Theravada Buddhism. “Tattoo” is a symbol of Dai culture with a long history. Its sociality, culture, and artistry make it the most important symbol in Dai culture. “Tattoo ceremony” is a rite of passage for Dai men at the age of 15. Due to the painful process, the baptism of “tattoo” shows that this adult man is a strong and brave person ^[7].

1.2.3. Artistic features

There are mainly three musical figures in the work, namely the seventh princess, the elder, and the tattooed young man. These three musical figures are respectively expressed by the soprano leader, the bass leader, and the tenor’s neck. The frequent appearance of dissonant intervals in the work and the chanting of scriptures in the chorus part are modern expressions. The ancient mysterious ritual of “tattooing” is rendered vividly. The use of Dai native language in the works makes the works more ethnic, because language is the most important symbol of a nation, the most important cultural carrier of the nation, and reflects the nation’s outlook on life and

survival. In addition to language, the use of dissonant intervals in the works, such as the appearance of the “augmented fourth” interval to express the seventh princess Langmolida, also makes the ethnic style of the works very obvious. According to Liu, such use is due to the existence of such “augmented fourth” intervals in the Dai people’s speaking tones (Figure 1) ^[8].



Figure 1. Example 1

In addition, the diverse and rich sound effects of the works perfectly reflect Liu’s advanced and bold artistic writing style. With the accompaniment of small bowl, wooden fish, stone, and other percussion music, the use of floor slapping and mouth strokes, the rhythm of non-logical stress, and the performance form of “meditation” during the performance process, the work also includes the breath sound when chanting scripture, and the shouting of young people when they are tattooed. All of them make the sound of the work fuller (Figure 2).

The success of this work, like most of Liu’s works,

Figure 2. Example 2

stems from his courage to break through tradition, continuous innovation, and insistence on using the native language of ethnic minorities to create. It is reflected in this song “Tattoo,” as well as many of his works. For example, he created the chorus “Waterhen” with Zhuang language singing, “Oh Ran” with Jingpo language singing, “Naxi ancient tune – Xun” with Naxi language singing. The frequent international awards and great recognition of these works also show that inheriting and carrying forward the excellent traditional culture of the nation is conducive to improving the cultural soft power and comprehensive national strength of the country.

2. Appreciation of Yong Chen and his representative works of folk music

2.1. Introduction to Yong Chen

Yong Chen, born in Yuanmou, Yunnan Province, is a famous composer, professor, master tutor, and leader of the provincial key discipline “musicology” in Yunnan Province. He is a famous teacher in colleges and universities in Yunnan Province and a music artist with remarkable achievements in all-round creation. In 1982, he graduated from Yunnan University of the Arts with a bachelor’s degree in Theoretical Composition and taught at the university. In 1984, he graduated from the Shanghai Conservatory of Music with a bachelor’s degree in Theoretical Composition and Senior Study Course of Composition and Conducting Department. He has served as Vice President of Yunnan University of the Arts, Vice President of Yunnan Normal University, Vice Chairman of Yunnan Provincial Federation of Arts and Culture, Chairman of the Yunnan Musicians Association, and director of the Chinese Musicians Association. He is also a member of the National Art Education Steering Committee, Executive Director of Yunnan Higher Education Association, member of the Provincial Degree Committee, member of the Provincial Academic Committee of Colleges and Universities, member of the Provincial Senior Position Evaluation Committee for College Teachers, etc. ^[9].

Professor Chen has a great influence on the whole country. As a series of art songs he created are widely circulated in the whole country, they are selected as teaching materials by various music and art colleges.

In 1999, Professor Chen was named “One Hundred Outstanding Young Writers and Artists in the Country.” In 2000, he was named an expert who enjoyed the special government allowance of The State Council. In 1999 and 2006, he was twice awarded as the “Artist of Virtue and Art” in Yunnan Province. He has been featured in many special reports by China National Radio, China Central Television, and news media in Yunnan Province, and has been included in many classic dictionaries such as “Who’s Who in the World of Chinese Literature and Art,” “Son of the East,” and “Chinese Expert Talent Pool” ^[10].

2.2. Appreciation of Yong Chen’s representative female solo “Torch of the Torch Festival”

2.2.1. Introduction to the work

Chen’s work was written in collaboration with Yunsheng Lu, a famous lyricist in Yunnan Province. In 1999, the work was awarded the seventh National Spiritual Civilization Construction “Five and One Project Award” by the Central Propaganda Department, and achieved the “zero breakthrough” in Yunnan in this award, which has a milestone historical value and significance. Due to its strong national style and catchy and beautiful melody, it has become the repertoire of many female singers in China. There are many versions of this song on various platforms, among which the most famous versions are the version sung by Jia Lei, a well-known singer in China, and the version sung by Shu Hr, a famous singer in Yunnan Province. Each version has its own unique features.

2.2.2. Background of the work

The Torch Festival is a traditional festival of the Yi, Bai, Naxi, Jino, Lahu, and other minority nationalities in Yunnan. With a profound national cultural connotation, these nationalities have fire worship, on the day of the festival will hold the ignition ceremony, and sing and dance around the torch, pray for good weather and harvest for the next year.

In this work, Chen describes the lively scene of the Yi people celebrating the Torch Festival in Honghe area of Yunnan Province. The melody is heavily integrated with the local Yi music materials and the use of the Yi language words, reflecting the language characteristics of the Yi people, expressing the joy and hope of the Yi

It is the music of Yunnan ethnic minorities that gives Wan infinite creative inspiration. He has created many well-known songs about Yunnan ethnic minorities, such as vocal works “Beating Rice Drum,” “Nujiang Major and Minor,” “Old Watch,” “Stepping on the Clouds,” and children’s chorus “Mountain Boy,” which won the first prize in the song contest for the 40th anniversary of the founding of the People’s Republic of China. The theme song “Plateau Woman” for the TV series of the same name was later adapted into a mixed chorus, which was sung by many teams. The female voice trio “A Nest of Birds” with Xiaogeng Liu and Mingchu Jiang won the tenth National Spiritual Civilization Construction “Five and One Project Award” issued by the Central Propaganda Department in 2007. In recent years, the female solo singing “Long Street Banquet” has been popular all over the country, the popular version is sung by the famous singer Jing Tan. In 2009, Wan collaborated with dancer Liping Yang and lyricist Mingchu Jiang to create a wonderful large-scale original percussion dance called “The Sound of Yunnan” and served as the music director. He composed music for large-scale operas, dance dramas, and musicals such as *Ashma*, *Zheng He*, and the *Sea and Bronze Soul*, which were both appreciated and recognized by the music industry at home and abroad [13].

Since the 1980s, Wan has created more than 500 songs, composed for many large-scale dance dramas, operas, musicals, evening parties, TV dramas, and special films, and won more than 50 national awards such as the “Five and One Project Award” of the Central Propaganda Department, the “Wenhua Award” of the Ministry of Culture, and the “Flying Music Award” of the Ministry of Radio and Television. He also won five international awards. He has been awarded the honorable titles of “Kunming Young and Middle-Aged Academic and Technical leaders,” “Excellent Experts with Outstanding

Contributions in Yunnan Province,” “Excellent Experts with Outstanding Contributions in Kunming City,” and so on.

3.2. Appreciation of Li Wan’s representative female voice solo “Plateau Woman”

3.2.1. Introduction of works

Wan’s song “Plateau Woman” is for the World Women’s United Conference. The song won the nomination award for “China Original Song” in 2007, and “New Daozi Group” sang in the fifth group final of the 13th CCTV Young Singer Grand Prix, winning the second-highest score of the night. The song was later adapted into folk dance music and premiered by Kunming Folk Song and Dance Troupe, and won the first prize in choreography, performance, and composition in the 10th National Minority Peacock Cup Single Three and Pair Dance Competition in 2000 [14].

3.2.2. Background of the work

In the culture of many ethnic minorities in Yunnan, women occupy an important position in a family. Women in the plateau are the symbol of diligence and bravery. Most of them are born with the ability to sing and dance, to be independent, to have children after marriage, to bear hardships, and to work hard to support the life of a family, which is inseparable from the tradition of the Chinese nation. This song “Plateau Women” takes plateau women as the object, describing their hard work and hard life (Figure 4).

3.2.3. Artistic features

The creation concept of the song “Plateau Woman” embodies the creative concept that Wan has always upheld, that is, to create the Yunnan minority dialect. Sound, language, and writing are important carriers

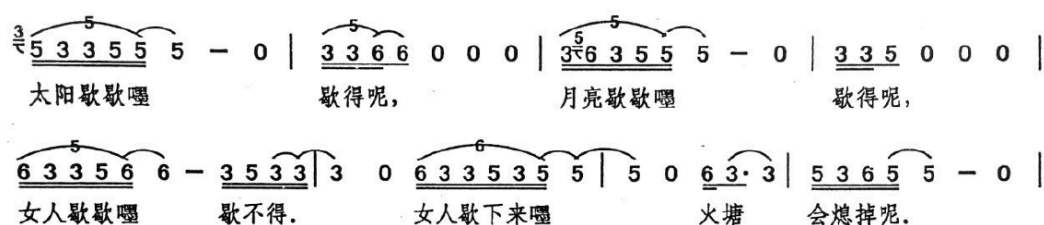


Figure 4. Example 4

of minority culture, especially language. The close relationship between music and language in song creation has been discussed by Mr. Yuanren Zhao, a famous linguist and musician in China. The language styles of ethnic minorities also determine their music styles. For example, the language of Dai and Hani is soft and waxy, and their music, especially their love songs, is spoken in a soft voice. The Tibetan language, on the other hand, has rough and loud music ^[15].

The lyrics of this work are simple and the melody is unique, describing the lofty image of plateau women who are hard-working and brave. The melody of the song is the tone of the minority ethnic groups in Yunnan and western Yunnan when they speak Chinese. The use of quintuplets is also in line with the rhythm of their speech. The use of dialects in the lyrics, such as “Zaodi,” makes the lyrics more grounded, so the song is quickly popular in the country after the singing of “New Daozi Group.”

4. Conclusion

The achievements made by Xiaogeng Liu, Yong Chen, and Li Wan in the creation of Yunnan ethnic music have actively promoted the integration and innovation of Yunnan ethnic minority music elements and modern creative techniques. These works are specific examples of inheriting and promoting Yunnan’s native ethnic minority music culture. In addition to them, many other musicians have also made important contributions to the promotion of Yunnan minority music culture. Many excellent Yunnan

minority music works have unique artistic styles and profound ethnic culture connotations, which have injected new vitality into Chinese ethnic music. These works not only enrich the treasure house of Yunnan folk music, but also provide valuable experience and inspiration for the future development of Chinese folk music.

As China’s famous musicologist and intangible cultural heritage protection expert, Qing Tian said: “Chinese music is an important part of the excellent traditional culture of the Chinese nation, every song carries history, every song contains culture.” Qing Tian encourages us to deeply understand China’s excellent traditional culture through music, and use music to generate resonance and pride to enhance cultural confidence.

Yunnan minority music is an important part of Chinese music. As a native music worker in Yunnan, we should shoulder the glorious mission of inheriting and promoting Yunnan minority music. We should make Yunnan minority music become an important carrier of inheriting the excellent traditional culture of the Chinese nation, and become a vivid embodiment of our province’s construction as a demonstration zone of national unity and progress. We should also strive to improve professional literacy and let more people know and love Yunnan minority music through various channels and platforms. We should use music as a medium to enhance exchanges and understanding among different ethnic minorities, promote ethnic unity and progress, and promote harmonious social development.

Disclosure statement

The author declares no conflict of interest.

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Key Technologies for an Augmented Reality Safety Education System Based on Real Railway Incident Cases

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Abstract:

This project is an augmented reality (AR) and virtual reality (VR) construction safety education and training system. The purpose of the system design is to allow users to experience the real construction scene, learn the correct construction process, and handle emergencies and safety rescue operations through VR immersive interaction, so as to achieve the purpose of safety training. The system involves different construction scenes. The key technology includes scene reconstruction and interaction, case-driven scenario simulation, and multisensory interaction technology. Through user interface and voice prompts, users are guided to learn construction precautions and complete construction operations. This system is developed in the Unity3D engine and finally displayed on the AR and VR device.

Keywords:

Virtual reality
Immersive interactive experience
Safe construction
Education and training
Unity3D

Online publication: December 16, 2024

1. Introduction

In life, the safety issues in the construction process should be emphasized, such as tunnel water leakage, high-altitude work, slope collapse, and so on. The construction personnel need to have rich experience and safety awareness. Therefore, safety education and training is critical. With the development of virtual reality (VR) technology, immersive training through VR has gradually replaced the traditional way of learning and training. Through the immersive interactive experience of this system, users can achieve the same training purpose and improve safety awareness under low-cost and safe

conditions. The functional modularity of this system is also unified and standardized, including the user interface (UI) system, scene model and material design, animation system, photorealistic rendering technology, particle effects, and so on. It provides technical support for the design and development of future related virtual reality systems^[1-3].

With the rapid development of the railway transportation industry, safety issues have increasingly become a focal point. Traditional safety training methods are no longer sufficient to meet actual needs, and technologies like VR and augmented reality (AR)

are gradually being introduced to enhance training effectiveness. This paper designs and implements an AR safety education system based on real railway incident cases (**Figure 1**). The system utilizes AR technology to recreate accident scenes with 3D reconstruction and interactive simulations, allowing employees to learn safety knowledge and procedures through immersive experiences ^[4-6].

The key technologies include:

- (1) 3D scene reconstruction and interaction: AR technology is used to model and reconstruct real railway accident scenes in 3D, enabling users to interact with different incident scenarios and safety hazards.
- (2) Case-driven scenario simulation: Based on actual railway safety incidents, the system incorporates multiple accident cases to generate various danger scenarios and provide real-time feedback, helping trainees master emergency response skills.
- (3) Multisensory interaction technology: Voice recognition, gesture control, and visual enhancement are employed to enhance user engagement and the effectiveness of the training.
- (4) Cross-platform adaptability and application: The system supports multiple terminal devices, including mobile devices and AR glasses, ensuring flexibility and wide applicability.

This system effectively enhances railway employees' safety awareness and emergency response capabilities, offering great potential for widespread adoption in the railway transportation industry.

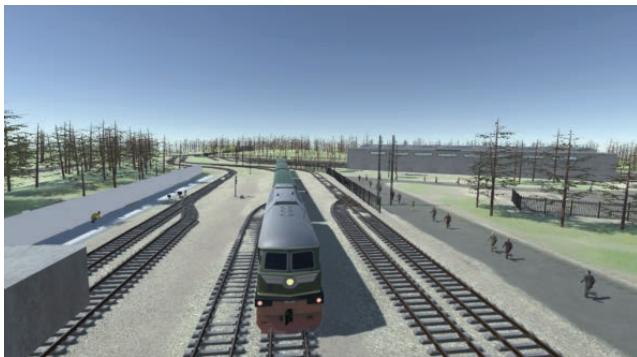


Figure 1. Scene of the system

2. 3D scene reconstruction and interaction

2.1. Based on construction scene

This system is based on the construction scene development and design, including ten different scenes. Through a comprehensive training experience, users can learn construction operations and safety awareness. The design of the scene refers to the real construction scene (**Figure 2**). In the aspect of 3D scene reconstruction and interaction, we adopted real-world scenarios as references and utilized advanced 3D animation modeling technology to create highly realistic virtual animation scenes ^[7,8]. The detailed technical implementation is described as follows.



Figure 2. Real scene

We first gathered real railway accident site data through field surveys, photography, and video recording. These materials provided accurate references for scene reconstruction, ensuring that the layout, structure, and details of the virtual scene closely match the real-world settings as shown in **Figure 2**. Additionally, technologies such as laser scanning and drone aerial photography were employed to generate high-precision point cloud data, serving as the foundation for 3D modeling.

Based on the collected real-world data, we used 3D modeling software (such as Maya, Blender, etc.) to build detailed scene models. To ensure the realism of the models, every object in the scene was carefully modeled, considering the geometric shapes, size proportions, and material properties of railway facilities ^[9]. For texture processing, high-resolution texture mapping techniques were used, combined with PBR (Physically Based

Rendering) materials, to provide realistic lighting, reflections, and shadow effects. This technique allows users to experience a visual effect within the AR system that closely resembles being in a real-world environment as shown in **Figure 3**.

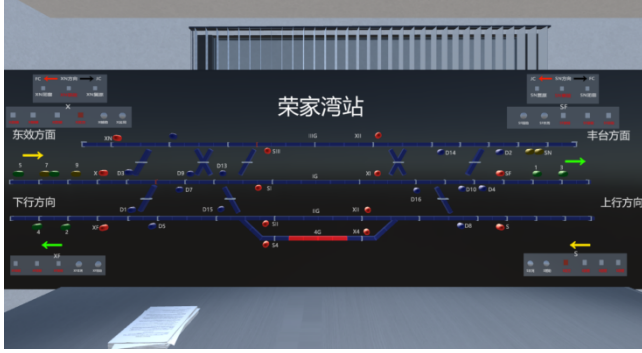


Figure 3. The scene of Rongjiawan station

2.2. Unified scene interaction

The ten construction scenes maintain the same interactive experience logic design and process to prevent ambiguity caused by different operations in different scenes as shown in **Figures 4 and 5**.

To enhance immersion, dynamic accident reconstructions and environmental interactions were added to the scene. For example, animations simulating train movements, track malfunctions, and changes in traffic signals were incorporated, creating realistic visual changes. We used 3D animation technology to recreate accident processes and employed skeletal animation and particle systems (such as fire, explosions, and smoke effects) to simulate real-world emergencies. These dynamic scene presentations enable users to fully immerse themselves in dangerous scenarios, reinforcing their safety awareness.

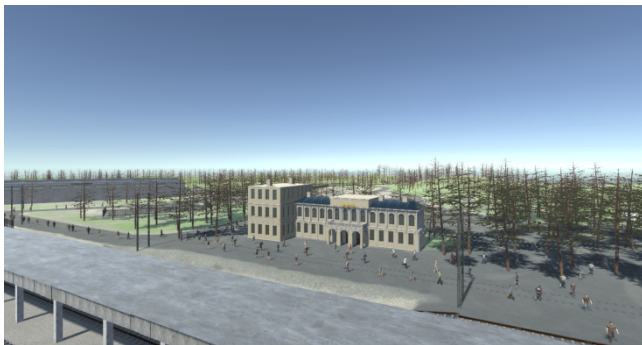


Figure 4. The railway station



Figure 5. The railway station

2.3. Based on realistic rendering

The models in the scene are rendered based on physics, which improves the rendering quality of the objects, makes the models look more realistic, and enhances the user experience. To provide a more realistic user interaction experience, the system integrates a physics engine (such as Unity or Unreal Engine), allowing users to interact with virtual scene objects in various ways. For instance, users can use gestures or control devices to interact with objects in the virtual scene, simulating real-world accident response operations. The physics engine ensures that the forces exerted by the users and the movement trajectories of objects comply with physical rules, enhancing the authenticity of the interaction and overall experience^[10,11].

In combination with AR devices, users can experience the accident scene from a first-person perspective. Using mobile device cameras or AR glasses, users can see virtual scenes superimposed onto the real world and interact with them. The system also provides real-time feedback mechanisms, offering tips or warning messages during the user's operation, further enhancing the effectiveness of the training.

3. System architecture

The system has ten scenes such as tunnel water leakage, road collapse, falling objects, fire accidents, bad weather, slope collapse, high-altitude work, no helmet, vehicle injury, and electric shock accidents. For each scene, after entering the scene, the system will introduce the construction scene, and then conduct a correct construction simulation experience through the guidance of UI and voice. When the wrong operation occurs,

there will be corresponding accidents, risk prompts, and emergency rescue prompts. Subsequently, the user will complete the training under the correct operating instructions^[12,13]. Finally, the system will summarize and review the construction scene to help users review. The system composition is shown in **Figure 6**.

Through these technical approaches, the system successfully constructs a 3D scene based on real-world cases and provides a highly immersive and interactive experience, offering more effective safety training for railway employees. This system aims to use VR and AR technologies to construct multiple highly realistic railway safety training scenes, including key areas such as the pre-departure personnel meeting room, vehicle dispatch room, and indoor and outdoor views of railway stations. By recreating real-world classic accident cases and using a narrative approach, the system vividly re-enacts the events, causes, and responses, aiming to enhance trainees' operational and emergency response skills. Below is the detailed technical solution^[14,15].

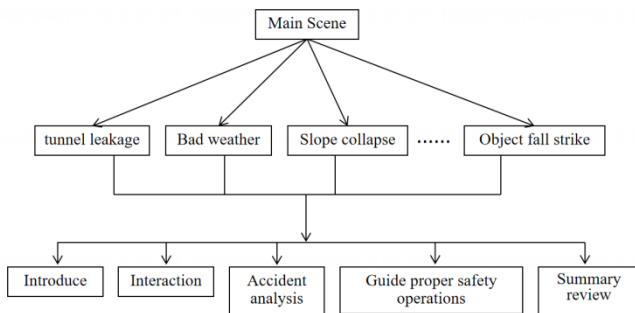


Figure 6. Construction system structure

4. Technical highlights

The system is divided into three parts, including the interactive module, the operation instruction module, and safety rescue training. The key technologies are as follows.

4.1. Interactive module

The system includes several scenes covering critical operations and decision-making points in railway operations, ensuring that trainees can engage in comprehensive learning and practice in the AR environment. The main scenes include the following:

Pre-departure personnel meeting room: This scene

displays the process of a pre-departure personnel dispatch meeting. Trainees can observe virtual characters' dialogues to learn about train schedules, safety instructions, and procedures for pre-departure safety checks and personnel assignments.

Vehicle dispatch room: The dispatch room is the central hub for train operation management. The system simulates the real-time data and workflow of train dispatching. Trainees can participate in key stages of dispatching, including train arrival and departure planning, signal system control, and emergency response. AR technology provides interactive experiences with dispatch equipment, allowing trainees to virtually operate devices and simulate real-world scenarios.

Indoor and outdoor views of the train station: Using virtual modeling, the system recreates station interiors (waiting rooms, platforms, ticket gates) as well as exterior areas (tracks and parking zones). Trainees can experience different job roles, such as guiding passengers, ticket inspection, and managing crowd control. Outdoor scenes simulate potential safety hazards during train arrival and departure, such as equipment failures or train overspeed. The interaction with objects is shown in **Figures 7 and 8**.



Figure 7. Interact with objects in the scene

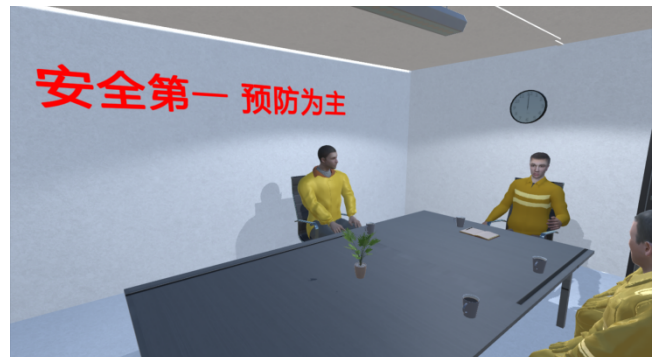


Figure 8. The staff office

4.2. Operation instruction module

This system can not only achieve the simulation of the construction process, but also achieve the correct operation guidance, and the final review of the construction process. Instructions for operation are shown in **Figure 9**. For safety education, the system is based on real-world classic railway safety cases and uses a narrative approach to fully recreate events. Case reconstruction is divided into several phases as follows.

Pre-event scenario recreation: The system first demonstrates normal operations before the accident, helping trainees understand the working state before the incident. For example, the normal operation of the dispatch room or passenger activity on the platform.

Incident triggering: Through virtual animation technology, the system simulates the occurrence of accidents, such as a dispatcher's command error leading to a train collision or equipment malfunction causing an emergency brake. The system highlights key moments and triggers to help trainees recognize potential risks.

Emergency response and aftermath handling: After the accident, trainees can simulate different emergency response measures using the AR system, learning how to handle emergencies quickly and effectively. Through repeated interaction exercises, trainees master emergency skills such as passenger evacuation, equipment repair, and dispatch adjustments, enhancing their crisis management capabilities.

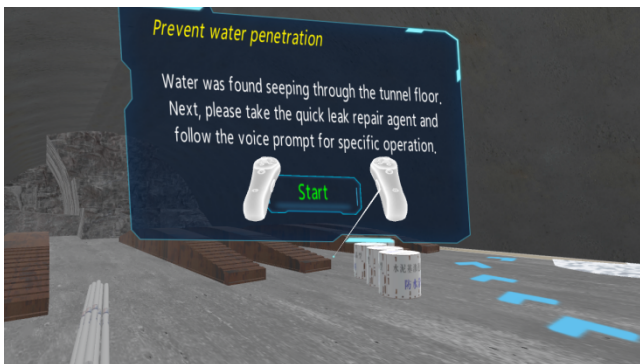


Figure 9. Operation instruction

4.3. Safety rescue training

When accidents happen in the process of construction, such as electric shock, students can learn the rescue measures that should be taken in an emergency. This topic will also cover the knowledge of emergency rescue.

Safety rescue is shown in **Figure 10**. The system not only presents the course of accidents but also provides various operational tasks that allow trainees to improve their practical skills through hands-on simulation. The specific technical implementations include the following.

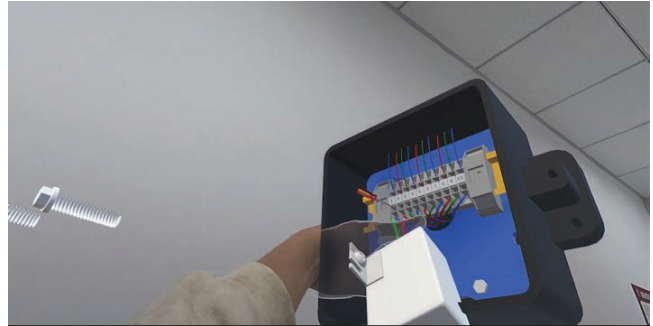


Figure 10. Equipment maintenance experiment

Virtual interactive devices: Using gesture recognition and touch controls, trainees can interact with virtual devices within the AR scenes. For instance, in the dispatch room, they can operate control panels, ticketing machines, and signal lights, allowing them to simulate the actual controls needed for various equipment.

Task-driven learning mode: The system sets multiple learning tasks, guiding trainees through procedures such as issuing dispatch orders or handling emergencies. Each task provides immediate feedback on operational steps, such as error prompts or rewards for correct operations, helping trainees continuously refine their skills.

Emergency response drills: Based on real accident cases, the AR scenarios allow trainees to simulate emergency response procedures. The system dynamically adjusts the difficulty of incidents through a stress-testing mechanism, testing trainees' decision-making and response speeds under pressure.

4.4. Narrative-driven learning experience

The system adopts a narrative-driven educational approach, embedding the safety training process into a series of complete storylines to enhance continuity and engagement in learning. Specific features include the following.

Event causes and progression display: Through virtual character dialogues and animated demonstrations, the system presents the background, causes, and

development of each accident. For instance, dispatcher miscommunication or equipment aging leading to failures, helping trainees understand the origins of safety hazards in a storyline format as shown in **Figures 11 and 12**.

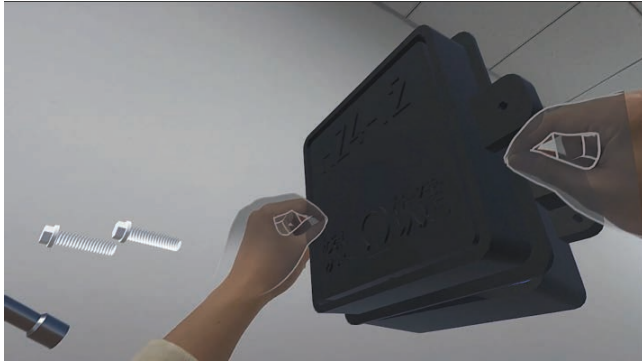


Figure 11. Hand interaction in AR

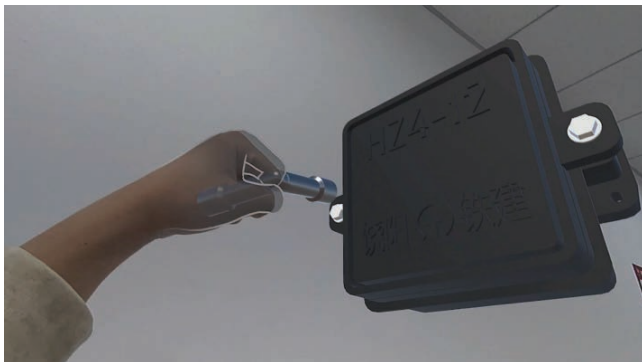


Figure 12. Hand operation

Multi-angle role participation: Trainees can take on various roles such as dispatcher, train attendant, or ticket inspector. By experiencing accidents from different perspectives, they gain a comprehensive understanding of the responsibilities and responses required in each role during an incident.

Scenario narration and feedback: The system provides dynamic story feedback based on trainee operations. For example, correct emergency operations lead to a positive storyline progression, while incorrect actions result in more complex accident developments, enhancing the interactivity and challenge of the learning experience as shown in **Figure 13**.

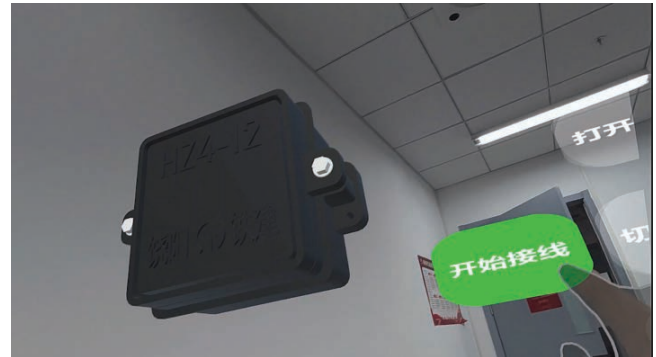


Figure 13. System design

4.5. System optimization and expansion

Cross-platform support: The system supports various device terminals, including AR glasses, smartphones, and tablets, ensuring trainees can use the system in different environments. It also features cloud synchronization, enabling real-time uploading of trainee progress and operational data for course management and evaluation.

Modular design: The system is designed modularly, allowing for easy expansion with new cases and scenarios in the future. For example, additional content on high-speed rail operation safety management or freight train dispatch can be incorporated, further enriching the training material.

With the above technical solution, this system realizes comprehensive virtual simulation of railway safety training. Through AR technology, trainees can experience realistic safety operations and emergency handling (**Figure 14**), significantly improving the effectiveness of training and practical skills.



Figure 14. Safety rescue

5. Conclusion and future work

This system successfully creates an immersive railway

safety training experience through the construction of multi-scene, case-based AR environments. It covers key operational scenes such as pre-departure meeting rooms, vehicle dispatch rooms, and both indoor and outdoor areas of train stations, simulating real accidents and their responses. The narrative-driven learning approach enables trainees to deeply understand the causes, development, and emergency handling of incidents. Meanwhile, AR technology's interactive capabilities allow trainees to practice operations using virtual equipment and improve their emergency response and operational skills within simulated accident scenarios. The system's cross-platform design and modular architecture offer great flexibility and scalability, providing robust technical support for future railway safety education and training.

As AR and VR technologies continue to evolve, this system is expected to see broader applications

and functional upgrades. In the future, artificial intelligence could be integrated to automatically analyze trainee behavior and offer personalized feedback and improvement suggestions. Additionally, more railway operation scenarios and emerging safety cases, such as those involving high-speed rail and smart railways, can be incorporated into the system to address the latest developments and safety requirements. With cloud-based platform support, the system could enable large-scale remote training, allowing trainees from different regions to participate in high-quality safety education anytime and anywhere. Through continuous optimization of technical features and training content, this system is poised to become a core tool for standardized and intelligent railway safety training, significantly contributing to enhancing the industry's overall safety standards.

Disclosure statement

The authors declare no conflict of interest.

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The Application of the Internet of Things Technology in Intelligent Agriculture Monitoring and Management

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Abstract:

In the wave of technology in the 21st century, the Internet of Things technology, with its unique charm and wide application prospects, is profoundly changing our way of life and production. Especially in the field of agriculture, the introduction of the Internet of Things technology has injected new vitality into traditional agriculture and promoted the development of intelligent agriculture. This paper focuses on the application of the Internet of Things technology in intelligent agricultural monitoring and management and demonstrates how it can accurately and efficiently promote the intelligent transformation of agricultural production.

Keywords:

Internet of Things technology
Intelligent agriculture
Meeting point
Monitoring and management application

Online publication: December 16, 2024

1. Introduction

With the rapid progress of information technology, the Internet of Things technology, as one of its core branches, is penetrating various industries with unprecedented depth and breadth, among which the application of intelligent monitoring and management is particularly prominent. Through its unique perception, transmission, and processing mechanism, the Internet of Things greatly improves the efficiency of monitoring and management, while effectively reducing operating costs. In agriculture, a traditional and essential industry, the introduction of the Internet of Things technology has promoted the wave of intelligent transformation.

The application of the Internet of Things technology in the agricultural field is not only limited to the real-time monitoring and adjustment of the production environment, but also expanded to many aspects such as animal identification traceability, and precise planting and breeding, realizing the precise management of the whole chain of agricultural production. This change not only significantly improves the efficiency of agricultural production, but also promotes the optimal allocation and sustainable utilization of agricultural resources, laying a solid foundation for the sustainable development of agriculture. More importantly, the application of the Internet of Things technology also effectively

guarantees the quality and safety of agricultural products and improves consumers' trust and satisfaction with agricultural products.

Therefore, an in-depth study of the Internet of Things technology application in intelligent monitoring management not only promotes agricultural modernization and improves agricultural production efficiency, but also promotes the sustainable use of agricultural resources and enhances the safe quality of agricultural products, building a harmonious society and achieving high-quality economic development.

2. The convergence of the Internet of Things and intelligent agriculture

2.1. Internet of Things technology

Internet of Things technology, as an outstanding representative of information technology in the 21st century, is subtly divided into the perception layer, network layer, and application layer. From the evolution of information technology, the Internet of Things deeply integrates computer technology and communication technology, as shown in **Figure 1**. This layered design not only promotes the seamless docking between technologies but also greatly expands the application boundary of the Internet of Things ^[1].

In the perception layer, the Internet of Things realizes the comprehensive and real-time acquisition of information in the physical world by deploying various sensors, RFID tags, and other sensing devices. These devices, like the “tentacles” of the Internet of Things,

can capture diversified information such as temperature, humidity, light, and sound in the environment, and turn them into digital signals, providing a solid foundation for subsequent data processing and analysis. The network layer bears the heavy responsibility of data transmission and communication. Through various communication methods such as wireless networks and wired networks, the Internet of Things gathers the data collected by the perception layer to the cloud or data center, realizing the long-distance transmission and sharing of data. In this process, the Internet of Things technology not only ensures the security and reliability of data transmission, but also realizes the real-time accuracy of data, which provides strong support for intelligent management and decision-making. At the application level, the Internet of Things technology demonstrates its wide potential for industrial applications. Whether it is a smart city, smart home, industrial manufacturing, or intelligent transportation, the Internet of Things plays an important role with its unique advantages. Through the construction of intelligent and automatic application scenarios, the Internet of Things not only improves the operation efficiency and management level of all walks of life, but also brings people a more convenient and comfortable life experience ^[2,3].

2.2. Intelligent agriculture

As the frontier position of modern agricultural development, the advantages of intelligent agriculture lie in multi-dimensional and deep-level reform and promotion. First of all, through real-time monitoring

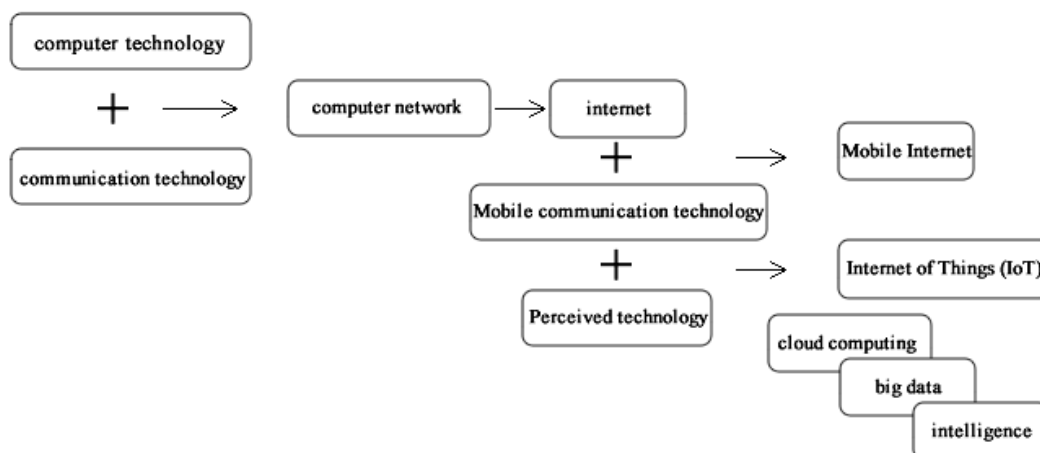


Figure 1. Physical network frame

and analysis of soil composition and humidity by high-precision sensors, intelligent agriculture realizes the accurate allocation and efficient utilization of agricultural resources, ensuring that every inch of land can grow the most suitable crops, so as to maximize production benefits and promote the sustainable utilization of agricultural resources. Secondly, intelligent agriculture realizes the fine management of the whole process of agricultural production. From sowing to harvest, every link is placed under intelligent monitoring. The application of high and new technologies such as the Internet of Things and big data enables the crop growth state to be acquired and regulated in real time, providing a scientific basis for agricultural production, and significantly improving the crop yield and quality^[4]. Moreover, intelligent agriculture also shows great potential in agricultural ecological monitoring. Through the Internet of Things and other high-tech technologies, the agricultural ecosystem has realized dynamic and comprehensive monitoring, which provides the possibility for timely discovering and solving ecological problems, and lays a solid foundation for the sustainable development of China's agriculture. Finally, the development of intelligent agriculture also promotes the process of agricultural informatization. The construction of the information system integrates a variety of sensor equipment, wireless transmission terminals, and other advanced technologies, realizes the automatic acquisition and remote sharing of equipment information, strengthens the close connection between farmers and crops, and provides strong support for the intelligence and precision of agricultural production^[5,6].

2.3. Intelligent agriculture based on the Internet of Things technology

In the wave of agricultural modernization, intelligent agriculture based on the Internet of Things technology is leading the profound change of agricultural production mode with its unique advantages. The core of the innovation mode is the diversity of sensor terminals cleverly deployed in the growing environment, including but not limited to temperature sensors, humidity sensors, CO₂ concentration detection sensors, etc. These devices act as "nerve endings" of agricultural production, capture and transmit the subtle changes of environmental parameters in real time, and build up a comprehensive

coverage, accurate, and efficient monitoring network.

The monitoring network built by the Internet of Things technology realizes the real-time collection and display of environmental data with the help of the intelligent algorithm of the network terminal, so as to accurately predict the growth state of crops and scientifically calculate the nutrients needed. On this basis, the intelligent agricultural system can automatically regulate irrigation, fertilization, temperature control, and other environmental parameters, create the most suitable growth environment for crops, and realize the refinement and intelligence of agricultural production management^[7].

In particular, it is worth mentioning that the application of the Internet of Things technology has greatly liberated the agricultural labor force, enabling managers to monitor and manage the agricultural environment remotely with the help of terminal equipment such as computers or mobile phones, which not only improves the work efficiency but also reduces the labor cost. Compared with the excessive reliance of traditional agriculture on the natural environment and the high-intensity input of human labor, intelligent agriculture, based on scientific algorithms and intelligent equipment as the means of intelligent agriculture, not only improves the accuracy and efficiency of agricultural production, but also promotes the significant improvement of agricultural economic benefits, and opens up a new path for the sustainable development of agriculture^[8].

3. The application of the Internet of Things technology in intelligent agriculture monitoring and management

3.1. Animal identification and traceability of epidemic prevention

Today, with the vigorous development of intelligent agriculture, animal identification and epidemic prevention traceability system, as a model of in-depth application of Internet of Things technology, is gradually becoming a key link to improving the level of agricultural management and ensuring food safety and public health safety. Through high-precision, non-contact RFID tags or advanced wearable sensor technology, each animal is assigned a unique identity, realizing the whole-chain

monitoring and traceability from farm to table. These Internet of Things identification devices can not only capture and record key physiological indicators such as position changes, activity patterns, eating intake, and body temperature in real time, but also monitor the temperature, humidity, and air quality of the feeding environment combined with environmental sensors, providing a scientific basis for accurate feeding. Data is transmitted to the cloud data center in real time through wireless communication technology, and advanced technologies such as big data analysis and machine learning are used for deep mining and processing, so as to accurately predict animal health status, disease risk, and growth and development trend [9].

In terms of epidemic prevention and traceability, the efficient response mechanism of the system is particularly critical. Once abnormal animal health or suspected signs of the epidemic are detected, the system will immediately trigger the warning mechanism, automatically send an alarm to the managers, and activate emergency plans, including isolation of suspected sick animals, tracing contact history, and adjusting feeding and management measures, so as to effectively curb the spread of the epidemic and protect the overall health of the animal community. In addition, the system also plays an irreplaceable role in the traceability of food safety. Consumers can scan the unique identification code on animals to obtain the whole chain information from breeding to processing and circulation, so as to enhance consumer confidence and promote the healthy development of the market.

3.2. Intelligent monitoring and environmental protection

The environmental monitoring network is based on the Internet of Things technology, integrating the diversified information collection capabilities of the wireless sensor network, combined with broadband communication, high-performance computing, cloud computing, and big data mining technology, and builds a comprehensive, high-precision, real-time environmental information collection and processing platform. This platform can not only fully cover key environmental parameters such as soil humidity, meteorological conditions, and air quality, but also realize in-depth integration and analysis of data,

providing strong data support for precision agricultural management [10].

For example, in the field of intelligent agriculture, the intelligent control system of agricultural greenhouses has significantly improved the management efficiency of modern agricultural greenhouses with its highly integrated and intelligent characteristics. By integrating a variety of high-precision sensors and intelligent control units, the system realizes the remote and real-time monitoring and accurate control of multiple modern intelligent greenhouses. Specifically, it can not only carry out uninterrupted monitoring of key environmental parameters such as the greenhouse temperature, humidity, ventilation, and light intensity, but can also create the most suitable environment for crop growth according to the preset conditions or crop growth demand, intelligent regulation irrigation system, shade, ventilation equipment, etc. (Figure 2). This move not only greatly reduces the labor intensity and cost of greenhouse management, but also effectively improves the yield and quality of crops [11].



Figure 2. Intelligent control system of agricultural greenhouses

Other than that, the application of intelligent monitoring systems of agricultural machinery has brought revolutionary changes to modern agricultural mechanization operations. Relying on advanced sensor technology and intelligent equipment, the system realizes the comprehensive monitoring and independent decision of the state of agricultural machinery and tools. Through real-time monitoring of the working state of agricultural machinery, fuel consumption, mechanical wear, and other key indicators of agricultural machinery, the system can accurately predict the best time for repair

and maintenance, effectively avoid the production delay caused by fault shutdown, and significantly improve the operation efficiency and the service life of the machinery (**Figure 3**). At the same time, the introduction of intelligent management and operation modes decreases the labor intensity of farmers, reduces production costs, and provides strong technical support for the sustainable development of modern agriculture.



Figure 3. Intelligent monitoring system of agricultural machinery

Third, the rise of livestock management technology of the Internet of Things is profoundly changing the production and management mode of animal husbandry. The technology uses advanced means of digital transformation to realize the comprehensive monitoring of the health status, activity location, and behavior mode of livestock through smart wearable devices and wireless sensors. This solution has been widely used in several key areas of livestock, including healthcare management, estrus cycle detection, calving process monitoring, precision feed feeding, and dynamic weight tracking. It not only improves the production efficiency and refinement level of animal husbandry, but also significantly enhances the ability of disease prevention and control, and injects new vitality into the sustainable development and industrial upgrading of animal husbandry.

Fourth, unmanned aerial vehicle technology is gradually becoming an indispensable auxiliary tool for modern agriculture, and its application range widely covers many fields such as crop health assessment, precision irrigation, field environment analysis, efficient crop spraying, and precision planting ^[12]. The introduction of this technology has brought many significant advantages to farmers: a significant reduction

in labor demand, a profound improvement in production efficiency, and the optimal allocation and efficient use of agricultural resources. Globally, remotely operated drones show great potential in agricultural crop spraying operations. In the Republic of Korea, for example, up to 30% of agricultural spraying missions have been completed by drones (**Figure 4**).



Figure 4. Unmanned aerial vehicle

In the practice of precision agriculture, the Internet of Things technology has helped farmers realize the transformation from “empirical” to “data-based” management. Through real-time monitoring of soil moisture, the system can accurately guide irrigation operations and avoid waste of water resources. Combined with meteorological monitoring data, farmers can adjust agricultural activities in advance to effectively avoid natural disasters, and the application of air quality sensors provides a scientific basis for early warning and control of diseases and insect pests, reduces the use of chemical pesticides, and guarantees the quality safety of agricultural products and the health of the ecological environment.

In terms of environmental protection, the Internet of Things technology has shown its unique advantages and value. By monitoring the use of pesticides and chemical fertilizers, the system can guide farmers to implement precise fertilization and green prevention and control strategies for diseases and insect pests, reduce agricultural non-point source pollution from the source, and protect the ecological balance between soil and water resources. At the same time, the Internet of Things technology is also widely used in farmland water quality monitoring, waste treatment, and other links, through intelligent

management means, to promote the resource utilization and harmless treatment of agricultural waste, providing solid technical support for the sustainable development of agricultural production.

3.3. Intelligent security system

In the process of agricultural modernization, intelligent security systems, as an important application field of Internet of Things technology, are gradually building a comprehensive protective network for agricultural production safety. The system integrates sensor monitoring, data transmission, intelligent decision-making, actuator control, and security prevention, to realize real-time and accurate monitoring of the farm environment. In the agricultural production site, the intelligent security system relies on high-definition cameras, infrared sensors, and other advanced equipment to build an invisible safety net^[13]. These devices can not only monitor human activities, animal behaviors, and abnormal conditions inside and outside the farm around the clock and without blind spots, but also quickly identify potential security risks through intelligent analysis algorithms. Once the system detects any abnormality or potential threat, the alarm mechanism will be immediately triggered, and the farm management will be notified in various ways to ensure that they can respond immediately, effectively prevent and contain the occurrence of accidents, so as to ensure the safety of the farm assets and personnel.

In addition, in the management of agricultural facilities, the intelligent security system also plays an irreplaceable role. Through the real-time monitoring of greenhouse internal environmental parameters, such as temperature, humidity, light, etc., the system can accurately regulate the greenhouse environment, provide

the best conditions for crop growth, and ensure its healthy growth, high yield, and high quality. At the same time, the system can also remotely monitor the operation of agricultural machinery and equipment, timely detection and early warning of equipment failure, provide strong support for the timely maintenance of equipment, and ensure the continuity and efficiency of agricultural production activities. To sum up, the intelligent security system, with its strong monitoring, early warning, and emergency response capabilities, provides a solid technical guarantee for agricultural production safety^[14].

4. Conclusion

To conclude, the application of the Internet of Things technology in intelligent agricultural monitoring and management shows its great potential and value. Through accurate data collection and analysis, the Internet of Things technology not only improves the efficiency and output of agricultural production, but also strengthens the traceability of the quality and safety of agricultural products, and promotes the rational allocation of agricultural resources and environmental protection. In the future, with the continuous maturity and popularization of the Internet of Things technology, intelligent agriculture will usher in a broader development prospect, providing strong technical support for the realization of strategic goals such as sustainable agricultural development and rural revitalization. Therefore, further increasing the research and development and application of the Internet of Things technology in intelligent agriculture is the key to promoting the transformation and upgrading of modern agriculture and enhancing international competitiveness.

Disclosure statement

The authors declare no conflict of interest.

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Construction of Practical Courses Based on Industry-Education Integration: A Case Study of the School-Enterprise Collaboration Major in Environmental Science (Smart Water Management)

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Abstract:

Environmental science is an interdisciplinary and comprehensive field that emphasizes the cultivation of applied talents. Based on the cooperation project between our university's Environmental Science (Smart Water Management) and enterprises, this study focuses on the collaborative education practice platform of industry-education integration and the construction mode of practical courses. By innovating the content of practical courses, this study aims to explore a set of practical course systems that adapt to social development and conducts an in-depth analysis and discussion of the issues encountered in the course construction process.

Keywords:

Industry-education integration
Practical courses
Environmental science

Online publication: December 16, 2024

1. Overview of the industry-education integration talent cultivation model

The industry-education integration talent cultivation model has become an important direction actively explored in the field of education. This model is dedicated to improving the quality of talent cultivation through deep integration of industry and education, in order to meet the needs of socioeconomic development. In recent

years, the state has successively issued relevant policies and documents to promote the deepening of industry-education integration. The matching degree of school-enterprise cooperation resources, the collaboration capabilities of cooperative entities, and the mechanisms that facilitate the orderly flow and aggregation of core elements constitute the connotative characteristics of industry-education integration. These characteristics

not only reflect the closeness and quality of school-enterprise cooperation but also serve as the intrinsic motivation for the smooth development of industry-education integration^[1].

Combining the characteristics of the major and the needs of industry development, our university's Environmental Science (Smart Water Management) major is committed to cultivating applied talents, which is the main goal of collaborative education in industry-education integration. The core of industry-education integration lies in closely integrating the actual needs of the industry with the education system, jointly designing talent cultivation programs, optimizing curriculum structures, and improving practical teaching systems to achieve deep integration between education and industry. This model helps cultivate high-quality talents who possess both a solid theoretical foundation and rich practical experience, providing strong talent support for industrial development.

In 2017 and 2019, the State Council and the Ministry of Education issued important documents such as "Several Opinions on Deepening Industry-Education Integration" and the "Implementation Measures for Building Industry-Education Integration Enterprises (Trial)," respectively^[1]. These documents emphasized the importance of closely integrating professional education with the industrial chain, advocating for the innovation of talent cultivation models through school-enterprise cooperation to meet the talent needs and employment standards of enterprises, and achieving true collaborative progress between industries and educational institutions. The documents also required higher educational institutions to further promote the education model of "industry-education integration and school-enterprise cooperation"^[2,3]. The 20th National Congress of the Communist Party of China elevated "modernization featuring harmonious coexistence between humans and nature" as one of the core contents of "Chinese-style modernization," reiterating the strategic goals of China's ecological civilization construction in the new era. With the aim of serving local economic development and considering the needs of ecological civilization construction and regional ecological development, it has become crucial to construct a high-quality and innovative talent cultivation model that integrates industry and education for environmental

majors^[4].

2. Constructing an industry-education integrated "teaching-research-practice-innovation (four-tier framework)" practical curriculum cultivation system

Schools and enterprises work hand-in-hand to build a practical curriculum system. Dedicated to continuously improving the existing talent cultivation framework and enhancing the configuration of practical courses, we aim to create a practical and innovative talent curriculum system that integrates theory and practice teaching. This curriculum system adopts the "four-tier structure" model of industry-academia-research integration, which includes "basic platform, professional skill modules, practical teaching platform, and research platform." The curriculum system consists of modules such as basic course experiments, core course experiments, comprehensive practical courses, and innovative practical courses, emphasizing the core of practical teaching in basic cultivation, innovative practice, and extended training; the school focuses on the teaching of basic practical courses, while the enterprise specializes in the construction of practical bases and the development and application of innovation and entrepreneurship practical courses. By establishing a platform that emphasizes the integration of practice and innovation, schools and enterprises jointly build a "dual-mentor system" faculty, research platform, practical teaching platform, and teaching quality evaluation system, aiming to solve practical problems, improve students' practical innovation abilities and scientific research literacy, and cultivate students' professional skills and scientific research innovation abilities^[5].

Within the framework of industry-education integration, we actively seek innovative methods for constructing practical courses^[6]. Taking our university's Environmental Science major as an example, we collaborate with leading industry enterprises to jointly cultivate talents and have established Environmental Science (Smart Water Management) as a school-enterprise cooperation major. Through establishing close cooperative relationships, we have implemented a series of industry-education integration strategies. These strategies

specifically include: implementing a 3+1 joint cultivation model, establishing off-campus internships and practical bases in enterprises to enhance students' practical skills; inviting enterprise experts with rich practical experience to teach industry technology development and internship practical knowledge; students further enhance their practical operation and skills through on-the-job internships in their fourth year; meanwhile, we have also established a talent supply-demand matching mechanism to promote graduates' employment and entrepreneurship [7]. Additionally, we have constructed a curriculum system centered on applied skills and adopted a "four-in-one" innovative practical curriculum system structure, which combines technology service platforms, innovation and entrepreneurship education platforms, skill competition platforms, and internship and practical training platforms.

3. Construction content of industry-education integrated practical courses

Under the background of "industry-academia-research" integration, undergraduate institutions have conducted specific research on the "four-in-one" (teaching-research-practice-innovation) applied research-oriented environmental talent cultivation system from aspects such as cultivation mode, practical teaching, technological innovation, and quality evaluation [8].

3.1. Research on talent cultivation mode for environmental majors

Through extensive research, analysis, and demonstration, combined with the realistic demand for innovative research-oriented environmental talents from society and the industry, as well as the school's positioning and disciplinary characteristics, we have further clarified the cultivation goals for innovative research talents. At the same time, we have conducted an in-depth and detailed analysis of the skill structure required by these talents, and used this as a guide to adjust and improve the current talent cultivation mode, establishing an innovative research-oriented cultivation mode that is more suited to the current professional needs [9].

Based on this, we have established and constructed a practical curriculum system that matches the talent cultivation goals, targets various skills, and coordinates

with the cultivation mode. For outstanding and innovative students in environmental majors, we have optimized the practical course settings to enhance basic and professional courses, optimize practical training, and reform the cultivation plan with innovative scientific research ability as the core, such as adding practical content for environmental toxicology, carbon neutrality-related courses, and innovative entrepreneurship practical credit courses, increasing the total practical credit proportion from 26.5% to 30.5% [10].

3.2. Construction of practical teaching content for environmental majors

A comprehensive curriculum system that includes basic theory, professional skills, and experimental practical training has been constructed, forming a multi-layered experimental practical teaching framework. Through diversified cooperation between colleges, industries, and enterprises, we have continuously improved the practical teaching system. As the core of modern universities, laboratories have adopted a three-pronged experimental practical teaching strategy of "utilizing research to promote experimental teaching, implementing small-class experimental teaching, and jointly cultivating talents with scientific academies and enterprises," establishing an experimental teaching system aimed at "consolidating basic knowledge, strengthening professional experimental teaching, enhancing applied practical ability, and stimulating innovative potential," thereby creating a new practical teaching mode. Relying on the industry-academia-research cooperation platform between colleges and enterprises, we have opened professional skill training, field practice, and production internship courses, such as practical content related to the smart operation of sewage treatment plants, enabling students to conduct on-site practice in frontline operational environments, thereby exercising their practical skills and cultivating their innovative abilities and capabilities to serve society [11].

3.3. Improving the chain-like platform support system for innovative cultivation

Research platforms are known as "the source of knowledge innovation and the cradle of talent cultivation," and their high-level construction plays

a crucial role in cultivating innovative talents. By constructing a technological innovation system that runs through “applied basic research, technology research and development, and industrialization,” we have created a comprehensive chain-like support network for innovative talents, forming a complementary practical training system composed of laboratories, enterprises, training bases, and research institutes. Currently, the college has two provincial key laboratory platforms and the scientific research platform of the Ecology Institute of the Academy of Sciences, which significantly enhance the abilities of disciplinary research and information assurance. The college also has a virtual simulation experimental teaching center, forming a distinctive practical teaching platform that combines virtual and reality and complements each other. Relying on these strong teaching and research platforms, we have changed the traditional model of experimental teaching that relies on theoretical teaching, constructing a practical teaching system that includes four levels: “basic experiments, comprehensive experiments, innovative experiments, and entrepreneurial outputs”; adhering to the small-class experimental teaching mode, practical operation training enables the cultivation of students’ abilities to solve practical problems.

3.4. Constructing a rich and diversified cultivation system for innovation and entrepreneurship

The innovative talent cultivation mode requires close collaboration between the first classroom and the second classroom. Fully aligning with the talent cultivation plan, with academic technological innovation activities as the core and the goal of promoting graduates’ in-depth learning and innovation and entrepreneurship, we have actively constructed a platform that reflects students’ independent practical skills and self-development, creating a distinctive research innovation and practical application cultivation system dedicated to promoting the effectiveness of innovation and entrepreneurship. As a multidisciplinary and intersecting field, the environmental major meets the national major strategic needs and provides an ideal environment for students’ innovation and entrepreneurship. In order to break through the bottlenecks of innovation and entrepreneurship, schools and enterprises have jointly established an academic

technological innovation incubation fund, eliminated barriers between national innovation experiment plans, social practice projects, and teacher projects, established a resource library for innovation and entrepreneurship projects, and participated in the Industry-Education Integration Summit Forum led by Beijing Enterprises Water Group and the “Internet+” Ecological Environment Innovation and Entrepreneurship Competition hosted by Beijing Enterprises Water Group Cup, providing excellent platforms and development opportunities for talent innovation and output.

3.5. Dual-mentor system cultivation model through school-enterprise collaboration

Actively promoting the construction of a “dual-mentor system” (combining mentors from both the school and enterprises) faculty team is crucial for enhancing the practical skills and teaching level of professional teachers, which is key to cultivating students’ practical skills. An excellent “dual-mentor system” faculty team has been established, currently comprising 18 senior professional technicians with rich practical experience, who, along with professional teachers, serve as academic mentors for students in Environmental Science (Smart Water Management), providing comprehensive guidance on their academics and innovation and entrepreneurship. This has strengthened practical teaching and innovation education by directly arranging experiments, internships, graduation projects, and other links to internal and external practical teaching bases in enterprises and research institutes, achieving joint guidance and cultivation of students’ practical and innovation and entrepreneurship abilities, while also enhancing their practical capabilities and qualities in innovation and entrepreneurship.

3.6. Exploring “industry-academia-research” as the foundation to improve multi-level quality evaluation mechanisms for cultivating innovative talents

Evaluation forms an integral part of the teaching process, particularly when exploring the content of practical courses jointly built by school-enterprise collaboration, reforms in teaching methods, as well as new evaluation objectives, standards, methods, and subjects. Through industry-education integration, the core purpose of

innovating practical curriculum design is to enhance students' abilities in innovation, entrepreneurship, and applying innovation in practice. To this end, a quality evaluation system centered on students' innovative output capabilities has been established to strengthen their practical skills and increase their weight in professional courses. Professional application skills will become a necessary component of professional assessments, with minimum requirements set for practical skills and innovative abilities. Therefore, the quality evaluation of innovative practical courses will be jointly developed in terms of standards and content by both school and enterprise parties, who will also jointly participate in the implementation of practical courses. A comprehensive indicator system for evaluating students' practical skills has been formulated.

Primarily, an “industry-academia-research” collaborative quality evaluation system for innovative practical skills has been constructed to promote the complementarity of teaching and practice, jointly enhancing the quality of talent cultivation, and making related research more systematic, scientific, and comprehensive. Strengthening the cultivation of innovative practical skills at the undergraduate education stage can enhance students' research capabilities and awareness.

4. Conclusion

This paper took the school-enterprise collaboration major of Environmental Science (Smart Water Management) as a case study, delving into the construction of practical courses based on industry-education integration. As a key exploration in the field of education, industry-education integration aims to improve the quality of talent cultivation through the deep integration of industry and education, meeting the needs of socioeconomic development. Specifically, it involves combining the actual needs of the industry with the education system, jointly designing talent cultivation programs, adjusting curriculum structures, improving practical teaching systems, and achieving a close connection between education and industry. This includes jointly building a curriculum system through school-enterprise collaboration, emphasizing the construction of platforms for the integration of practice and innovation, and improving the chain-like platform support system for innovative cultivation. This research aims to guide and promote universities in making progress in innovative research, talent cultivation, and mechanism construction within the “industry-academia-research collaborative education” system, thereby enhancing the level of talent cultivation, increasing educational efficiency and social influence, and more effectively meeting societal needs.

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Connotation, Significance, and Approach: International Chinese Language Education from the Perspective of Narrative Ethics

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Abstract:

International Chinese language education is both a way of cultural transmission and a narrative method, which can be used to convey knowledge, exchange ideas, and reshape the spirit by means of educational narratives in order to achieve the purpose of international understanding. This paper focuses on the connotation and significance of international Chinese language education from the perspective of narrative ethics as well as explores its ethical narrative problems based on three aspects: teachers, students, and classroom teaching, and suggests corresponding solutions. It aims to provide new theoretical and practical research perspectives for the development of international Chinese language education and help Chinese language education to be carried out more effectively in order to promote intercultural communication and integration.

Keywords:

International Chinese language education
Narrative ethics
Connotation
Meaning
Approach

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1. Introduction

The importance of international Chinese language education as an essential bridge for cultural dissemination and exchange is self-evident. With the continuous evolution of educational concepts and the in-depth development of multicultural exchanges, the perspective of narrative ethics provides a novel and in-depth research perspective for international Chinese language education. Narrative ethics focuses on individual life

stories and the ethical values behind them, emphasizing the transmission of cultural meaning and ethical concepts through narratives. In order to meet the needs and challenges of the times, it is of great theoretical value and practical significance to conduct in-depth research on the connotation, significance, and approach of international Chinese language education under the perspective of narrative ethics.

2. Connotation: Narrative content in international Chinese language education

Since the development of Chinese language education, academics and colleagues have been committed to exploring the applicable research paradigms and development paths. According to Kuhn, an American philosopher of science, the development of science depends on the revolutionary transformation of “paradigms” rather than gradual progress^[1]. Therefore, the continuous innovation of teaching research paradigms and perspectives is also driving the continuous development of education. The perspective from which teaching and learning should be viewed is usually closely related to the context of the times. Since the 1980s, Chinese language teaching has gone through three innovations, from “Teaching Chinese as a Foreign Language” to “Chinese Language International Education” and to the current “International Chinese Language Education.” The change in the name of the discipline also means that the connotation and meaning of the discipline are constantly updated. Academics generally define international Chinese language education as the dissemination and inheritance of the Chinese language in the world. The responsibility and obligation of Chinese language education is not only limited to language education itself, but also includes the cultural ideas and stories behind the language, especially in today’s world situation, Chinese language education should have a global vision. In order to tell a good Chinese story, Chinese language education is an important means of communication.

As early as 1996, UNESCO put forward the concept of education with the aim of “international understanding,” aiming at enhancing the understanding and tolerance of all peoples in the world through education^[2]. According to Zhang and Hu, “international understanding” implies the interaction and understanding of the target country’s society, China’s society, and the international community, i.e., you, me, and others^[3]. Therefore, the connotation of education does not only lie in communication, but also in seeking mutual understanding and tolerance. From a narrative perspective, through language, people become narrators; and through language, education can become a narrative bridge that promotes the exchange and integration of

ideas from different cultures.

In addition to considering the requirements of the times and policy mechanisms at the macro level, it is also necessary to return to the front line of teaching, to understand the responsibilities of teachers, and to solve the problems of students. Zhu and Hao pointed out that “teachers, teaching methods, and teaching materials” are the three core issues of international Chinese language education^[4]. If education is regarded as a narrative method, then teachers and students are the main subjects in the narrative process and the teaching materials are like the scripts of the narratives that are carefully arranged. To rely on the teaching materials to carry out the educational narratives, it is necessary to give full play to the role of pedagogy. Among these three core issues, pedagogy is the most flexible, and teachers’ choice of pedagogy greatly affects the effect of educational narratives. It can be seen that international Chinese language education is both a means of communication and a narrative method.

3. Significance: The importance of narrative ethics in international Chinese language education

The classroom, as an important place for teaching and learning activities, is an indispensable part of the educational process. In fact, the process of teaching also involves the process of the teacher as a narrator. The difference is that a good classroom is not merely a simple description and explanation of the content by the teacher, but also the ideas, attitudes, and emotions conveyed by the teacher as a narrator. According to Li, the significance of educational narrative lies in the process of realizing the reconstruction of the narrator’s self-spiritual life by way of recounting educational events^[5]. That is to say, the connection between practical science and thought experience is constructed, knowledge is transmitted, ideas are exchanged, and the spirit is remodeled by means of educational narratives.

As early as in the ancient Greek period, the philosopher Aristotle proposed that a good narrative should have ethical values. Similarly, international Chinese language education narratives can only reflect the real meaning of education if they have certain ethical values and missions. In cross-cultural communication,

guiding students to establish life goals, find value pursuits, and realize spiritual remodeling is an important task of the international Chinese education narrative.

A good educational narrative should have the following characteristics: human-centered, creative, two-way, equal, and multifaceted. From a human-centered perspective, education focuses on individual needs, dilemmas, and growth. In the process of educational narrative, it is necessary to tap the creativity of individuals, put knowledge into practice effectively, and then transform the practical experience into the spiritual power that belongs to a certain individual, realizing their spiritual remodeling. Teaching is never a single perspective, but a two-way process of “teaching” and “learning.” The process of educational narrative is not only a two-way transformation of the roles of the narrator and the listener, but also a mutual resonance between the two from the spiritual soul. In the course of life filled with stories, everyone is the narrator of their own life story as well as the listener of other people’s life stories, and the significance of educational narratives is to give everyone the right to choose their own life role on an equal footing. At the same time, educational narratives should be inclusive, rich, multifaceted, and possess endless possibilities, to avoid overly simplified black-and-white education.

If the individual is regarded as the center of a circle, then the educational narrative is the process of discovering, creating, and reshaping the self in an all-round way through the two-way interaction between teachers and students on an equal footing, so as to correctly establish the individual’s ethical beliefs and guide their life practices. In a cross-cultural context, how to allow students to obtain unlimited growth and development based on association and their own experiences through the Chinese context is the important purpose and meaning of Chinese language education.

4. Approach: Practical exploration of ethical narratives in international Chinese language education

4.1. Ethical narratives in teachers’ instruction

International Chinese language teachers face many ethical challenges in the teaching process. Firstly, due

to differences in cultural backgrounds, students from different countries and regions have varying values and behavioral norms, and their understanding of different ethical concepts also differs, which brings certain difficulties to teachers’ teaching and management. Secondly, teachers may also face problems when choosing the content of ethical narratives. Therefore, if teachers select the content of educational narratives on a certain topic without in-depth understanding and consideration, it may cause conflicts due to cultural differences. In addition, teachers are under pressure for their own professional development. With the changes in the world landscape and external environment, international Chinese language education models and concepts have seen new developments, which also means higher demands on teachers’ professionalism and teaching abilities.

First of all, with regard to the issue of cultural differences, it is important to adopt a multifaceted narrative approach based on cultural contrasts. A single cultural comparison is just a superficial exchange of words, and only by giving students a platform for free expression can cultural integration be truly realized. For example, teachers can organize activities like “cultural reservoir,” allowing students to show their own country’s cultural characteristics and the integration and collision of the Chinese language. Multiple narratives not only enable students to understand the diversity of Chinese language learning in different cultural contexts, but also allow teachers to draw new inspirations from them to enrich the existing teaching contents and methods.

Secondly, concerning the selection of the content of ethical narratives, it is important to note that culture is not a “point” but a “surface.” Teachers and students can co-construct an understanding of Chinese culture and its ethical concepts through two-way educational narratives, and jointly explore the values and connotations of different cultures in the interchange of the roles of narrator and listener. This kind of interaction not only helps students to better understand Chinese, but also helps teachers to better understand the cultural background and cognitive characteristics of their students, thus realizing the mutual benefit of teaching and learning.

Finally, regarding teachers’ personal career development, it is important to focus on teachers’ self-

growth as well as the external environment and subject needs. On the one hand, teachers need to continuously improve their professionalism and teaching ability to adapt to the constantly developing and innovative teaching mode; on the other hand, they also need to clarify their own career development orientation, deeply understand the connotation and meaning of international Chinese language education, and be a good narrator of Chinese language education.

4.2. Ethical narratives in student learning

Students also face many ethical narrative problems when learning Chinese. First of all, students may face differences in narrative understanding. For example, for some international students from more individualistic cultural backgrounds, it is difficult to understand the complex social and ethical relationships carried by the Chinese word “人情.” Secondly, the knowledge that students are exposed to is often presented in the form of “being revealed,” and it is difficult to show the creativity of knowledge. The currently advocated flipped classroom has obvious advantages in flexibility and interactivity, but at the same time, the technical requirements for teachers and students, as well as students’ learning autonomy are higher. If students do not have the appropriate equipment or lack awareness and ability to learn independently, it may affect the effectiveness of classroom teaching. When it is difficult for students to discover knowledge on their own, it will be more difficult to realize the creativity of knowledge. Finally, it is difficult for students to transform “education on paper” into “education in life.” When teaching becomes a fixed mode, it is challenging for students to put their real feelings into it, and when students aim at accomplishing a certain task or project requirement, it defeats the original purpose of teaching based on practice. Therefore, it is difficult to arouse students’ emotional resonance by relying only on a fixed mode of teaching and learning.

In order to cope with the dilemma of ethical narratives, it is necessary to be “student-centered” and realize a successful closure of educational narratives. First of all, regarding the problem of differences in narrative understanding, it is necessary to help students understand the world through stories by means of narratives. Stories are the carriers of human experience and provide us

with a structured way to make sense of the world. In international Chinese language education, a vivid and short story is sometimes much more powerful than a verbal explanation. Not only is it an important way for people to convey values, knowledge, and emotions, but it can also help people construct their self-perceptions and thus stimulate deep emotional resonance. Despite the different cultural backgrounds and experiences among individuals, the associative and transmitting effects of stories can still help students establish links with different cultures, thus deepening their understanding of different cultural connotations and ethical concepts.

Secondly, as far as the presentation of knowledge is concerned, less rewriting of experience and more self-experiencing of the true state of being can truly realize the creativity of knowledge. Experience rewriting is a kind of repetitive behavior based on past cognitive frameworks and behavioral patterns. Self-experience, on the other hand, emphasizes individual feelings, experiences, and reflections. Only through active participation in the process of acquiring and exploring knowledge, and the connection between existing knowledge and their own life experiences, can students discover the value of knowledge, guide their self-development, and truly realize the creativity of knowledge.

Finally, in order to truly realize “education in life,” a life-based educational narrative is indispensable. Telling interesting and ethical Chinese stories can stimulate students’ interest and enthusiasm in learning Chinese and help them build their own identity. The value of narratives lies not only in sharing but also in thinking and feeling. In a Chinese language learning environment, ethical narratives can help students construct an understanding of and identity with Chinese culture. Students can also construct their identity as Chinese language learners through the narratives of their own life experiences. Through intercultural exchanges and integration, students are able to construct cross-cultural identities. In this process, teachers should play a good role in guiding students to realize that Chinese language learning is not only about language learning, but also about communicating and practicing the philosophy of life.

4.3. Ethical narratives in the classroom teaching

The ethical narratives faced in international Chinese

classroom teaching include not only the various linguistic elements and language skills of the Chinese language, but also the rich cultural connotations and ethical concepts of the Chinese language, and the teaching based on the latter is still in need of further depth. From a macro point of view, the Chinese language is characterized by a long history, strong continuity, and heavy ideology, which are precisely the difficulties for students to learn. Therefore, if we can explore practical teaching strategies from a narrative perspective, it may be able to promote the further development of ethical narratives in international Chinese classroom teaching.

For example, Chinese sayings and idioms can be a good breakthrough. With their simple forms and profound meanings, they carry rich cultural memories and ethical connotations and are also able to vividly express complex thoughts and emotions. However, the teaching of sayings and idioms still faces some challenges in international Chinese language education. On the one hand, due to their complex semantics, they are difficult for non-native learners to understand and master. On the other hand, the current teaching methods and textbooks contain relatively little content on sayings and idioms, which lacks systematicity and relevance. Teaching also mostly stays at the level of semantics and utilization, seldom involving cultural connotations and ethical concepts.

Based on this, how to help students deeply understand the cultural connotations and ethical concepts of the Chinese language and obtain self-growth and remodeling is the important purpose and significance of international Chinese language classroom teaching. First of all, it is necessary to focus on systematic teaching design. The scattered language knowledge can be categorized and taught according to the theme, which can be taught as a whole topic, or distributed in each lesson as one of the links of classroom teaching. Taking the teaching of idioms as an example, it can be categorized into emotion, such as “怒发冲冠”; animal, such as “画龙点睛” and so on. By teaching thematic categorization, students can learn idioms in a more systematic way and improve their learning efficiency. At the same time, it will also deepen students’ understanding of Chinese expressions and Chinese ways of thinking.

Secondly, cultural understanding can be deepened through narrative teaching, and cultural understanding

can be used to promote emotional resonance. Narrative teaching can deepen students’ understanding of Chinese culture and ideology. For example, by telling the story of “Chang’e Flying to the Moon,” students can learn about the Mid-Autumn Festival, feel the romantic imagination of the ancient Chinese people about the universe, and realize the importance of the “family” culture in Chinese ethical concepts. Cultural understanding is a bridge to build emotional resonance, and in the exchange of different cultures, understanding can be enhanced to stimulate students’ emotional identity and resonance.

Thirdly, it is important to focus on personal authentic emotional experience. In the international Chinese classroom, teachers not only have to improve their professionalism and teaching methods, but also their responsibility and mission as an educational narrator. While possessing the identity of a teacher, first of all, they should not forget their own emotions and values as an independent individual. Based on “less broad assumptions, more individual depth,” they give students adequate space for expression, in order to promote the diversity of their knowledge and understanding.

Finally, it is necessary to help students to de-label and explore the meaning of life growth in classroom teaching. In an open and inclusive classroom atmosphere, teachers establish equal rules with students, clarify that everyone’s viewpoints and experiences deserve to be honored, and give students enough comfortable space to express their unique insights into growth. Whether teacher or student, everyone in the classroom is a narrator of their own life and a listener to the life experiences of others. Through rich life stories, students can learn that growth is a complex and individualized process, and there is no fixed label. In addition, diverse teaching methods can be utilized such as the case study-based method. Teachers provide a wide variety of growth cases related to the content of the curriculum, guide students to view and solve problems from different perspectives, and appreciate the complexity and diversity of growth.

Classroom teaching involves not only the transmission of knowledge, but also the shaping of values and the cultivation of personality. Through educational narratives, cultural connotations and ethical concepts can be skillfully integrated into the teaching process, so that students can realize self-development and spiritual

remodeling in a subtle way.

5. Conclusion

International Chinese language education is a critical bridge for cultural exchange and dissemination, as well as an effective educational practice and narrative. The Chinese language can be used as a carrier to convey knowledge, communicate ideas, and reshape the spirit through educational narratives, realizing the true meaning of knowledge dissemination and cultural understanding. In today's world, discussing international Chinese language education from the perspective of narrative ethics is conducive to breaking down cultural barriers at a deeper level and enhancing international

students' understanding of Chinese cultural connotations and ethical concepts. It also plays a positive role in maintaining cultural diversity and building a harmonious and coexisting international cultural environment. Ethical narratives enrich the connotation of education and inject emotion and humanistic care into classroom teaching. While pursuing the answer to reality, we also need to find the answer to growth in life, which is exactly the meaning of education. By exploring the ways of practicing ethical narratives in international Chinese language education, it is expected to provide new ideas for international Chinese language education and its research in the future, as well as to inject continuous vitality and vigor into helping global cultural exchanges.

Disclosure statement

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Research on Integrated Case Teaching in Primary School English Teaching Methods

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Abstract:

This study adopts the research framework of “background analysis, theoretical conception, empirical testing, and reflective improvement,” employing a combination of literature review, statistical analysis, and case study methods. It systematically and scientifically examines the necessity, rationale, and effectiveness of integrated case-based teaching within the context of primary school English education methodologies. Using H University as a case study, this paper conducts applied research and verification and proposes improvement suggestions to explore the integrated case teaching mode of primary school English teaching method courses, providing a valuable reference for the reform of English education teaching mode in China.

Keywords:

New curriculum standards
Primary school English teaching method courses
Integrated case teaching

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1. Introduction

This research fully implements the concept of “student-centered, output-oriented, and continuous improvement” according to the “Certification Standards for Normal Education Majors,” further refines professional characteristics, deepens curriculum and classroom teaching reforms, and actively explores effective strategies for the application of case teaching to cultivate high-quality, professional, and innovative teachers in the new era. It is of great significance for comprehensively improving the quality of normal student training and

promoting the construction of normal education majors.

2. Research significance

This paper is significant in providing high-quality and efficient learning experiences for teacher trainees. Case teaching is a situational teaching model that emphasizes the process of learners actively constructing knowledge. Adhering to the student-centered certification concept, the teaching mode should focus on how to utilize the design of the learning environment and innovative

teaching activities to maximize teaching effectiveness and transform theoretical knowledge into professional abilities and work qualities^[1]. Teachers should carefully and rigorously design case teaching activities in advance, such as designing case scenarios based on students' knowledge and experience combined with course learning objectives, constructing corresponding teaching environments, and predicting appropriate teaching strategies.

It can also inspire the endogeneity of teaching methods in primary school English methodology courses. The methodology curriculum for primary school English needs to respond to classroom knowledge and teaching practices guided by dynamic and complex problem situations, transferring knowledge to specific contexts for flexible application, in order to avoid shallow learning that involves mechanically passive acceptance of knowledge and isolated storage of information. Therefore, factors affecting the effectiveness include the quality of the case, the control capability of the teacher, the differences and initiative of the students, and the classroom environment. The case teaching mode of primary school English methodology curriculum is conducive to stimulating the internal mechanism of cyclic endogeneity in each link, forming a teaching mode of single-link internal integration and mutual influence among each link.

3. Research status

3.1. Case teaching

Case teaching is a student-centered teaching method that requires students to actively participate in analyzing and discussing cases provided by teachers. It is a hallmark teaching model of Harvard Business School. The use of cases enables students to apply theoretical knowledge to specific situations, thereby promoting knowledge transfer and problem-solving and critical thinking skills. In terms of theory, researchers have conducted extensive research on the connotation, modes, and theoretical foundations of case teaching from different perspectives. For example, the famous American educator Kowalski systematically studied case teaching and pointed out that case teaching is a teaching method based on cases for discussion^[2]; while Ehrhardt explained case teaching from key factors, believing that case teaching should at least include three key elements: goals, situations,

and evaluations^[3]. In terms of application, researchers have proven in different courses that case teaching has a certain role in improving learning motivation, self-confidence, and classroom participation. For example, Matthews adopted case teaching in explaining psychological concepts, and the results showed high student classroom participation^[4]. Empirical studies by Garvin have shown that case teaching can effectively promote learners' knowledge application abilities and prompt learners to reflect on theory^[5]. A large number of empirical studies have proven the positive effects of case teaching in improving learners' academic performance, learning experiences, and learning motivation. With the development of information technology, cases used for teaching have gradually shifted from text descriptions to multimedia-based presentations such as videos and animations^[6]. Multimedia case teaching has its unique advantages: interactive multimedia-presented cases can better attract and motivate learners, and multimedia cases have higher exploratory potential to simulate the complexity of real-world problems^[7]. Hewitt *et al.* used video cases as the carrier of case teaching, prompting learners to think and solve problems through pauses and interactions at each decision-making point of the video case. Learners reflected and discussed at key problem nodes, and the results proved that video case teaching promoted learners' learning interest and motivation^[8].

3.2. Case teaching in normal education majors

Research mainly focuses on case selection, development, teaching processes, teaching modes, etc., in normal education majors. Wang summarized the history of case teaching development that teachers are important subjects in case development and should provide support for case development^[9]; Li discussed issues such as case selection, case presentation, teaching processes, and teaching evaluations during the implementation of case teaching based on high school artificial intelligence courses, and put forward his own views on issues that need attention during implementation^[10]; Professor Jinzhou Zheng applied the case teaching method to teacher training, divided it into three basic links: case introduction, case discussion, and summary, and pointed out that case teaching helps develop the innovative spirit and abilities of trainees to solve practical problems and

other qualities^[11]. In terms of the practical application of case teaching, its effectiveness has been proven in the fields of Chinese, mathematics, geography, physics, biology, chemistry, and other subjects. Students expect teachers to adopt other case forms in teaching^[12]. Some researchers discussed teaching strategies, teaching processes, and teaching evaluations based on video cases, summarizing that video cases have situationality and authenticity, which can cultivate students' abilities to observe, think, analyze, and solve problems^[13]. Yang and Hong adopted multimedia cases in ideological and political education classes, and the results proved to have achieved positive teaching effects^[14]. Zhu summarized the commonly used forms of informatization teaching cases including text presentation, verbal presentation, performance presentation, video presentation, animation presentation, and online presentation. She designed and developed informatization teaching cases for specific courses, and conducted practical teaching through traditional text groups and informatization teaching case (multiple resource forms) groups. The results proved that the teaching effect of informatization teaching cases was better^[15].

4. Presentation of integrated cases for primary school English teaching methods courses

The presentation of integrated cases for primary school English teaching methods courses represents a teaching mode that deeply integrates theory with practice (Table 1). Through carefully designed cases, it incorporates the core knowledge and skills of primary school English teaching methods courses into specific teaching situations, enabling teacher trainees to deeply understand and master primary school English teaching methods while analyzing and solving problems. The integrated case teaching process is shown in Figure 1.

5. Conclusion

This study examines the origins and development of case-based teaching, defines the core concepts of cases and case-based teaching methodology, discusses the functional significance of case-based teaching and its applicability to teacher education through literature analysis and comparative research. Additionally, it summarizes the constraints limiting the domestic development of case-based teaching and the current trends in research on case-based teaching models in China through literature review.

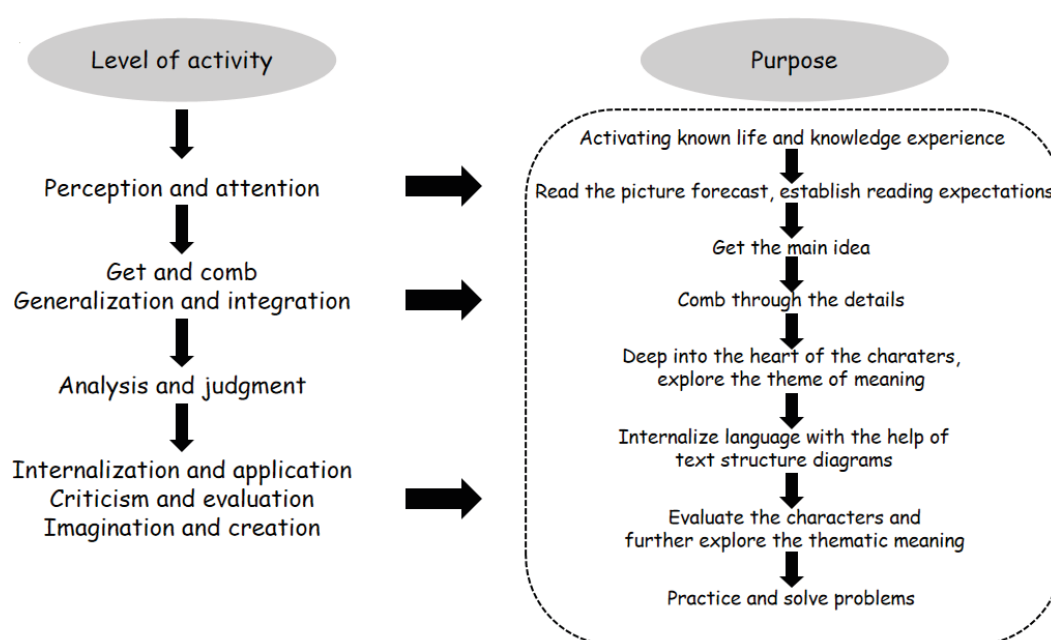


Figure 1. Integrated case teaching process

Table 1. Integrated cases of primary school English teaching methods courses

Instructional design				
Textbook analysis	Through numerous primary school English teaching cases, in-depth analysis has been conducted on various aspects of the English teaching process. These cases cover a wide range of aspects such as teaching methods, student interaction, classroom organization, etc., aiming to provide a comprehensive and practical guide for students majoring in teacher education.			
Design philosophy	The student-centered educational principle adopts an integrated case-based teaching approach, with the aim of cultivating students' teaching design ability, classroom management ability, and teaching reflection ability. We attach great importance to the deep integration of theory and practice and are committed to encouraging students to effectively transform their theoretical knowledge into practical teaching abilities. At the same time, we integrate the concept of large unit teaching, emphasizing the integrity and coherence of knowledge to enhance students' cognitive level of the primary school English teaching system.			
Teaching progress	Instructional objectives	Teacher activities	Effect evaluation	Design idea
Primary school English "National Curriculum Standards for Primary Standards" 2022 edition interpretation	<p>Y Understand and master the core content of the 2022 National Curriculum Standards for Primary School English.</p> <p>Y Cultivate students' sense of educational responsibility and mission through introduction and questioning.</p>	<p>Y Use introduction and questioning methods to discuss in conjunction with the course content.</p> <p>Y Introduce the experience of excellent teachers in the case and discuss how to integrate these experiences into personal growth planning.</p>	<p>Y Students are able to accurately articulate the requirements of the curriculum standards and preliminarily analyze their relationship with teaching practice.</p> <p>Y Students are able to express their expectations and plans to become excellent teachers, demonstrating a positive educational sentiment.</p>	<p>Y Using specific examples from "Case Analysis of Primary School English Teaching," guide students to explore the practical application of curriculum standards.</p>
The relationship between the new curriculum standard and core literacy	<p>Y Analyze case studies to understand the intrinsic connection between the new curriculum standards and core competencies.</p> <p>Y By decomposing the curriculum objectives of each stage of the new English curriculum standard, help students develop certain language skills, cultural awareness, thinking qualities, and learning abilities.</p>	<p>Y Using multimedia materials display and questioning methods, combined with fragments from specific teaching cases, conduct bilingual communication and discussion, and deeply analyze the specific manifestations of core competencies in teaching practice.</p> <p>Y Integrate the discussion content closely with the course content, conduct bilingual communication, and have student representatives give speeches and explanations.</p>	<p>Y Students are able to accurately explain the relationship between the new curriculum standards and core competencies, and can propose strategies for cultivating core competencies in teaching.</p> <p>Y Students can propose suggestions for integrating cross-cultural elements into teaching, demonstrating their understanding and attention to primary school English education.</p>	<p>Y Guide students to think deeply about how to effectively cultivate their core competencies in the education and teaching process, based on the teaching scenarios involved in the case.</p>
Analysis of teaching materials (take the PEP textbook as an example)	<p>Y Familiarize and master the structural system and unique features of PEP textbooks.</p> <p>Y Gain a deep understanding of the unity between the instrumental and humanistic aspects of English curriculum.</p>	<p>Y Through reading articles, teacher introductions, and group discussions, combined with the analysis of the textbook in the case, conduct bilingual discussions to gain a deeper understanding of the design philosophy of the textbook.</p> <p>Y Analyze how to introduce Chinese culture in English and strategies for understanding foreign cultures in case studies, guiding students to think about how to cultivate their cultural awareness in teaching.</p>	<p>Y Students are able to accurately analyze the structure and characteristics of textbooks and provide suggestions for optimizing their use.</p> <p>Y Students can propose suggestions for integrating Chinese cultural elements into teaching, demonstrating a sense of pride and inheritance of national culture.</p>	<p>Y Through the course, students can reshape their learning enthusiasm and enhance their sense of social responsibility, strengthen their cultural awareness, learn to serve the country, and put them into practice.</p>
Case analysis report and communication	<p>Y Proficiently master the professional skills of creating lesson plans, teaching, and presenting lessons related to primary school English curriculum.</p>	<p>Y Introduce the historical story of primary school English textbook writing, and guide students to create and exchange textbook analysis reports based on the PPT production experience in the case.</p> <p>Y Through group discussions and sharing, guide students to think about how to contribute to primary school English education, and inspire their sense of responsibility and mission.</p>	<p>Y Students are able to create a clear structured and rich content textbook analysis report PPT, and can effectively communicate and share.</p> <p>Y Students are able to express their enthusiasm and expectations for primary school English education, demonstrating a positive attitude towards education and career pursuits.</p>	<p>Y To cultivate students' sense of mission in primary school English teaching, their sense of responsibility for making achievements in teacher education, their ability to analyze cases, and improve their thinking quality.</p>

By investigating the current situation, the study identifies and summarizes the implementation difficulties faced by case-based teaching in teacher education programs at universities in Guangdong, focusing on and categorizing these issues to analyze the underlying problems of case-based teaching in this context.

Based on the years of practical experience and observations, this study explores the overall design and implementation of case-based teaching from aspects such as learner experience background assessment, creation of teaching situations, the process and mechanism of knowledge construction, learners' proactive awareness and self-regulation abilities, and objective evaluation of transfer results, guided by the constructivist perspective on learning transfer and instructional theory, as well as competency-based education theory. It elaborates on the general teaching process of constructivism and establishes an integrated case-based teaching model consisting of

four stages: case development, case-based classroom teaching, case-based action, and case evaluation. During the establishment process, the study analyzes the internal mechanisms that stimulate and recycle among various stages of case-based teaching, forming a complete case-based teaching model with both internal integration within individual stages and mutual influence and integration among all stages.

For the next step, the study will macroscopically focus on and explore the interconnected roles of various elements related to the overall case-based teaching model, including the selection and design of teaching cases, management forms of case-based classroom teaching, innovations in teaching forms, case compilation and methods for teachers, deficiencies and supplementary practices of case-based teaching, as well as the micro-methods for these crucial aspects.

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Disclosure statement

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Design and Realization of Cluster Monitoring System Based on IoT Technology

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Abstract:

With the increasing global awareness of ecological protection, this project responds to the relevant policies of Guangdong Province and the initiative of the National Beautiful China Pioneer Zone, aiming to develop a multi-point cluster monitoring system through artificial intelligence and Internet of Things technologies to realize intelligent monitoring and protection of mangrove forests. The system utilizes real-time monitoring technologies, including the detection of oxygen and carbon dioxide concentrations to assess the carbon sequestration capacity of the trees, and a soil monitoring function to provide a comprehensive understanding of the environmental conditions under which the trees are growing. The system also enables real-time alarms for any abnormal conditions and automatic intelligent irrigation management when soil moisture content falls below the growth requirement threshold. The data is read in real time by the sensors and uploaded to the MixIO cloud platform using the MQTT protocol, enabling real-time updating and visualization of the data, making the monitoring, protection, and management of trees and the environment easier and more efficient.

Keywords:

Old and valuable trees protection
Artificial intelligence
Internet of Things
Ecological monitoring
Cluster monitoring

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1. Major problems with current mangrove testing

- (1) Inconsistent data standards and inadequate integration: Domestic tree monitoring systems have different standards for data collection,

processing, and storage, insufficient data integration, and a lack of integrated management platforms, resulting in inconsistent data formats that are difficult to share and analyze ^[1]. This project will improve data quality based on

formal collection indicators.

- (2) Lack of long-term monitoring data: Long-term continuous monitoring data are critical for the study of mangrove-environment interactions, particularly with regard to climate change resilience and soil erosion impacts ^[2]. However, the accumulation of available data is insufficient, limiting the understanding of the ecological response of mangroves and the effective development of conservation measures.
- (3) Lack of integrated platforms: Existing mangrove monitoring systems often focus on a single indicator and lack a comprehensive platform to integrate multiple data sources ^[3]. It is difficult to fully reflect the complex interactions between mangroves and the environment, such as photosynthesis, carbon sink capacity, water circulation, and ecological service functions.

assessment that integrates real-time multi-point monitoring and intelligent cloud data management. Each node is equipped with a variety of sensors and devices to continuously measure key indicators of tree growth in real time, evaluate carbon storage and sequestration capacity in combination with ecological models, and analyze changes in carbon footprints caused by greening activities. It also analyses important environmental parameters that affect plant health, such as soil temperature, humidity, pH, and conductivity. This kind of all-round data collection provides managers with a basis for decision-making and grasps the growth status of trees and environmental changes (**Figure 1**).

The project allows the public to adopt mangrove forests online and monitor their growth in real time through an intelligent cloud planting platform. The system integrates the data to generate reports to help the adopters grasp the health and growth of the trees and to promote the ecological construction of green Guangdong.

2. System design and implementation

This project builds a data network for tree growth

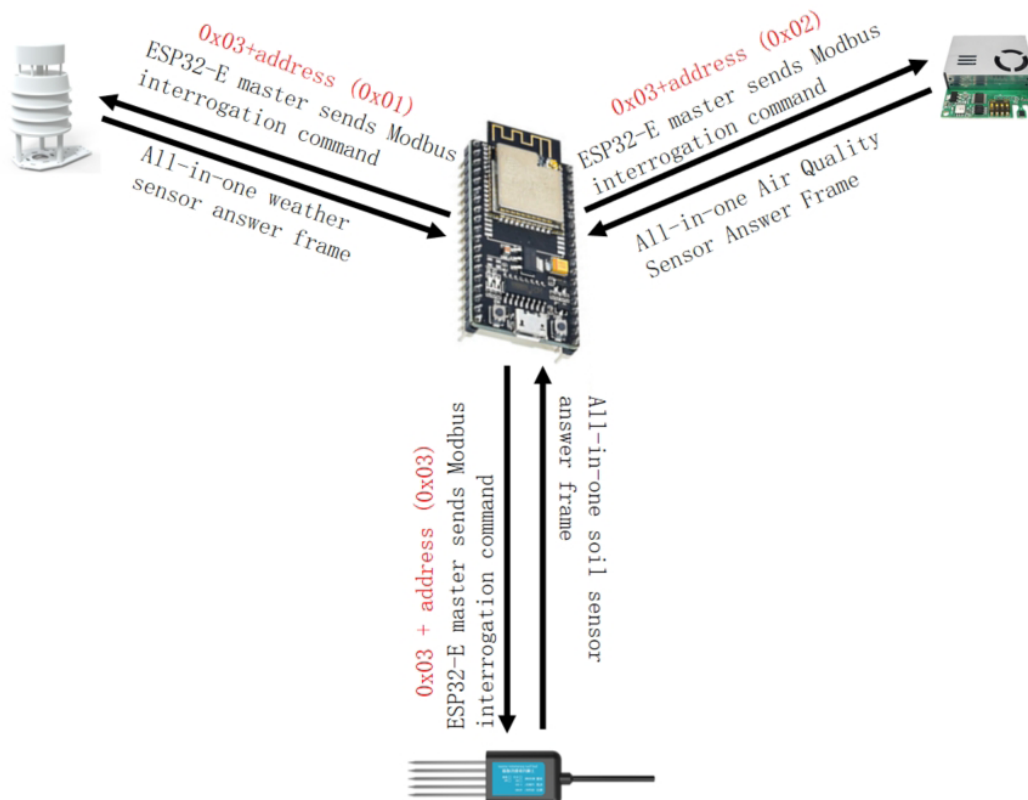


Figure 1. Schematic diagram of the main functions of the work

2.1. MixIO web-side data visualization and display function

The all-in-one soil sensor is connected to the ESP32 main control board via the RS485 bus and the same serial communication parameters are set (**Figure 2**). The main control board sends query commands to obtain the sensed data and parse them and then uploads the processed data to the MixIO cloud platform to realize real-time monitoring and statistics of the mangrove growth environment. A text display is created on MixIO to show real-time tree growth data monitored by an all-in-one soil sensor and AI camera. The data is uploaded to the cloud platform via MQTT protocol for real-time visualization of the tree growth environment. The camera in the system monitors mangrove growth in real time, and through a network connection, the image data is transmitted in real time to a cloud server and analyzed using open-source image processing libraries in order to monitor indicators such as the number of leaves, colors, and trunk thickness.

RS485 All-in-One Air Quality Sensor Wiring Diagram

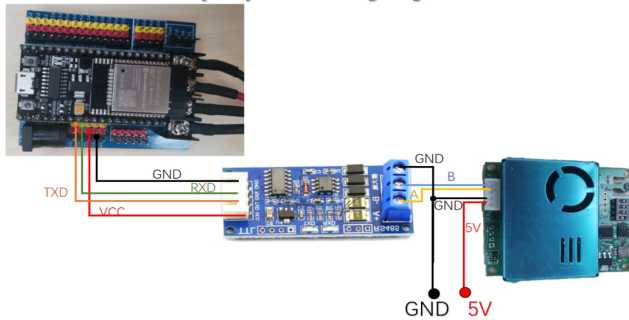


Figure 2. RS485 all-in-one air quality sensor wiring diagram

2.2. Data anomaly warning function

In this project, by setting the mangrove soil health data range, if the data measured by the industrial grade all-in-one soil sensor is out of this normal range, the warning light on the IoT cloud platform will turn red, and if it is normal, the warning light will turn green.

The normal range of soil health data is set, such as temperature, humidity, and pH. If the data is abnormal, control the warning light to turn red as a reminder through the MQTT protocol; if it is normal, keep the green light. This mechanism assists the administrator in adjusting and handling the abnormality in time.

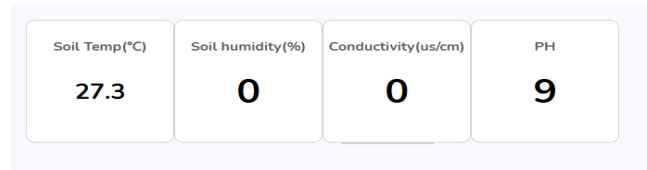


Figure 3. Warning light effect display

2.3. Local visualization function

The USART HMI software is used to design the touch screen page, in which the text display box of corresponding data is set. As the main interface between the user and the system, the touch screen mainly realizes the visual display of data and user interaction. The project flowchart is shown in **Figure 4**.

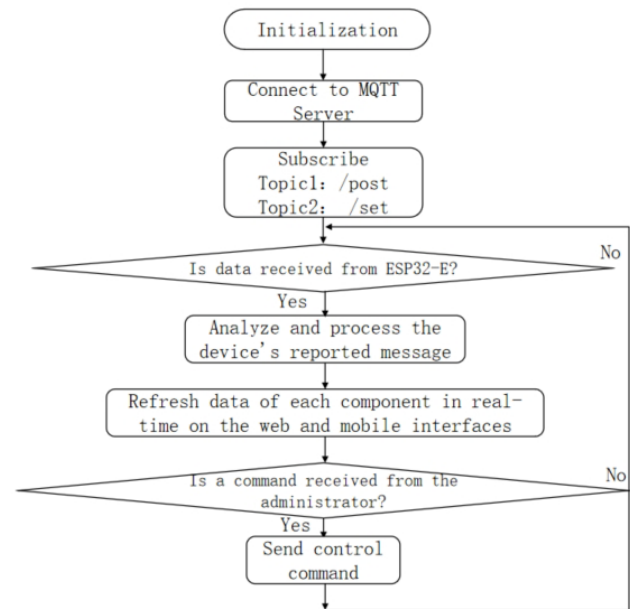


Figure 4. Project flowchart

2.4. Intelligent cloud cultivation

The project introduces intelligent cloud planting, “AI + wisdom to help farmers” new model, empowering the planting industry to reduce costs and increase efficiency, activate the industry’s “blood” function, and help the transformation of “sweat agriculture.” “Intelligent agriculture” allows community members to adopt mangrove forests online. The multi-point monitoring system can track growth in real time and generate daily reports. Based on the report data, suspicious data of adopters can be reported at any time, and administrators can solve and provide feedback.

2.5. Intelligent watering function

This system can automatically adjust the watering amount and frequency according to the growth demand of the trees to achieve automated watering. It precisely adjusts the watering strategy to avoid over or under-watering and save water resources. Such intelligent management not only improves the watering efficiency, but also reduces the cost of manual operation and the waste of water resources.

2.6. Climate, pest, and disease detection and carbon stock assessment functions

Monitoring carbon dioxide concentration and wind direction and speed through meteorological and air quality sensors can assess the carbon neutral capacity of the environment. High-definition cameras and AI technology can monitor pests and diseases and support the precise application of medication. AI applet provides online identification of pests and diseases, which allows quick access to prevention and control recommendations and reduces farmers' loss^[4].

3. Innovation point

3.1. AI-enabled data collection and management

3.1.1. Mangrove soil data monitoring

The Mangrove Monitoring System uses AIoT technology to monitor the soil environment in real time with all-in-one soil sensors. The data supports an accurate assessment of soil health and optimization of growing conditions. The monitoring device collects data and transmits it to the management center, reducing the frequency of site visits and reducing the labor load.

3.1.2. Mangrove growth data monitoring

Through AI height measurement technology, the system is able to accurately measure the height of mangroves. While traditional measurement methods may be limited by the angle of vision or the accuracy of the measurement tool, AI models can achieve accurate height measurements by analyzing tree image data. While traditional age estimation often relies on tree ring rings or dendrochronological methods, AI models can combine machine learning algorithms with growth data and image analysis to provide more accurate and non-destructive

measurements^[5]. AI models provide a more accurate and non-destructive approach to age estimation, providing managers with recommendations to optimize growing conditions.

3.2. Establishment of a multi-regional mangrove cluster management system and early warning mechanism

3.2.1. Cluster management system

The cluster system is capable of real-time monitoring of multiple mangrove forests in multiple areas, thus achieving centralized management of multiple trees in multiple areas. This innovative idea breaks the limitations of traditional single-point monitoring, enabling managers to obtain a comprehensive understanding of the growth of mangrove forests in multiple areas on a unified platform, so as to make management decisions more effectively.

3.2.2. Early warning mechanisms

The system is equipped with a data abnormality warning mechanism. On the one hand, the camera's real-time monitoring and system analysis can predict the abnormal phenomena of mangrove growth, such as sudden changes in growth rate and abnormal leaf color, to remind the relevant management personnel to carry out further investigation and treatment. On the other hand, the system can detect and judge whether the plants lack water and how much water is needed to meet their growth needs. Meanwhile, if the tree is cut down by unauthorized people, the sensor will trigger the transceiver to send the tag ID and alarm signal to the control room^[6].

4. Conclusion

This paper discussed advanced monitoring technologies and management experiences at home and abroad, and put forward strategic suggestions such as optimizing monitoring tools, strengthening data open sharing, and upgrading the monitoring network layout. The specific project introduces a data network for assessing tree growth conditions, which utilizes multi-point real-time monitoring and intelligent cloud data management technologies to achieve an accurate assessment of tree growth indicators and environmental parameters and mangrove cluster management, providing managers

with a scientific and effective basis for decision-making. The smart cloud planting concept introduced in the project encourages community participation and public education to enhance public awareness and participation in ecological environmental protection. Through these

measures, this paper aims to provide technical support and practical implementation for the sustainable improvement of ecological environment quality and the construction of ecological civilization in China in the future.

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The authors declare no conflict of interest.

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An Exploration of a New Relationship Between Teaching and Learning and Its Application to Classroom Teaching in China

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Abstract:

China is currently in the stage of compulsory education reform, where primary education has been developing rapidly and leading the way in academic achievement over the decade. However, the application of different pedagogies to classroom teaching has been regarded as a controversial issue in the related field over the years. The teacher-centered pedagogy evolved from behaviorism proposed by Skinner emphasizes students benefit more from the behavior of external stimulation while constructivism advocates learners-centered pedagogy that stresses children's internal cognitive process based on the theories of the more knowledgeable other (MKO) and zone of proximal development (ZPD). The purpose of this paper is to explore a new relationship that strives to balance the proportion of the two teaching methods through an extensive review of literature related to the context of the current status and problems of primary school education in China.

Keywords:

Behaviorism
Constructivism
Teacher-centered pedagogy
Learner-centered pedagogy

Online publication: December 16, 2024

1. Introduction

Tam *et al.* ^[1] claimed that “students have traditionally been viewed as passive recipients of knowledge,” since classroom teaching is an activity in which teachers lead classroom content and students are less willing to take the initiative in the learning process in Chinese classrooms. According to Lak *et al.* ^[2], teacher-centered pedagogy is the most common method which is used by schools in the world. Hancock *et al.* ^[3] concluded the teacher is the

dominant leader who establishes and enforces rules in the classroom under this mode, which puts more emphasis on the performance of the instructors. Cox ^[4] discussed that this kind of education system is not teaching learners to learn but to conform because this system neglects their individuality and productivity. However, there has gradually been more and more research on student-centered mode, which provides a new perspective for teaching relationships. This paper explores the new

teaching and learning relationship, the advantages and challenges of the “student-centered” mode, and how teachers can effectively “serve” students in this mode. This study offers an analysis of the method that refers to classroom teaching in China.

As a student in the past ten years, the author has always been taught in a teacher-centered mode from primary school to high school in China. The schools adopt the form of standard exams to evaluate students. While considerable knowledge is mastered under this mode, the understanding is not deep enough and cannot be truly put into practice. Most importantly, the ability in language expression, independent thinking, and critical thinking has not been improved, which is experienced by most Chinese students. According to Bamber^[5], from the social perspective, with economic growth and the arrival of the information age, employability is more relevant to creativity and innovation. School education indeed plays a vital role in the cultivation of creativity and innovation. Although the common mode “teacher-centered, textbook-centered” still dominates, whether this kind of teaching mode is the most effective for the cultivation of talents still needs further exploration. The aim of this paper is to identify the distinction between the two modes and find a way to combine them in classroom teaching through the learning theory of behaviorism, constructivism, and social-constructivism.

2. Literature review

2.1. Behaviorism

According to Skinner^[6], behaviorism refers to stimulus-response behavior. Watson^[7] stated that humans learn behavior from the environment and behavior is the product of stimulus-response. Skinner^[8] conducted the experiment in a “Skinner Box,” which was about operant conditioning. Inside the box, there is a bar for the rat to press in order to gain a reward. Through constant repetition, the rat gradually knows how to avoid getting pain^[9]. The experiment reveals that the formation of the behavior is affected by reinforcement and punishment^[10]. In addition, Kain^[11] suggested that teacher-centered pedagogy derives from behaviorism of education, in which students can be trained to respond to certain stimuli to produce certain behavior. The more

frequent the stimuli, the stronger the training. McLeod further provided specific examples that combine the learning process of students. Students can be rewarded if they finish the homework, thus they tend to repeat and strengthen this behavior, which is reinforcement. By contrast, students will be punished if they do not finish the homework, thus they will finish the homework to avoid being punished. McLeod concluded that reinforcement tells people what should be done, but punishment tells people what should not be done^[10].

Skinner^[8] supported that behaviorism is often used by school teachers to reward or punish students’ behavior and behaviorists believe that school learning is promoted when the learner makes active and repeated responses to the stimuli. Brophy^[12] stated that in teacher-centered education, teachers retain full control over students’ behavior and strengthen it through reward or positive punishment. According to Corpuz^[13], teacher-centered pedagogy is based on the notion of stimulus and response. In other words, teacher-centered pedagogy is a process, which uses formative assessment to select the right stimuli that will result in changed student behavior. Children are exposed to stimuli in the environment and their repeated responses to these stimuli will lead to correction.

The disadvantages and limitations of behaviorism exist. Collier^[14] criticized behaviorism and claimed that physiological and psychological structures between humans and animals are different. The ability to observe and analyze animals is relatively simple. However, human beings have complex psychological structures, which are quite different from animals. Similarly, Genovese^[15] stated that the teaching conclusions drawn from animal experiments are inappropriate. Peel^[16] suggested that cognitive processes, such as “perception” and “reflection,” are neglected by behaviorists, which play an important role in the learning process. Fosnot^[17] claimed that behaviorism is merely knowledge acquisition during the learning process and more emphasis should be put on the process of understanding. To be more specific, these scholars argue that behaviorism pays too much attention to external stimuli but ignores the internal processes that produce the behavior. From the author’s own learning experience, it is believed that learning is not only the acquisition of skills under the teacher-centered approach, but a process of perception. The stimulation

of the external environment and the internal perception comprise a complete learning system.

2.2. Constructivism

Piaget^[18] proposed four stages of cognitive development, which demonstrate the change of cognitive structures in interaction with the environment during the development of individuals from birth to maturity.

- (1) Sensorimotor stage (birth to age 2): According to Meyer and Dusek^[19], children experience the world through sense and actions during this stage. Simatwa^[20] stated that one of the characteristics of children at this stage is to connect the senses with the environment. For example, children learn about the external environment by watching, grasping, or hearing. Another characteristic is that children have the ability to know “object permanence.” With the development of their intelligence, children understand although things are not in sight, things still exist.
- (2) Preoperational stage (age 2 to age 7): According to Ojose^[21], children in this stage think that everything is alive. They are so self-centered that they will only think about things from their own perspective. Their thinking is irreversible and stereotyped.
- (3) Concrete operational stage (age 7 to age 11): Burns and Silbey^[22] suggested that children can perform abstract thinking operations at this stage, but thinking operations must be supported by specific things, such as jigsaw puzzles, counters, etc. At this stage, their thinking begins to become reversible.
- (4) Formal operational stage (age 11 to adulthood): Piaget^[23] suggested that during this time, children’s thinking matures; they have abstract thinking and they can think rationally. Children have logical reasoning skills and their thinking becomes more flexible^[24]. Therefore, teachers should educate the children at this stage in a way that encourages them to explore the answers to the questions by themselves, rather than telling them the answers directly.

It can be seen that children’s cognitive structures

are constantly changing and enriching with age. Piaget’s cognition theory shows that if humans want to develop their cognitive levels, they need to “build” their knowledge through previous personal experience^[25]. Therefore, based on the theory of cognitive development, Piaget proposed the theory of constructivism. Kain claimed that student-centered pedagogy derives from constructivist views of education. According to Bada^[26], students are not passive recipients of information, but active constructors of information. Oliver^[27] stated that the implementation of constructivist learning theory is that teachers should motivate students to use their previous experience to create knowledge when they encounter new external information. Therefore, the teacher’s role in the classroom is to create a “collaborative problem-solving environment” that allows students to build their own knowledge^[26].

According to Akpan and Beard^[28], students can improve critical thinking skills under this pedagogy since every student’s experience is different, therefore the meaning of constructing knowledge is different. Bada^[26] stated that in such an environment, students’ enthusiasm can easily be mobilized rather than passive knowledge recipients. They can express their thoughts based on their explorations with peers, which improves their social and language skills. McLeskey *et al.*^[29] suggested that students become independent in the process of learning, instead of relying on the teacher to give them the correct answer.

2.3. Social-constructivism

According to Vygotsky^[30], before children construct internal cognition, they will first be in a social context. Roth^[31] stated that knowledge is established through interaction with people around you. Rummel^[32] further claimed children’s cognitive levels are improved through interaction with more knowledgeable people. Therefore, according to Weegar and Pacis^[25], Vygotsky’s theory of the child’s cognitive process is similar to that of Piaget. Both of them think that children’s cognition requires internal processes, and cognitive ability is based on children’s previous personal experience; however, Vygotsky focused on the social environment. McLeod^[33] claimed that the environment to which children are exposed can affect how their minds work.

Vygotsky proposed two theories of cognitive development: one is the more knowledgeable other (MKO), and the other is the zone of proximal development (ZPD). In order to better understand the social-constructivism, we need to know the two theories. In terms of the MKO, Moalosi^[34] suggested that nobody can succeed on his own in the process of learning. Students need to communicate with people who have better skills or understand a task better than students themselves. Kumar^[35] claimed that a more knowledgeable person can be a tutor or a parent. However, Kumar^[36] argued that the key to the MKO is more knowledge rather than the learner himself. In other words, if peers have more knowledge or experience than students, they can influence the construction of knowledge and are included in the scope of the MKO.

From the perspective of the ZPD, Vygotsky stated that the ZPD refers to the distance between a child's ability to solve problems independently and the ability to get help from an adult or a competent member to complete a task. Freund^[37] conducted an experiment where he observed two groups of children, one group working with their mother to complete a task, and the other group doing the same task on their own. He found that the group of children who worked with their mother were able to complete the task with good performance. McLeod claimed that "guided learning within the ZPD led to greater understanding/performance than working alone." In other words, when discussing problems with experienced people, the cognitive process will be smoother and building knowledge will become more efficient. From the author's point of view, in the social context of classroom teaching and learning, learners will improve problem-solving skills and they tend to be more active participants in classroom activities. Moalosi suggested that the ZPD can contribute to effective teaching and learning. According to Amineh and Asl^[38], social constructivism suggests that in classroom teaching, students should be more emphasized than instructors. The communication and cooperation between students and their peers or tutors are very important, which is related to their establishment of knowledge. Mishra^[39] stated that teachers should encourage students to learn cooperatively and discuss together by using "interactive methods" such as group work. In addition, Moalosi stated that teachers

should increase the challenges of learning tasks, otherwise there will be no progress.

In short, through the analysis of behaviorism, constructivism, and social-constructivism and their characteristics in classroom teaching and learning, compared to constructivism and social-constructivism, behaviorism is relatively passive and mechanical. It is stimulus-response behavior that the teacher acts on the student. According to Weegar and Pacis^[25], "the teacher would provide hints or cues to guide students to a desired behavior, and then use consequences to reinforce the desired behavior." Therefore, unlike constructivism, it ignores the children's internal cognitive process and they can only learn as a result of teachers' experiences, which is an incomplete learning process. From the author's own experience, the student who is in a "teacher-centered" classroom does not have the tendency to think actively and they are more willing to wait for the teacher to give the answer. However, the practice of constructivism makes up for these problems. Barker^[40] suggested that the theory of constructivism does not regard learning as an isolated skill. To be more specific, constructivists focus on the development of internal cognition, so they encourage teachers to set more open-ended questions for their students to build cognition through their previous experiences^[41]. The distinction between constructivism and social-constructivism is the "social context." Fosnot suggested that students are able to learn more effectively through cooperative learning with more knowledgeable peers. Above all, it is believed that social constructivism more scientifically and fully demonstrates the process of constructing knowledge. Therefore, the inclusion of student-centered methods in classroom teaching and learning should be advocated.

3. Comparison between "teacher-centered" and "learner-centered" modes

There are many differences between the two modes of teaching and learning, which are manifested in many aspects. First and foremost, the role of teachers should be emphasized. In a teacher-centered mode, Liu^[42] stated "the teacher is actively involved in teaching while the learners are in a passive, receptive mode listening as the teacher teaches." According to a recent educational survey, about

62% to 67% of primary and secondary schools use this teaching mode in a certain city in China ^[43]. However, McCabe and O'Connor ^[44] claimed that student-centered pedagogy is to encourage students to acquire knowledge by themselves. The knowledge is explained in detail by the teacher under teacher-centered pedagogy, while students are guided by their teachers through asking questions and leading the learners under learner-centered pedagogy.

Students learn in different ways. According to Huba and Freed ^[45], under the teacher-centered mode, students receive the information passively and they tend to study alone. There are few opportunities for students to discuss problems with each other in class. From the author's own experience, in some experimental classes, the teachers complete the experiment by themselves and tell the students the results of the experiment directly. As Skinner mentioned, this kind of behavior of "stimuli-response" leads to reinforcement, which repeats and strengthens this behavior. In contrast, Brown ^[46] suggested under the student-centered mode, learners are given the ownership to design their answers by working in groups and discovering knowledge by themselves. In that case, learners are in a social context to construct knowledge on their own.

From the perspective of evaluating academic achievement, under the teacher-centered teaching mode, the evaluation system is single ^[47]. To be more specific, examination-oriented education is usually adopted to judge the degree of students' knowledge mastery and the quality of teaching according to the score. By contrast, under the student-centered mode, there are multiple evaluation systems. In addition to formal examinations, students are usually asked to conduct a project to examine their ability to use knowledge comprehensively, which fully reflects the integration of theory with practice.

In terms of teaching achievement, under the teacher-centered mode, students have a good command of theoretical knowledge. According to literature ^[48], "because teachers direct all classroom activities, they do not have to worry that students will miss an important topic." On the other hand, under the student-centered mode, students can acquire diversified skills. Ellis ^[49] suggested they tend to take part in learning activities when they realize they can communicate with group

members and participate actively. Through the group activities assigned by teachers, students know the importance of communication and cooperation and how to think independently and search for answers.

4. Student-centered pedagogy

4.1. Methods to create the environment

To create such an environment, we should first define the student-centered teaching mode. In brief, in a student-centered teaching mode or learning environment, the attention of teaching is transferred from teachers to students and the ultimate goal is to develop autonomous and independent students ^[50]. In such an environment, students stand in the center of the stage and play an active role, while teachers provide students with choice and voice.

4.1.1. Earlier stage: Preliminary preparation

Brown ^[51] suggested that "Get your student's input before changing the classroom environment." He further gave an example that at the beginning of one semester, teachers can ask the students how they want to arrange their desks. The questions include: Which seat arrangements are most suitable for group work? Should we put our seats in circles or in rows? The form of group work is to enable students to express their views on a certain problem, and to cultivate their ability to think actively. The form of the class should be clear so that students themselves can participate in arranging the class, and make them more aware of how they should treat the course. Harvard President Eliot believed that the course selection process itself has educational value, which can cultivate students' sense of self-responsibility, which is one of the aims of education ^[47].

4.1.2. Middle stage: Specific implementation

An open and trusting classroom should be built. Loveless ^[50] stated in order to create trusting and open communication between teachers and students, teachers ought to be fair with their students, listen to them, and allow them to speak. Fu ^[52] claimed it is essential for instructors to actively create a democratic and harmonious teaching atmosphere so that students can think positively, speak boldly, and speak out without

fear in class. However, sometimes students' speeches are often fragmented, incoherent, and even biased, teachers do not need to deny the students but praise their participation^[53]. Every student wants to be heard, seen, valued, and respected, so teachers should properly encourage and motivate students. This kind of motivation can be linguistic or non-verbal, including a hearty smile, a glanced gaze, a warm reminder, and so on. These may have an incentive effect on students. Over time, students will be able to develop the learning habits that they are good at thinking, dare to ask questions, and are willing to solve problems.

Group cooperative learning should be implemented. Cooperative learning increases the opportunities for students to share ideas with each other, which puts students in a social context^[47]. In the cooperative study group, students work together with their peers to identify the questions raised by their teacher, put forward opinions, collect data and analyze them, and finally find answers or conclusions. MacKenzie^[54] stated one of the characteristics of student-centered classrooms is to keep the students thinking and seeking their own answers. In this mode, students' potential for creativity could be achieved, which greatly improves the efficiency of teaching, and the subjective position of students is more prominent.

Homework should be replaced with project-based learning activities. Project-based learning is "learning through identifying real-world programs and developing real-world solutions"^[50]. Mackenzie^[51] gave a specific example. In a high school in Vancouver, teachers asked students to design a solution to bring clean drinking water to rural areas where water is scarce. The first group of students designed an affordable handheld water purification system, the second group of students designed a community wastewater treatment facility, and the third group of students created a water use plan for the community. Although many students did not give practical solutions in the end, this is not our goal. The significance of this process is that students can understand how to solve practical problems, and teachers can see the social and emotional skills of students at work.

4.1.3. Late stage: Teaching evaluation

In China, teaching evaluations done by students at the

end of each semester have not been popularized. Wang^[47] claimed that in some schools, the indicators of evaluation pay less attention to students' learning effect and their satisfaction with the teaching methods, and thus students' further learning cannot be promoted. In the author's opinion, the evaluation of student-centered teaching evaluation should be scientific and comprehensive. Indicators should include the cultivation of students' abilities, interaction with students, students' mastery of knowledge, students' learning enthusiasm, and the teaching methods that students think need to be improved. In this way, teachers can understand the students' ideas and requirements, know the students' shortcomings, and then modify teaching strategies in time.

4.2. The dilemmas: Problems and challenges

Although the student-centered teaching mode has many advantages and cultivates students in an all-round way, there are still many obstacles in the implementation, which are limited by many factors. Under different backgrounds, many educators discuss different influencing factors through research and their own teaching experience.

Dr. Kumar conducted a study at Agazi Preparatory School in Adigrat Ethiopia. The school found some problems in the implementation of student-centered teaching in the English teaching classroom. Kumar stated, "Most of the students were not interested in learning through student-centered method due to different factors, such as sense of fear, lack of interest and confidence, and mother tongue influence." At present, in most schools in China, English teachers are required to adopt the whole English teaching method. Therefore, in some of these student-centered activities, students will be encouraged to participate and have the autonomy to express their opinions in English. From the author's own teaching experience, some students are afraid to express their ideas because of their shyness. In addition, they are afraid of making mistakes and lack confidence. There is also a fundamental difference between the student's native language and English, and it is difficult for them to adapt to such teaching activities. Tian^[43] also suggested that some school education reforms in China did not take long, and students have not fully adapted to this teaching mode.

Jabbour ^[55] suggested many schools consider small classes to be the cornerstone of student-centered teaching. Small classes are more beneficial for teachers to supervise students' performance and learning, so the student-centered mode can be better implemented. Plus, it is convenient for teachers to manage classroom discipline, and most importantly, teachers ask questions in class or ask learners to work in groups, providing students with more opportunities to speak and express themselves. Small-class teaching is regarded as providing a better learning experience for students, thus improving the quality of education. Jabbour did a survey at Lebanon University, which shows the majority of the teachers (96%) agree that one reason that inhibits school teachers from adopting the student-centered method is the enormous number of students in a classroom. Thus, teachers in Lebanon usually keep their classrooms teacher-centered. This is similar to most primary and secondary schools in China. It is common to see over 40 learners in a classroom. Teachers need to discipline students, thus it is difficult to carry out certain classroom activities, which greatly hinders the student-centered mode.

Some teachers confirm that the student assessment system is also one of the factors that affect the application of student-centered teaching mode. In China, almost all courses adopt the closed-book form to assess the degree of students' mastery of knowledge at the end of the semester, and to measure the teaching level of teachers. Some teachers think that the student-centered teaching mode consumes too much time in class. In order to let students acquire the course knowledge in a short time, teachers still choose the traditional teaching method. As Jabbour suggested, teachers feel that time is their biggest challenge in completing teaching tasks, they lack sufficient time to meet the needs of all learners.

Finally, school leadership is also an important factor. There is no doubt that the school leadership manages rules and regulations, develops curriculum plans, and urges the quality of teaching. School leaders have direct and indirect effects on teachers' effectiveness ^[56]. Therefore, in order to promote this teaching system, teachers need the support of the school leaders. With their support, teachers can organize meetings to discuss how to effectively use the classroom time, so that students can learn knowledge

happily. They have cultivated their ability to think independently, theoretically, and practically. However, according to a survey, 52% of school leaders, in a middle school in Hainan Province in China, are reluctant to accept such teaching methods.

5. Application of a new relationship to classroom teaching in China

5.1. Current status and problems of primary school education

According to Zhou ^[57], China's primary education has been developing rapidly and leading the way in academic achievement over the decade from the aspects of the educational environment, the issue of educational equity, and the quality of teachers. However, the teaching methods in the classroom have not changed significantly. It is claimed that "a classroom full of students obediently taking notes and only breaking their silence for a prompted chorus of repetition" ^[58]. This phenomenon represents the classroom of an elementary school in China. Reville ^[59] suggested through his observation that the teachers in China tend to stand at the platform and teach children well-organized knowledge, which forms a disciplined classroom environment. In other words, the whole classroom is led by the instructors, who retain full control over children's behavior ^[12]. The reasons why teacher-centered pedagogy plays a leading role in the basic education stage in China can largely be attributed to exam-oriented education ^[60]. Kirkpatrick and Zang ^[61] suggested the Chinese educational system is more inclined to "highly exam-centric" education. To be more specific, what instructors teach in classes is closely related to what learners are examined in the tests ^[62]. As a result, the "established body of knowledge" is transmitted from instructor to learners, and then it will be reinforced through homework and exams ^[59]. This is the typical stimuli-response in behaviorism, which emphasizes learning is the connection in a stimuli-response relationship ^[25]. Therefore, many teachers believe that the teacher-centered mode is an effective pedagogy for students to gain knowledge, thereby achieving good academic performance ^[61].

The problems and limitations of teacher-centered pedagogy exist. Since teacher-centered pedagogy

derives from behaviorism of education, the problems of behaviorism will inevitably occur in teacher-centered pedagogy. Peel ^[16] suggested that cognitive processes are neglected by behaviorists. Similarly, Fosnot ^[63] claimed that behaviorism puts more emphasis on knowledge acquisition during the learning process, however, the process of understanding and constructing are ignored. Therefore, it is clear that behaviorism pays too much attention to external stimuli but ignores the internal processes that produce the behavior. The stimulation of the external environment and the internal perception comprise a completed learning system. From the perspective of teacher-centered pedagogy, the process instructors transmit well-organized knowledge to children and then, the knowledge is reinforced through tests, and rewards are the external stimuli to children. Tursunov ^[64] suggested that under this pedagogy, the biggest problem is that children will only be able to do rote memorization in order to cope with exams. According to Mpho ^[65], “rote memorization reinforces children’s passive learning, which hinders the development of the higher cognitive abilities.” The knowledge mastered by rote memorization is not constructed through the internal “perception” and “reflection,” however, it is used to deal with the tests to obtain high marks. Therefore, the teacher-centered pedagogy under the examination-oriented education system contradicts the knowledge construction theory proposed by Piaget. Furthermore, Dahling ^[66] stated that Chinese teacher-centered pedagogy does not make students form effective study habits and higher modes of learning, such as evaluation, analysis, and synthesis. This will be detrimental to their access to higher education in the future because they lack the ability to solve practical problems.

However, China has been carrying out educational reform in the past 30 years and new educational policies have been constantly put forward. Mo ^[67] claimed that one of the hotspots in the discussion of educational reform is the transformation of examination-oriented education to quality-oriented education. The concept of quality-oriented education is highly extensive, but the core of it is to respect students’ individuality and encourage them to learn independently ^[68]. Zhou ^[69] stated that quality-oriented education was first proposed in the 1980s, but the State Education Commission organized

the “National Primary and Secondary School Education Quality Meeting” in 1997, which laid the foundation for implementation. According to Jing ^[70], the reason quality-oriented education has become a heated discussion is that educators in China have found the drawbacks of our basic education in the new era: students are bound to the examination, which results in their lack of creativity. Thus, in different eras, China has different requirements for education. To be more specific, Mo suggested that with the rapid development of science and technology and the challenge of an increasing amount of knowledge, it is impossible and unnecessary for schools to teach all knowledge to students. What important is to develop their ability to acquire and construct knowledge by themselves. In this era, technological innovation and economic competition are becoming more and more fierce, so schools should focus on students’ innovative spirit and ability. Guan and Meng ^[71] claimed that student-centered pedagogy produced under quality-oriented education pays attention to the cognitive process of children and the cultivation of their problem-solving skills.

5.2. Application of student-centered pedagogy to primary school

White ^[72] stated that context is a key factor when we discuss education programs. The context should avoid being too generalized since education issues vary from place to place. Therefore, in this section, the context is limited to the basic education stage in China, especially in the primary school stage to explore how to integrate student-centered pedagogy into classroom teaching. As mentioned in the section of the literature review, student-centered pedagogy derives from constructivism and social-constructivism of education. Thus, the teaching method should be based on these theories. Piaget ^[18] proposed that environment and previous personal experience play a leading role in the development of cognitive structures among children, thereby forming four stages of cognitive development. Simatwa ^[20] stated that the “learning environment should be rich in physical (concrete) experiences because growth in any one stage depends upon activity.” Piaget ^[18] also claimed the key to a child’s cognitive development depends on the direct physical and mental perception of a particular environment. In the author’s understanding, if these

theories are linked to the actual classroom teaching in primary school, teachers should adopt different situational teaching approaches to create an immersive experience for children so that they are able to develop the cognitive level, which lays the foundation for the internal establishment of knowledge in the future. Subsequently, Piaget stated when children are in the stage of a formal operational stage, they can think rationally and they are able to find answers by themselves through previous personal experience. As a result, instructors should prepare materials that are relevant to the children's current cognitive abilities ^[21] and then they motivate students to use their previous experience to create new knowledge when they encounter new external information ^[27]. From the perspective of the theories proposed by Vygotsky, McLeod claimed that "guided learning within the ZPD led to greater understanding/performance than working alone" ^[33]. In other words, the new cognition is a cooperative achievement, not an individual effort. Vygotsky's theories emphasize the importance of social context in the teaching and learning process. So according to literature ^[73], the practical application of ZPD and MKO is to design collaborative learning activities to develop cooperative spirit, such as group discussion. Vygotsky ^[74] stated if a child has the ability of cooperative learning now, he will be able to think creatively and independently in the future. In summary, cooperative learning and joint discussion with peers in the classroom are indispensable links under student-centered pedagogy.

However, Zhang ^[75] stated that China is a huge country and every region has various education problems. It is not easy to implement student-centered pedagogy throughout the country in a short time. In addition, Huang and He ^[76] suggested in terms of the national conditions of China, which is a country with a large population, the most effective way to select talent at present is through exams. Therefore, as long as these two situations exist, student-centered pedagogy is challenging to implement. However, it cannot be denied that compared with teacher-centered pedagogy, student-centered pedagogy is an effective way to produce innovative talents. Therefore,

as a teacher, we should consider both the general environment in which the students live and the value of student-centered pedagogy, then strive to balance the proportion of the two teaching methods in the classroom.

6. Conclusion

The overall aim of this paper was to compare the differences between two pedagogies in classroom teaching under the theories of behaviorism, constructivism, and social-constructivism. From the perspective of behaviorism proposed by Skinner, it puts more emphasis on the behavior of stimuli-response between teachers and learners and behaviorists believe that children are exposed to stimuli in classroom teaching and their repeated responses to these stimuli will lead to correction. However, Piaget and Vygotsky focused on children's cognitive ability and the social context. To be more specific, constructivists think that learners can construct their own cognition through previous personal experience and the learning process will become more effective if the learners work cooperatively with the MKO. Therefore, the main difference between them was that behaviorism stresses the importance of external stimulation in the learning process while the other two focused on internal perception and reflection of the learners.

China is currently in the stage of basic education reform. The aim is to improve students' active participation and independent thinking in the classroom. However, at present, most classrooms still use the teacher-centered pedagogy under exam-oriented education, which leads to a lack of innovative and creative talents. The student-centered pedagogy should be considered in our classroom teaching despite its limitations. Zhao *et al.* ^[77] claimed that student-centered pedagogy does not apply to all courses and some courses will be more effective using the teacher-centered pedagogy. From the author's point of view, one of the challenges that teachers in China face is to balance the proportion of the two teaching methods in the classroom by considering the general environment in which the students live and analyzing the value of student-centered pedagogy in a certain course.

Disclosure statement

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Construction Achievements and Experience Summary of the FIDIC Conditions and Contract Management Course

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Abstract:

FIDIC Conditions and Contract Management is the core professional course of the national first-class major of engineering management at Changsha University of Science and Technology, and it is selected as the online and offline hybrid first-class undergraduate course of Hunan Province. The curriculum team carries out teaching reform and innovation from the aspects of teaching content, teaching methods and means, assessment reform, platform construction, resource construction, etc., creates a teaching organization form of “task-driven guidance before class, multi-interaction in class, and communication expansion and improvement after class,” and promotes the integration of production and teaching through three-dimensional application offline and online. Through the reform and innovation of curriculum construction, students’ learning interests and their innovation ability and practical skills have been significantly improved.

Keywords:

Curriculum construction
Reform and innovation
Achievements
Lessons learned

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1. Introduction

FIDIC Conditions and Contract Management is the core professional course of the national first-class major of engineering management at Changsha University of Science and Technology, which is closely combined with engineering practice and seamlessly integrated with the international project contracting market. This course systematically introduces FIDIC contract conditions, contract negotiation, contract conclusion, contract performance, contract dispute and dispute resolution,

project risk and insurance, project measurement payment, project subcontracting management, project change management, project claim management, and other knowledge in construction contract management ^[1]. Through the study of this course, students can broaden their international vision, cultivate their spirit of excellence, inspire their feelings and mission of serving the country through science and technology, and reserve knowledge and skills for better “going global.” The course was selected as the online and offline hybrid first-

class undergraduate course in Hunan Province in 2020 and has made certain achievements through construction in recent years.

2. Key problems to be solved in curriculum and teaching reform

2.1. The knowledge system required by international talents in contract management

With the acceleration of the pace of “going out” of Chinese enterprises’ foreign engineering contracting, the total amount of contracted business is also growing rapidly, and its share in the international engineering contracting market is increasing. Although the technology of Chinese construction enterprises has made rapid progress, the shortage of high-level international project contract management personnel has caused repeated setbacks in the international project contract market. This course reconstructs the teaching content and updates the knowledge system with the new FIDIC contract conditions, covers the key issues in the management of international engineering contracts, and solves the knowledge system problems required by international talents to a certain extent ^[2,3].

2.2. Organic integration of ideology, politics, and professional knowledge

Through the analysis of typical international engineering cases, the course organically integrates ideological and political education with professional learning, cultivates students’ excellent international vision and spirit of excellence as a national craftsman, and inspires students’ feelings and mission of serving the country through science and technology. It aims to establish students’ values of “core technology,” “scientific management,” and “great power tools” to promote the great rejuvenation of the Chinese nation and the realization of the Chinese dream, and the development concept of “world community with a shared future” ^[4].

2.3. Single evaluation method of the learning process

Through several years of continuous exploration and verification and the course assessment reform, a diversified evaluation method has been formed, and

a multi-dimensional, whole-process, and all-round assessment mechanism has been built, fully reflecting the characteristics of online and offline hybrid courses. Assessment item 1 (attendance and class performance 10%): Tracking students’ attendance and daily listening through teaching assistance platforms such as “Superstar Learning,” etc.; assigning topic discussion questions, encouraging students to actively express different views, and focusing on cultivating students’ ability to analyze and solve problems. Assessment item 2 (class test and homework 20%): Releasing classroom test questions for each chapter through “Superstar Learning” platform to check students’ grasp of the major and difficult knowledge, assigning chapter homework tasks, pushing reading materials, and guiding students to analyze problems and think deeply. Assessment item 3 (midterm exam 20%): Assessment of phased knowledge of major and difficult points, focusing on students’ ability to use theoretical knowledge to analyze problems and innovative consciousness, etc. Assessment item 4 (final exam 50%): Problem analysis is used to test students’ ability to use theoretical knowledge to analyze problems and innovative consciousness, etc.

2.4. Single learning platform and information resources

The original online platform is mainly a comprehensive school network teaching platform and “Superstar Learning” platform, the platform is relatively simple, and the resources are only limited to theoretical learning. The course team and a high-tech information enterprise in Changsha jointly built the “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology,” which includes two modules: theoretical learning and professional software practical training, including teaching videos, enterprise classes, excellent majors, learning resources, news hotspots, related topics and other columns, school-enterprise linkage, and resource sharing. Not only is it the home of online learning for students, but also provides a re-learning platform for the management personnel of enterprises and institutions in the field of civil engineering construction.

3. Effectiveness of course content and resource construction

3.1. Effectiveness of course content construction

3.1.1. Reconstructing the teaching content and updating the knowledge system with the new FIDIC contract conditions

FIDIC contract documents are internationally common contract documents that have been widely recognized and adopted by relevant organizations of the United Nations, international financial organizations such as the World Bank and the Asian Development Bank, etc., as well as many countries. FIDIC Civil Engineering Construction Contract Conditions (Red Book) have been revised again after nearly 20 years since 1999. In order to further meet the demand for international engineering contract management talents under the “Belt and Road” Initiative, the course team closely combined the original Red Book framework system to design the course content and establish an “international engineering” contract management knowledge system. On the premise of ensuring that the content is not distorted, we get rid of the dull confusion of contract terms and make them vivid and popular. According to the knowledge goal, skill goal, and quality goal, we gradually improve our logical thinking to make the course content clearer.

3.1.2. Enriching the teaching content and expanding the international vision with typical international engineering cases

In order to better integrate with the international engineering contracting market, and be more conducive to the understanding and application of contract terms, the course team has extensively collected typical international engineering cases in recent years, and sorted out and processed them to serve the course teaching. So far, a total of 12 typical cases suitable for course teaching have been collected, covering all important knowledge points in this course system^[5].

3.1.3. Designing a “hybrid” teaching organization by means of information technology and promoting the effective combination of online and offline

According to the specific teaching content of each lesson, information means are used selectively, from online to

offline and then to online. The whole teaching design adheres to the concept of “student-centered and teacher-led,” and synchronously carries out online and offline, helping students to actively participate in learning and improve their learning enthusiasm and knowledge understanding, so as to achieve the expected teaching goals^[6,7].

3.1.4. Carrying out practical training with engineering information platform to ensure that theory is connected with practice

The “Engineering Measurement Payment Management Cloud Platform” is introduced in the course teaching, and each student is assigned an account and password, so that students can enter the platform at any time to carry out practical operations of engineering measurement payment, engineering change management, and other modules, which can well cultivate students’ hands-on ability and achieve an organic combination of theory and practice.

3.2. Effectiveness of curriculum resource construction

3.2.1. Online platform construction

In addition to making full use of the school’s integrated platform for online teaching and Xueyin Online (“Superstar Learning” platform) as online teaching platforms, this course has also jointly developed an online learning platform with high-tech enterprises, including two modules: theoretical learning and information practical operation. It is not only an online learning home for students in school. It also provides a re-learning platform for the management personnel of enterprises and institutions in the field of civil engineering construction. The platform specifically includes teaching videos, enterprise classes, excellent majors, learning resources, news hotspots, and related topics and other columns, school-enterprise linkage, resource sharing, and integration of engineering project management electronic sand table, engineering bidding electronic sand table, and other practical training platforms to achieve multi-platform linkage.

3.2.2. Online resource construction

Based on the university’s network teaching platform, “Superstar Learning” platform and the university-

enterprise linkage, “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology,” there are 85 online teaching videos (including 20 course teams and 65 corporate classes, with a total duration of 2,800 minutes), about 200 non-video resources, about 400 test questions, about 100 latest industry trends and contract management frontier, about 100 engineering subcontracting, engineering risks, engineering changes, engineering claims, about 1,000 contract texts, flow charts, organizational structure charts, technical schemata, etc. There are about 100 news reports, policy interpretation, expert commentary, about 50 risk management, schedule management, change management, BIM application virtual simulation projects.

4. Effectiveness of curriculum implementation and assessment reform

4.1. Improvement of teaching methods

4.1.1. Engineering case teaching method

Teachers combine knowledge points with engineering cases, create scenarios, raise questions, arouse students' thinking, guide heuristic thinking, stimulate learning interest, and integrate thoughts and politics into professional. They take typical cases of international engineering risk management: international EPC project “step by step,” risk management “escort” teaching as examples, and design case analysis ideas.

4.1.2. Guided reading teaching method

Adhering to the concept of “student-centered, teacher-lead,” the guided teaching method has been formed, in which teachers grasp the guiding points, refocus on guiding doubts, guiding thoughts, guiding creativity, giving play to the leading role of teachers and the body role of students, making the class into a bilateral activity between teachers and students, two-way information transmission, teachers' “guiding road” and students' “learning road” can form an optimal combination with the teaching design “ideas”^[8].

The whole teaching design is carried out asynchronously online and offline. Pre-class preview materials and MOOCs resources are released on the online teaching platform, learning tasks and pre-

class quizzes are released on the “Superstar Learning” platform, and students will provide feedback on their learning difficulties to the teacher, helping students to actively participate in learning, improve their learning enthusiasm and knowledge understanding, so as to achieve the expected teaching goals^[9].

4.1.3. Project practical training teaching method

The project measurement payment management cloud platform can be used to experience role-playing. Students can play the roles of the construction unit, supervision unit, construction unit, as well as various units under the measurement of metrological engineer, supervisor, project manager, owner representative, etc., in the process of using the platform, so as to have a clearer understanding of the division of work and responsibilities of these roles in the real industry. Using specific engineering projects is task-driven. Measurement payment is the core content of cost management in contract management, the measurement payment management process can deepen the understanding of how to control the cost of engineering projects in the construction stage and the whole life cycle stage of the entire project, and get familiar with the information management in the current construction process of the industry through the use of project management cloud platform^[10].

4.2. Application of information teaching

Combined with the characteristics of the course and the concept of blended teaching, we use “Superstar Learning” platform and network teaching platform, etc., to conduct pre-class guidance reading. In class, we use flipped classroom, rain classroom, live connection, enterprise class, and multiple interactions of various platforms. After class, we use various communication tools to communicate and answer questions. At the same time, we make full use of the “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology” jointly built by the university and enterprise to share the resources of the university and enterprise.

4.3. Change of teaching organization form

Through the teaching practice in recent years, the teaching

organization of “task-driven guidance before class, multi-interaction in class, communication and expansion after class” has been formed, and the learning atmosphere of “need to think, know how to think, need to express, know how to express” has been gradually formed, and the class activity has been steadily improved.

4.4. Reform of assessment methods

Diversified evaluation methods are adopted to build a multi-dimensional, whole-process, and all-round assessment mechanism, fully reflecting the characteristics of online and offline hybrid courses. Taking the teaching of this course in 2024 as an example:

Assessment Item 1: Attendance and class performance (10%)

The “Superstar Learning” platform is used to track students’ attendance and daily attendance. This semester initiated 14 sign-up times, the sign-up rate is 100%. We arranged six thematic discussions, launched a rush answer and selected more than 40 times, encouraged students to actively express different views, and focused on cultivating students’ ability to analyze and solve problems.

Assessment Item 2: Classroom test and homework (20%)

The classroom test questions of each chapter are published nine times on the “Superstar Learning” platform to check the students’ grasp of the knowledge of the major and difficult points. We assign 10 homework tasks after class and publish learning materials on the network teaching platform, including courseware, pre-class preview materials, case analysis, video resources, etc., to guide students to consolidate and improve advanced knowledge; The group was divided into complementary groups, forming a task group of five people, making comprehensive comments on the assigned tasks, focusing on cultivating students’ teamwork ability.

Assessment Item 3: Mid-term exam (20%)

In the eighth week of the semester, the “Superstar Learning” platform is used to carry out online assessments of the phased major and difficult knowledge, focusing on the situation of students mastering basic knowledge, and all the questions are objective questions.

Assessment Item 4: Final exam (50%)

In the form of an offline subjective question paper,

students’ ability to use theoretical knowledge to analyze problems and innovation consciousness are tested.

5. Curriculum characteristics and innovation

5.1. School-enterprise cooperation and resource sharing to serve students and feedback society

5.1.1. School-enterprise cooperation to build an online open learning platform

The “FIDIC Conditions and Contract Management Online Learning Platform of Changsha University of Science and Technology” jointly built by the university and enterprise includes two modules: theoretical learning and professional software practical training, including teaching videos, enterprise classes, excellent majors, learning resources, news hotspots, related topics and other columns, school-enterprise linkage, and resource sharing.

5.1.2. Wide range of service targets and large number of beneficiaries

This platform is not only the online learning home of students but also provides a re-learning platform for the management personnel of enterprises and institutions in the field of civil engineering construction. Therefore, the service object is very wide and the number of online learners is large; taking an online special lecture on “Industry Latest Policy and Wind Vane Interpretation” by course leader Mingshun Li as an example, the number of online learners is more than 2,000 people.

5.2. Informatization resources are abundant, and policy and regulation news reports are selectively included in the lessons.

There are more than 100 cases including engineering risks, engineering changes, engineering claims, etc. There are more than 1000 visual images and charts including contract text, flow charts, and other aspects. There are more than 100 audio-visual videos including various news reports, policy interpretations, expert explanations, and other aspects. There are more than 50 virtual simulation projects including engineering progress simulation and other aspects. At the same time, the online learning platform updates the hot news in the professional field in real time, making the informatization resources of this course very abundant.

5.3. Multi-platform linkage, offline and online three-dimensional application to promote the integration of production and education

We make full use of various platforms for linkage teaching, combined with a variety of professional software applications, so that students can carry out personalized learning online and offline at any time. There are 14 practice teaching bases jointly established with outstanding enterprises in the industry, and the course teaching is compatible with enterprise projects. Students can experience the process and method of contract management in the industry on the spot, and complete the learning process of guiding practice by theory and verifying theory by practice.

5.4. Integration of ideology and politics into professional learning, unification of learning and thinking with knowledge and action

Combined with the content and characteristics of the course, we make full use of the analysis of typical international engineering cases and cultivate the spirit of great craftsmanship in students' pursuit of excellence; establish students' feelings of serving the country through science and technology, as well as a scientific outlook on development. Through the discussion on the development of the international project contracting market under the new situation and the transformation and development strategy of China's project contracting enterprises under the "Belt and Road" development mode, the students can fully understand the great wisdom of China's "Belt

and Road" initiative, and establish the values of "core technology," "scientific management," and "major country weight" to promote the great rejuvenation of the Chinese nation and the realization of the Chinese dream, as well as the development concept of "a community of shared future for the world."

6. Conclusion

"FIDIC Conditions and Contract Management" is an online and offline hybrid construction course. Since its self-establishment, the course has carried out teaching reform and innovation from the aspects of teaching content, teaching methods and means, assessment reform, platform construction, resource construction, etc. In view of the learning pain points, contract management knowledge has been linked with international practices, engineering cases, and professional discipline competitions. We create a teaching organization form of "task-driven guidance before class, multi-interaction in class, and communication expansion and improvement after class," promote school-enterprise cooperation to build an online open learning platform, carry out offline and online three-dimensional application to promote the integration of production and education, the integration of ideology and politics in professional learning, and unification of learning and thinking with knowledge and action. Through reform and innovation, students' interest in learning and their innovation ability and practical skills have been significantly improved.

Disclosure statement

The authors declare no conflict of interest.

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The Value Orientation, Internal Logic, and Practical Approach of Embedding Labor Education into a “One-stop” Student Community

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Abstract:

In today's society, labor education, as an important component of the education system, plays an irreplaceable role in cultivating students' innovative spirit and practical abilities. As an important battlefield for university education, the “one-stop” student community's comprehensive management model provides a broad space and platform for the implementation of labor education. Therefore, embedding labor education into a “one-stop” student community can not only promote the improvement of student labor skills and the development of comprehensive quality but also strengthen the cultural and spiritual civilization construction of student communities. This article will delve into the integration of labor education into a “one-stop” student community from three aspects: value orientation, internal logic, and practical approach.

Keywords:

Labor education
A one-stop student community
Value
Practical approach

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1. Introduction

To adapt to the new characteristics of college students in the new era, “one-stop” student communities have emerged. It uses Internet technology to make student community work more intelligent, professional, and safe through smart party building, precise education, and solid defense lines. The “one-stop” student community should be guaranteed by strengthening leadership and transforming concepts, and better play its role in cultivating new talents who shoulder the great

responsibility of national rejuvenation.

2. The value of embedding labor education into “one-stop” student communities

2.1. Innovative practice of comprehensive education concept

In the field of higher education, labor education has always been regarded as an important way to cultivate

students' comprehensive qualities and temper their willpower. As an emerging student management model, the "one-stop" student community provides great convenience for students' learning and life with its intensive and diversified service characteristics. Embedding labor education into a "one-stop" student community is not only an innovative practice of the concept of comprehensive education but also a deepening and expansion of the cultivation of students' comprehensive qualities.

The embedding of labor education helps to cultivate students' practical abilities and sense of social responsibility. In a "one-stop" student community, students can not only enhance their hands-on ability and teamwork spirit by participating in various labor activities, such as environmental maintenance and facility management but also deepen their understanding of social responsibility and enhance their awareness of social services during the labor process.

The embedding of labor education helps to enrich the cultural connotation of the "one-stop" student community. Labor itself is a culture that contains rich spiritual connotations such as diligence, wisdom, and innovation. Carrying out labor education in a "one-stop" student community not only allows students to feel the influence of culture through labor but also enriches the cultural life of the community and enhances its cultural taste through various forms of labor cultural activities, such as labor-themed lectures and labor skills competitions.

The embedding of labor education helps to promote the sustainable development of "one-stop" student communities. Through labor education, students can have a deeper understanding of the operating mechanism of the community, actively participate in community management and construction, and provide constructive opinions and suggestions. The promotion and practice of this model will inject new vitality into the development of higher education in China and make greater contributions to cultivating more outstanding talents.

2.2. The integration of community culture and labor spirit

The report of the 20th National Congress pointed out the need to deepen the integration of industry and education, as well as school-enterprise cooperation. This

requires universities to actively carry out labor education practices and combine them with labor and vocational skills education to enhance the comprehensive quality of students and cultivate high-quality workers and skilled talents for the country. In this context, the "one-stop" student community has emerged. As a new mode of education, it integrates campus resources, innovates management mechanisms, optimizes service processes, and achieves comprehensive support and guidance for college students in their learning, life, and social interactions. Therefore, embedding labor education into student communities is not only an inevitable choice to adapt to the development of the times but also an important measure to meet the diverse needs of students.

The so-called labor spirit refers to people's attitudes, values, and behavioral norms towards labor, including qualities such as hard work, selfless dedication, and continuous improvement. Community culture, on the other hand, is a set of value systems jointly created and maintained by community members. It reflects the mutual relationships, shared experiences, and collective memories among community members, and becomes an important source of community cohesion. As Marx said, "Labor is not only a means of making a living, but it has also become the first necessity of human beings. Only with one's own hands can one create a beautiful future." Therefore, for labor education to truly play a role, it must be integrated with community culture, thereby stimulating students' enthusiasm and interest in participating in labor practice. At the same time, only when students can receive sufficient exercise and growth in the community can they better realize their values and missions, and promote their comprehensive and healthy development.

2.3. The improvement of students' practical ability and social adaptability

"One stop" student community refers to a new type of community model that integrates community management, cultural construction, club activities, and other functions, aiming to provide students with a more convenient, efficient, safe, and warm living environment. This model can fully leverage the advantages of student autonomy, create a good community atmosphere, strengthen communication and exchange among students, and promote their mutual learning and growth. However,

in the actual operation process, some students still have weak self-discipline and high dependence, which not only affects the normal operation of the student community but also hinders the comprehensive development of students. Therefore, it is necessary to further strengthen the education and guidance of students, especially those with poor self-control, to help them develop good habits and enhance their self-management abilities. In addition, students are important subjects in community management work and need to be encouraged to actively participate in community affairs, play a sense of ownership, and improve their sense of responsibility and mission.

In the long run, labor education can effectively enhance students' practical abilities and social adaptability. In labor practice, students can not only learn how to use their learned knowledge to solve practical problems, but also cultivate their innovative thinking and teamwork spirit, and improve their ability to adapt to society. Therefore, embedding labor education into a "one-stop" student community can not only create more diverse practical opportunities for students but also help improve their comprehensive quality and lay a solid foundation for their future careers.

2.4. Building a platform for student self-education and self-development

Currently, in the practice of "one-stop" student communities, labor education has gradually become a new platform and carrier for education, effectively promoting the improvement of students' comprehensive quality and abilities, and highlighting the value and connotation of labor education. The "one-stop" student community provides a relatively independent environment, which is conducive to achieving the professionalism and systematicity of labor education. Traditional labor education is often limited by the boundaries between the educational subject and object, resulting in a significant reduction in educational effectiveness. The "one-stop" student community breaks this constraint and provides a broader space for labor education, enabling related activities to be carried out more systematically and scientifically. In addition, the abundant facilities and resources within the community can also provide sufficient material support for labor education. A "one-

stop" student community facilitates educators to monitor students in real-time and identify potential problems promptly. In the past, labor education mainly relied on the observation and feedback of educators, which may have some lag. In the "one-stop" student community, every student can participate in labor education through the Internet, so that educators can understand the situation of students more comprehensively. Once a problem is identified, the teacher can quickly take corresponding measures to correct it and prevent it from worsening.

3. The inner logic of embedding labor education into "one-stop" student communities

3.1. Optimizing the allocation of educational resources

The inherent logic of embedding labor education into a "one-stop" student community is first reflected in the optimized allocation of educational resources. This configuration is not only a rational allocation of material resources, but also a deep integration of educational concepts, teaching methods, and student needs.

In a "one-stop" student community, labor education is no longer an isolated teaching activity, but a part that is closely integrated with students' daily life and learning. By reasonably planning community space, and integrating labor practice venues, skill training centers, innovation laboratories, and so on into student communities, the educators can achieve maximum utilization of resources. This not only facilitates student participation in labor education but also promotes resource sharing and communication cooperation within the community.

The optimal allocation of educational resources is also reflected in curriculum design. Labor education courses should closely integrate the characteristics and needs of student communities, and design teaching content that is targeted, practical, and interesting. By introducing teaching methods such as project-based learning and team collaboration, students can learn through practice and grow through collaboration, enhancing their hands-on ability and overall quality.

At the same time, this optimized configuration also focuses on meeting the individual needs of students. Each student is unique, with different interests, strengths,

and development directions. By providing diverse labor education programs and activities, educators can meet the personalized learning needs of students and stimulate their interest and enthusiasm for learning. This not only helps to cultivate students' innovative spirit and practical ability but also helps them better understand and develop themselves.

3.2. The integration of student needs and community functions

The “one-stop” student community is a new type of student community that has emerged in recent years, with its functional positioning centered on the growth and development of students. With the introduction of the Overall Plan for Deepening the Reform of Education Evaluation in the New Era, the position of labor education in the “Five Education Simultaneously” is becoming increasingly prominent. This poses a challenge for universities, requiring them to follow the trend of educational development, actively explore effective ways to embed labor education into student communities, and continuously improve the quality and level of labor education. At present, the construction of “one-stop” student communities in different types of universities is facing various problems, such as some universities have not fully clarified the relationship between student management and services, and cannot achieve the transformation from simple student management to education and services; Some student communities in universities are still in a transitional stage from living space to learning space and then to activity space, making it difficult to fully meet the diverse and personalized needs of students. Some universities tend to overly rely on external resources and cannot self-generate, which can easily lead to high community operating costs ^[1]. These issues not only affect the long-term stable development of student communities but also constrain the effective implementation of labor education. To solve the above problems, it is necessary to optimize the functions of the community and enhance its internal motivation and vitality through measures such as a reasonable layout of student community space and the construction of a school-enterprise cooperation mechanism ^[2]. At the same time, efforts should be made to cultivate the community spirit of college students, stimulate their endogenous

motivation to participate in the community, guide them to shift from passive service acceptance to active integration into the community and form a good atmosphere of self-management and self-service. In addition, strengthening top-level design, improving work systems, and improving policy guarantees can ensure that labor education is effectively embedded in student communities, and promote the comprehensive implementation of the fundamental task of moral education in schools ^[3].

3.3. The update and transformation of educational concepts

With the continuous deepening of education reform, labor education is gradually shifting from traditional classroom models to more diversified and practical forms. Especially in the construction of “one-stop” student communities, the embedding of labor education is not only an innovation in educational forms, but also a vivid reflection of the updating and transformation of educational concepts ^[4].

Firstly, the embedding of labor education reflects the “humanization” transformation of educational philosophy. Traditional education often focuses on imparting knowledge, while neglecting the cultivation of students' practical skills and social responsibility. In the “one-stop” student community, labor education emphasizes students' personal participation and experience, allowing them to feel the value of labor in practice, cultivating their hands-on ability and teamwork spirit, and reflecting the educational concept of “people-oriented” ^[5].

Secondly, this embedding also reflects the “practical” transformation of educational concepts. Labor education itself is a highly practical educational activity that requires students to apply the knowledge they have learned to practical life. In the “one-stop” student community, labor education enables students to closely integrate their learned knowledge with real life through various practical activities such as community services and campus beautification, improving the pertinence and effectiveness of education ^[6].

3.4. Collaboration between community management and educational services

Embedding labor education in a “one-stop” student community, its inherent logic is also reflected in the synergy between community management and

educational services. Labor is the foundation of human survival and social development, as well as an inherent requirement for realizing personal and social values ^[7]. For college students, labor is not only a way to acquire basic life skills but also an important way to realize their life value. In the process of socialist modernization construction, college students need to actively engage in the main battlefield of economic construction, fully utilize their knowledge advantages, and grow their abilities in practice. At the same time, this group also needs to closely monitor the national development strategy, strengthen ideological and political education, enhance scientific and cultural literacy, cultivate good moral qualities, and become the new generation of the times who shoulder the great responsibility of national rejuvenation ^[8]. Therefore, carrying out labor education, guiding college students to establish correct labor concepts, helping them form positive labor attitudes and healthy and upward labor values, and promoting their comprehensive development are of great significance. Education services, as an important supplement to community management, meet the personalized development needs of students by providing diverse labor education resources and practical opportunities. This collaborative effect not only improves the efficiency and quality of community management but also promotes the comprehensive improvement of students' overall quality. Therefore, embedding labor education into a "one-stop" student community is an important measure to achieve deep integration and coordinated development of community management and educational services ^[9-11].

4. The practical approach of embedding labor education into "one-stop" student communities

4.1. Building a comprehensive labor education system

In the process of promoting the integration of labor education into "one-stop" student communities, building a sound labor education system is the primary and crucial task. Clarify the core goals and content of labor education, which includes cultivating students' correct labor concepts, labor skills, and labor habits, as well as enhancing their comprehensive quality and sense of

social responsibility through labor practice. The content of labor education should keep up with the times, combine with the actual needs of the current society, and focus on cultivating students' innovative spirit and practical ability ^[12]. Building a diversified labor education platform, providing students with rich opportunities for labor practice through establishing labor practice bases, organizing labor skills competitions, and organizing volunteer service activities. Based on the actual situation of the student community, establish some labor projects closely related to community life, such as environmental maintenance, facility maintenance, and so on, so that students can feel the value and significance of labor in their participation. Strengthen the construction of teaching staff for labor education, improve teachers' understanding and ability of labor education through organizing training, exchange, and learning, and invite off-campus mentors with rich labor practice experience to participate in student labor education and guidance work, providing more professional and practical guidance and assistance for students. Actively collect feedback from students, continuously optimize and improve the labor education system, ensure its implementation effectiveness and quality, establish a scientific evaluation mechanism, and objectively and comprehensively evaluate the performance of students in labor education ^[13].

4.2. Building a diversified labor practice platform

With the increasing emphasis on labor education by the country, the "one-stop" student community, as an important carrier of talent cultivation and social service functions in universities, has gradually become an important place for carrying out labor education practical activities. However, currently, labor education on campus is mostly passive labor that involves indoor, written, and simple operations, and students have low enthusiasm for participation. Therefore, it is necessary to embed labor education into the "one-stop" student community and explore innovation based on it ^[14].

In the process of building a "one-stop" student community, educators can combine the school's unique culture, fully tap into community site resources, utilize various facilities and equipment, establish distinctive labor practice platforms, and guide students to actively

participate in labor practice^[15]. For example, some universities have set up “Dream Farm” and “Sky Vegetable Garden” in student communities, where students can plant crops, master basic planting techniques, and experience the hard work and joy of harvest. Some universities have collaborated with off-campus enterprises and communities to jointly build and share resources, and have established off-campus internship and training bases, as well as work-study positions, to help students better understand the national and social conditions and enhance their labor concepts^[16]. Overall, these are all very meaningful attempts.

In addition, attention should also be paid to the relationship between labor education and other moral education work. At present, some college students lack a correct view of labor, believing that labor is hard work and tiring, and even have a wrong tendency to underestimate physical and mental labor^[17]. This is mainly due to the one-sided understanding formed by the influence of historical and cultural factors for a long time. To change this situation, schools need to place labor education in a more prominent position. By organizing rich and colorful labor practice activities, students can truly value and love labor from an ideological perspective, and thus establish a correct view of labor^[18].

4.3. Strengthen the publicity and promotion of labor education

To strengthen the publicity and promotion of labor education, it is necessary to start from multiple dimensions to ensure that the concept of labor education is deeply rooted in people's hearts and truly transformed into the conscious actions of students. By hanging promotional banners, setting up labor education columns, and holding labor culture lectures, the value

and significance of labor can take root and sprout in the hearts of students^[19]. Based on the interests and hobbies of students, carry out various forms of labor practice activities, such as handmade crafts, horticultural planting, community services, and so on, so that students can experience the charm and value of labor through personal participation^[20]. By organizing teacher seminars, student symposiums, and other means, educators can deeply interpret the connotation and importance of labor education, guide teachers and students to establish correct labor concepts, encourage teachers to integrate labor education into daily teaching and enable students to receive the influence of labor education unconsciously. Strengthening the publicity and promotion of labor education is a systematic project that requires educators to start from multiple aspects and form a joint force. Only in this way can labor education take root and bear fruit in a “one-stop” student community.

5. Conclusion

In short, with the continuous improvement of the “one-stop” student community construction and the deepening of labor education, educators look forward to seeing more students grow in practice and gain from labor. Students will cultivate a love and respect for labor in this fertile land of the community, forming a correct outlook on life and values. The integration of labor education into “one-stop” student communities will provide valuable experience for higher education reform and lay a solid foundation for cultivating more outstanding talents with innovative spirit and practical ability. Let everyone work together to build a more harmonious and vibrant student community.

Disclosure statement

The author declares no conflict of interest.

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Adaptation of Dance Performance Forms to Evolving Environments

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Abstract:

This study explores how dance performance forms adapt to changing environments, focusing on digital technology, multicultural integration in the process of globalization, and the impact of changes in the social environment on dance performance. By analyzing the application of technologies such as virtual reality (VR), augmented reality (AR), and mixed reality (MR) in dance, the study reveals how these technologies provide new creative spaces and expression techniques for dance performances. At the same time, this article also deeply explores the multicultural integration of dance performance forms in the context of globalization and analyzes how dancers and choreographers balance traditional culture and modern innovation in creation. In addition, research also explores the environmental adaptation of dance in specific cultural contexts, including responses to ecological awareness, social crises, and cultural inheritance. Through these studies, this paper proposes a development strategy for dance performance forms in the context of the new era, providing theoretical and practical guidance for future dance creation and practice.

Keywords:

Dance performance forms
Digital technology
Virtual reality
Multicultural integration
Environmental adaptation
Dance innovation.

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1. Introduction

As a comprehensive art form, dance performance has demonstrated a high degree of adaptability to the evolving social, cultural, and technological landscapes. The rapid advancements in science and technology since the 20th century have had a particularly profound impact on the forms of dance performance. Digital technologies, particularly virtual reality (VR) and

augmented reality (AR), have introduced a new frontier for dance. VR technology enables dancers to perform in virtual spaces, interact with digital elements, and offer audiences an enhanced immersive experience ^[1]. For example, through VR technology, dancers can explore diverse stage designs and space layouts in virtual environments, creating unlimited stage possibilities ^[2]. AR technology can superimpose virtual content on the

real stage, enriching the audience's visual experience and providing real-time visual feedback to assist dancers during performances ^[3]. The application of holographic projection technology also makes dance performances appear beyond reality. By combining virtual images with the dancers' real movements, stunning visual effects on stage are created ^[4].

Globalization and the integration of multiculturalism have also profoundly affected dance performance. Dance styles and elements from different cultural backgrounds gradually merged to form a rich and diverse form of dance expression. This multicultural integration not only broadens the expression space of dance art but also provides dancers and choreographers with more creative materials. However, the challenge of integrating modern technology and multiculturalism while preserving the essence of traditional dance has become a significant issue in contemporary dance performances ^[5]. The fusion of modern and traditional dance has emerged as a crucial direction in dance creation, influencing not only movements and music but also stage design, costumes, and props ^[6].

In recent years, the global pandemic has had a significant impact on dance performance forms. Offline performances are restricted, and online performances and live broadcasts have become important ways for dance artists to interact with audiences. This change is not only a response strategy to the real environment but also provides a new development direction for future dance performances. Performance forms that integrate online and offline, such as mixed reality (MR) performances, bring new possibilities to dance performances, and audiences can also experience diverse viewing experiences across various media environments ^[7]. Meanwhile, online performances have expanded the communication channels for dance, enabling audiences to watch performances anytime and anywhere and interact with artists and fellow viewers globally ^[8]. This form of performance enriches the audience experience and provides dance artists with more opportunities to interact with the audience.

The needs of modern audiences for dance performances are also constantly changing. They pay more attention to participation and interactivity, hoping to connect with performers through diverse channels.

The development of digital technology provides dance performances with more possibilities for interaction with the audience, such as real-time feedback, virtual reality experience, and so on. This interactivity not only enhances the audience's viewing experience but also provides more opportunities for the creation and presentation of dance performances ^[9]. Therefore, exploring how to better integrate technology, audience aesthetic changes, and multicultural backgrounds in dance performances has become the focus of current research.

The purpose of this study is to explore how dance performance forms adapt to changing circumstances, including advances in digital technology, changes in audience aesthetics, and the multicultural integration brought about by globalization. By analyzing the practice of existing dance performance forms in terms of technology application, online and offline integration, etc., this study summarizes the strategies for dance performances to adapt to environmental changes and provides guidance for the development of future dance performances.

Theoretical significance: This study deepens the understanding of the integration of dance art and technology. Case analysis of the application of digital technology in dance performances reveals the interactive relationship between technology and art, offering a new perspective on the theory of dance art ^[10]. By exploring how dance performance forms integrate multicultural backgrounds and digital technology, the development path of dance art in the new era is revealed.

Practical implications: The research results will provide useful guidance for dance artists, choreographers, and educators. With the widespread application of digital technology in performing arts, dance practitioners need to master new technologies and creative methods. This study inspires innovative creations for dancers and choreographers by summarizing the application experience of digital technology, online and offline integration, along with multicultural expression, has become a key feature in contemporary dance performances ^[11]. In addition, through surveys on audience preferences, understanding the audience's acceptance of different performance forms will help dance performers and production teams better design and present works and enhance the audience

experience.

2. Literature review

2.1. Digital technology and dance performance

The integration of digital technology into dance performance has created new opportunities for innovation. Virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies have significantly transformed how dance performances are created and experienced. With VR, dancers can perform in virtual spaces that are impossible to replicate in the real world, offering a new dimension to performance art ^[10]. For instance, VR allows dancers to explore fantastical worlds and interact with virtual objects in ways that were previously unimaginable ^[11].

Augmented reality (AR) enhances the traditional stage by superimposing digital elements onto the physical environment, providing audiences with a unique viewing experience. AR technology has been used in several contemporary dance performances to add layers of meaning and depth to the choreography, blending the real and virtual worlds seamlessly ^[12]. This technology not only expands the creative possibilities for choreographers but also allows audiences to engage with the performance in new and interactive ways.

2.2. Influence of multiculturalism on dance performance

Globalization has led to the integration of diverse cultural elements in contemporary dance performances. This has resulted in hybrid forms of dance that combine traditional movements with modern choreography, reflecting the interconnectedness of the global community ^[13]. For example, many contemporary choreographers are incorporating elements from African, Asian, and Latin American dance traditions into their work, creating a rich tapestry of cultural expression ^[14].

Multicultural integration in dance allows for a more inclusive and dynamic form of expression, where different cultural narratives are woven together to create something entirely new. This fusion of cultures not only enriches the dance performance but also serves as a reflection of the increasingly diverse world people live in ^[15].

2.3. Environmental adaptation of dance in specific cultural contexts

The use of technology in dance has also shifted the way audiences engage with performances. Interactive technologies, such as motion sensors and audience-triggered effects, have allowed audiences to become active participants in the performance, rather than passive observers ^[16]. This interactivity creates a more immersive experience, where the boundaries between performer and audience are blurred. The development of digital platforms has further expanded this interaction, enabling global audiences to participate in performances from remote locations.

2.4. Future directions in dance and technology

As technology continues to advance, the future of dance performance will likely see even more integration of digital tools. From wearable technology that tracks and enhances dancers' movements to AI-driven choreography, the possibilities are endless. The continued development of digital tools will undoubtedly push the boundaries of what is possible in dance, allowing artists to explore new forms of expression.

3. Methods

3.1. Research design

This study adopts a mixed-methods research design, combining both qualitative and quantitative approaches to examine the role of interdisciplinary integration in dance education. Specifically, the research explores how the combination of traditional dance and modern technology can influence students' creativity, critical thinking, and performance skills. The integration of VR, AR, and other digital tools with traditional dance education serves as the foundation for the experimental group, while the control group follows a more conventional dance curriculum.

3.2. Participants

The study sample includes 80 students from different universities who are enrolled in dance programs. The participants were randomly divided into two groups: 40 students in the experimental group, who participated in the interdisciplinary curriculum, and 40 students in the control group, who received traditional dance training.

without the use of digital technology ^[14].

3.3. Tools and measurement

3.3.1. Case study tools

In the case study, an analytical framework was designed to cover aspects such as stage presentation, technology application, integration of cultural elements, and audience interaction. Data were collected mainly through video observation, on-site observations, and interviews with choreographers and dancers. The focus was on innovation, technology use, cultural element integration, and audience feedback.

3.3.2. Questionnaire design

The questionnaire included two main parts: the dance performance form evaluation scale and the audience experience scale (AES). The dance performance form evaluation scale includes 20 items focused on digital technology application, multicultural integration, and online-offline integration. The AES is used to evaluate audience preferences and experiences with different dance performance forms, including immersion, interactivity, cultural identity, technology acceptance, and performance innovation.

3.4. Data collection and analysis

3.4.1. Data collection

Case study: Data on stage presentation, technology application, cultural integration, and audience interaction were collected through observations and interviews of selected dance performance cases. Each case was analyzed in detail to understand the practical application

of innovative dance performance forms.

Questionnaire: The questionnaire was distributed online to gather data from a broad sample. It was designed to cover attitudes and preferences regarding various forms of dance performance, as well as the acceptance of technology in these performances ^[15].

3.4.2. Data analysis

Descriptive statistics: Descriptive statistics, such as frequency distribution, mean, and standard deviation, were calculated for the questionnaire data to understand the respondents' attitudes toward different performance forms ^[16].

Difference analysis: A *t*-test or analysis of variance (ANOVA) was conducted to compare the preferences and evaluations of different performance forms between dance practitioners and general audiences.

4. Data analysis and results

4.1. Descriptive statistics

To understand the preferences and experiences of audiences and dance practitioners with different dance performance forms, a descriptive statistical analysis was first conducted. The data includes ratings on indicators such as immersion, interactivity, cultural identity, technology acceptance, and performance innovation (Figure 1).

From the descriptive statistics, it can be seen that dance practitioners rated slightly higher than audiences on all indicators, especially in terms of immersion and performance innovation. This shows that

Table 1. Indicators of the audience experience scale and their scoring criteria

Indicator	Description	Rating scale
Immersion	The extent to which the audience feels immersed in the performance	1 (Very low) – 5 (Very high)
Interactivity	The degree of interaction between the audience and the performers or stage environment	1 (Very low) – 5 (Very high)
Cultural identity	The audience's sense of identification with the cultural elements presented in the performance	1 (Very low) – 5 (Very high)
Technology acceptance	The audience's acceptance of the use of digital technology in dance performances	1 (Very low) – 5 (Very high)
Performance innovation	The audience's evaluation of the innovative elements in the performance	1 (Very low) – 5 (Very high)

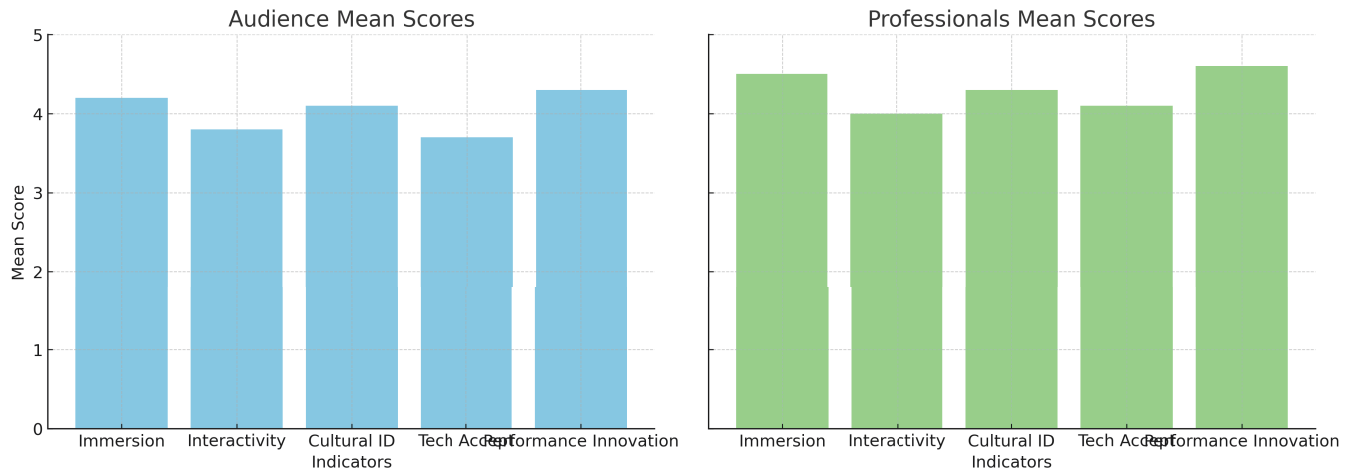


Figure 1. Demonstration on the average ratings of audience members and dance practitioners on different indicators

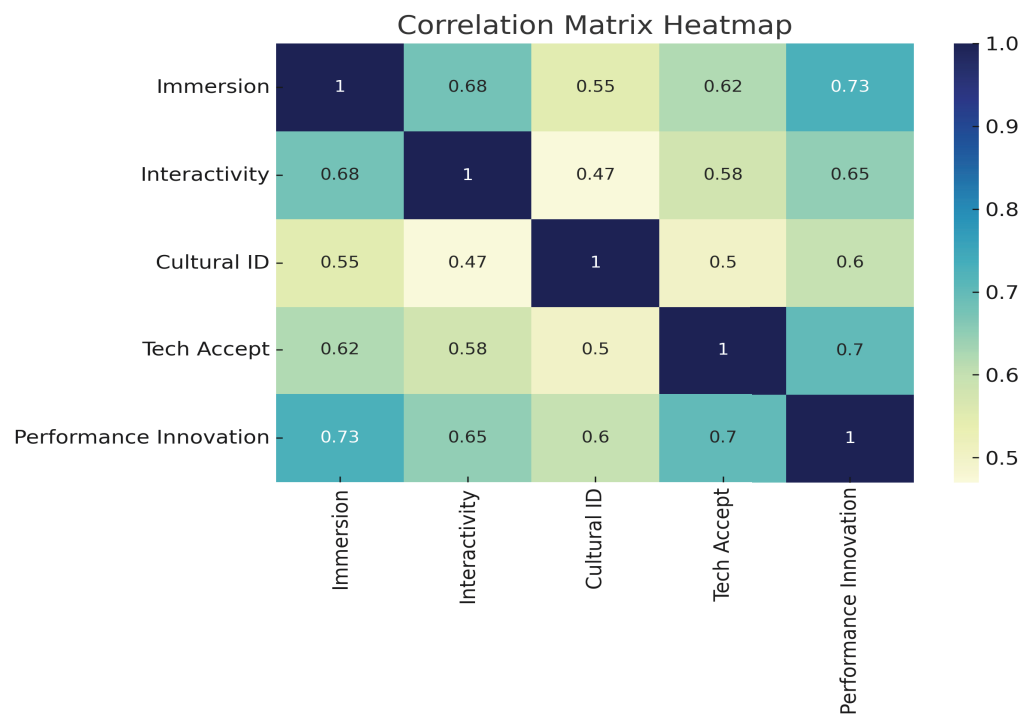


Figure 2. Correlation matrix diagram between various indicators

dance practitioners have a higher recognition of new technologies and innovative performance forms.

4.2. Correlation analysis

To explore the correlation between various indicators, Pearson correlation analysis was performed (**Figure 2**).

All correlation coefficients range from 0.47 to 0.73, indicating a moderate to strong positive correlation between indicators. In particular, the correlation between immersion and performance innovation is the highest, reaching 0.73, indicating that audiences and practitioners

believe that innovative performance forms are more likely to bring immersive experiences.

4.3. Analysis of variances

To compare the differences in preferences and evaluations of different performance forms between dance practitioners and ordinary audiences, an independent sample *t*-test was conducted (**Table 2**).

Table 2. Results of the *t*-test for each indicator between the two groups

Indicator	<i>t</i> -value	<i>P</i> -value
Immersion	2.15	0.03
Interactivity	1.89	0.06
Cultural identity	1.56	0.12
Technology acceptance	2.45	0.02
Performance innovation	2.87	0.01

The *t*-test results showed that there were significant differences between dance practitioners and audiences in terms of immersion, technology acceptance, and performance innovation ($P < 0.05$), with practitioners scoring significantly higher than audiences on these three items. Although there are differences in interactivity and cultural identity between the two groups, they did not show significance ($P > 0.05$).

Through these analyses and charts, this study found that innovative elements, the use of digital technology, and cultural integration in dance performance forms are welcomed to varying degrees by audiences and practitioners. Practitioners, in particular, are more inclined to pay more attention to these innovative forms of expression, showing a high rating. At the same time, the correlation between various indicators also shows that innovative performance forms are more likely to bring immersive experiences and higher interactivity.

5. Conclusion

This study explores how dance performance forms adapt to changing circumstances, focusing on the application of digital technology, the integration of multiculturalism, and the impact of audience experience on dance performance. By analyzing the application of technologies such as virtual reality (VR), augmented reality (AR), and mixed reality (MR) in dance, as well as case studies of dance performance forms in different cultural backgrounds, it reveals the technological innovation of modern dance performance and cultural integration characteristics and challenges.

Research has found that digital technology plays an increasingly important role in dance performance.

Technologies such as VR and AR not only provide new creative spaces for dance but also change the way audiences watch, enhancing their sense of immersion and interactivity. However, the application of technology also places new demands on dancers and choreographers, who need to find a balance between maintaining artistry and technology. Through the analysis of cases, it can be seen that successful dance performances can usually skillfully integrate technology into stage design and performance, making it a part of artistic expression rather than just an addition to visual effects.

In the context of globalization, the integration of multiculturalism has become one of the important features of dance performances. This study found that modern dance performances show strong adaptability in integrating different cultural elements. Dance choreographers from different cultural backgrounds create modern dance works with unique styles by drawing on and integrating elements of traditional dance. This fusion not only enriches the expression of dance but also provides the audience with a diverse aesthetic experience. However, in the process of multicultural integration, choreographers and dancers also need to consider cultural sensitivity and respect the uniqueness of different cultures to avoid cultural appropriation or misunderstanding.

Through descriptive statistics and differential analysis of audience experience, it was found that there are differences in preferences and evaluations of different dance performance forms between dance practitioners and ordinary audiences. Dance practitioners are more receptive to innovation and technological applications, while general audiences are more concerned about immersion and cultural identity. This demonstrates the need for dance performances to consider the needs of both professional and general audiences as they adapt to changing circumstances. The enhancement of audience experience depends not only on the use of technology and performance innovation but is also closely related to the ability of the performance to arouse the audience's emotional resonance and cultural identity.

This study provides several implications for the future development of dance performance. First of all, the development of digital technology has provided new possibilities for dance performances, but its application needs to be closely integrated with artistic expression to

avoid technology taking over the spotlight. Secondly, the integration of multiple cultures provides rich materials for dance creation. Choreographers should maintain respect and understanding of different cultures during creation and achieve a balance between innovation and inheritance. In addition, dance performances should focus on audience experience, combine technology and creativity, and enhance audience participation and interactivity.

Although this study explores how dance performance forms adapt to changing environments from

multiple dimensions, there are still some limitations. For example, research has mainly focused on the impact of digital technology and multicultural integration on dance performance, while the impact of other factors such as changes in the social environment, education, training, and so on has not been explored in depth. Future research can further explore the impact of these factors on dance performance and how dance performance can maintain artistic innovation and cultural heritage in a changing environment.

Disclosure statement

The authors declare no conflict of interest.

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Research on Online and Offline Mixed Teaching of Physical Education and Sports Training in Colleges and Universities

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Abstract:

With the development of information technology, the application of online and offline mixed teaching modes in higher education is more and more extensive. This paper discusses the necessity and feasibility of online and offline mixed teaching in the field of physical education and sports training. Firstly, the paper analyzes the problems of rigid teaching, single curriculum goals, and low interest of students in traditional teaching mode. Then, the paper proposes to optimize the teaching process by extending the teaching time, innovating the teaching form, and integrating ideological and political education into the physical education curriculum. Finally, the implementation plan of blended teaching is described in detail, and its effect on improving students' curriculum satisfaction and comprehensive ability is summarized according to the practical results.

Keywords:

College physical education
Sports training
Online and offline mixed teaching
Resource integration

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1. Introduction

With the progress of society and the development of technology, the traditional teaching model has been unable to fully meet the needs of modern education. Especially in the field of physical education and sports training in colleges and universities, the traditional teaching methods have many shortcomings, such as the single teaching method of teachers and the lack of diversity in curriculum settings. These deficiencies not only limit the overall development of students but also affect the quality of teaching. Therefore, exploring a new teaching model becomes an inevitable choice. In recent years, online and

offline blended teaching has attracted wide attention as a new teaching mode because of its effective integration of online resources and offline practice.

2. Disadvantages of the existing teaching mode of physical education and sports training in colleges and universities

2.1. Teacher's teaching is rigid

Traditional physical education teaching methods are often limited by teachers' personal experience accumulation and habit formation, resulting in excessive reliance on

established teaching processes and models in teaching practice and a lack of necessary flexibility and innovative spirit. Teachers tend to follow familiar teaching methods and seldom try or adopt new teaching strategies and means, which not only limits the diversity and novelty of teaching content but also limits the ability to teach. This also inhibits students' interest and enthusiasm for sports activities to a certain extent. Over time, this teaching method can cause students to get tired of sports courses and affect their enthusiasm and initiative to participate in physical exercise for a long time ^[1].

2.2. Single curriculum objective

Traditional PE curriculum design tends to over-focus on specific sports skills training, ignoring the comprehensive care and development of students' physical and mental health. The curriculum structure is usually rigid and fails to fully take into account the individual differences and individual needs of different students. Such a single curriculum goal setting is not conducive to the overall improvement of students' comprehensive quality. Especially for those students who are not superior in sports skills, the lack of targeted support and guidance may lead to their frustration in sports activities, which will further affect their attitude towards sports activities and willingness to participate ^[2].

2.3. Students have low interest

Given the above factors, many students show a low level of interest and participation in physical education courses, which directly leads to the decline of the teaching effect, and students lack sufficient learning motivation and internal driving force to actively participate in physical activities. In the long run, it will not only fail to achieve the expected educational goals but also weaken students' understanding of the importance of physical exercise. Furthermore, it will affect the formation and development of their lifelong sports concept ^[3]. In this case, no matter how advanced the teaching facilities and conditions are, the enthusiasm of students to participate in sports activities cannot be fundamentally solved ^[4].

3. Advantages of online and offline mixed teaching in physical education and sports training in colleges and universities

3.1. Extend teaching to make up for the shortage of class hours

By providing additional learning resources on the online platform, more independent learning opportunities can be created for students in addition to the limited class hours, thus effectively making up for the problem that teaching content cannot be fully developed due to a limitation in class hours. This teaching mode not only expands the time dimension of learning but also enables students to flexibly arrange learning plans according to their progress ^[5]. This can achieve the effect of personalized learning to ensure that each student can fully master the required knowledge and skills and improve the overall teaching quality ^[6].

3.2. Innovative forms to enrich teaching methods

The use of Internet technology can introduce modern tools such as multimedia teaching materials and virtual laboratories into physical education so that the teaching form is no longer limited to traditional teaching and demonstration. Video demonstration, three-dimensional animation, simulation interactive games, and other ways to increase interest and interaction in the learning process can attract students' attention, stimulate their interest in learning, and promote the close combination of theory and practice so that students can master complex sports skills and theoretical knowledge in a relaxed and pleasant atmosphere ^[7].

3.3. Deepening ideological and political integration to sports people

Integrating ideological and political education elements into the physical education curriculum can not only promote the overall development of student's physical health but also cultivate students' good moral quality and sense of social responsibility through teamwork, fair competition, and other links in sports activities. This teaching mode combining physical education and moral education not only highlights the essential attributes of physical education but also strengthens physical

fitness and tempering will. In addition, the physical education curriculum is endowed with higher educational significance, making it an important carrier for shaping sound personality and promoting socialist core values^[8].

4. Construction and practice of online and offline hybrid teaching of physical education and sports training in colleges and universities

4.1. Specific implementation plan

4.1.1. Design of course teaching objectives

It is clear that the teaching objectives of physical education courses are not limited to skill training but also cover multiple dimensions such as physical and mental health education and the cultivation of teamwork consciousness. The aim is to promote the all-round development of students through comprehensive education programs so that students can not only master basic sports skills but also form good psychological quality and social adaptability. This also enhances the cooperation and communication skills of individuals in a team environment and their self-regulation and management ability in the face of challenges^[9]. This goal setting not only responds to the needs of modern society for high-quality talents but also imparts more educational connotation and value orientation to physical education courses, emphasizing that physical education is not only a process of physical exercise. It is also important for mental growth and personality shaping^[10].

4.1.2. Course teaching content design

According to the set teaching objectives, the online and offline teaching contents are reasonably planned. The online part focuses on the teaching and understanding of theoretical knowledge, including but not limited to the popularization of exercise physiology, exercise psychology, and related health knowledge. The advantages of the network platform are utilized to provide various learning materials, such as video tutorials, interactive Q&A, and simulation tests. It is convenient for students to learn and explore independently, and the offline part focuses on practical operation and skill exercise, combining the characteristics of specific sports and designing a series of practice tasks from easy to

difficult. Under the guidance of professional coaches, students can gradually master the correct movement key points. At the same time, offline class is also an important place for teacher-student interaction. Solve the problems encountered in the learning process promptly to ensure that each student can receive personalized guidance and support, achieve the effective combination of online theory and offline practice, and improve the overall teaching effect^[11].

4.1.3. Curriculum teaching model design

“Observation” — the stage of online self-study before class. With the help of an online education platform, students learn the relevant content of upcoming courses in advance, including theoretical basis and basic concepts. By watching teaching videos and reading electronic textbooks, they can understand the knowledge points to be touched in advance and lay a solid foundation for subsequent offline practice^[12]. Under the guidance of teachers, students will apply the knowledge acquired by self-study before class into practical operation, deepen their understanding and mastery of motor skills through repeated exercises and simulated competitions, and “solid” — the online consolidation stage after class. Through online homework and interaction in discussion forums, students are encouraged to review what they have learned in class and share their experiences with peers. While strengthening memory, it can also stimulate in-depth thinking. In the “promotion” stage, students are encouraged to actively participate in various club activities and in-school competitions, and apply the skills learned in class to the actual competitive environment, which can not only test the learning results but also continuously improve their competitive level and comprehensive quality in the actual situation^[13].

4.1.4. Design of course assessment methods

The establishment of a diversified assessment system aims to comprehensively evaluate students' theoretical knowledge mastery and practical ability performance. In addition to the traditional written test and skill test, it also includes multiple evaluation dimensions such as daily homework, online test results, class participation, and team cooperation projects, to ensure that the assessment results can objectively reflect students' comprehensive

learning status. Daily homework and online tests are used to test students' ability to understand and apply theoretical knowledge, while class participation is measured by recording the number and quality of students' speeches in discussion sessions. Teamwork projects not only test students' motor skills but also pay attention to their sense of collaboration and leadership in teams. It not only promotes the initiative of students to learn, but also provides them with various platforms to show their self-ability, and further promotes the development of physical education teaching in a more scientific and reasonable direction ^[14].

4.2. Course practice effect

4.2.1. Students' course satisfaction rate has increased

Through a questionnaire survey on the students who have implemented the online-offline hybrid teaching mode, the results show that the vast majority of participants hold a positive attitude toward this new teaching mode. They generally believe that compared with the traditional single offline classroom mode, hybrid teaching not only increases the diversity of learning channels but also greatly enriches the forms of acquiring knowledge. Furthermore, the whole learning process is more in line with individual learning habits and preferences, thus significantly improving students' overall satisfaction with physical education courses. This phenomenon shows that the blended teaching model can better meet the diversified and personalized learning needs of contemporary college students, and bring new vitality to physical education ^[15].

4.2.2. Improvement of students' comprehensive ability

Based on the analysis of exam results and specific performance in various practical activities, it can be observed that students have made progress in various aspects of ability, especially in the mastery of motor skills, teamwork spirit, and self-management ability, which is mainly due to the more systematic and comprehensive teaching design under the mixed online and offline teaching mode ^[16]. Online links provide sufficient theoretical basis and preparatory knowledge to help students build solid basic skills, while offline practice provides a broad stage for the application of this theoretical knowledge, enabling students to test and improve their abilities in real situations. In addition, the

group cooperation projects introduced in the course have effectively trained students' communication skills and collective sense of honor. Finally, it achieves the purpose of comprehensively improving students' overall quality, which reflects the advantages of this teaching mode in cultivating compound talents.

4.2.3. The utilization rate of teaching resources is improved

After the implementation of online and offline mixed teaching modes, the utilization rate of teaching resources has been significantly improved. The online platform not only provides students with a wealth of learning materials, including video lectures, interactive tutorials, and online tests, but also can track students' learning progress and results in real time, so that teachers can adjust teaching strategies in time to adapt to students' learning status. At the same time, offline classes can be used more efficiently. Since students have mastered basic theoretical knowledge through online self-study before class, classroom time can be fully utilized for in-depth discussion, skill practice, and personalized guidance, which not only improves the quality and efficiency of classroom teaching but also enhances the interaction and cooperation among students. It has formed a good learning atmosphere ^[17]. In addition, the sharing nature of online resources also promotes information exchange and resource sharing between different classes and even different schools, expands the coverage of educational resources, makes high-quality educational resources benefit more students, and further promotes the dual improvement of educational equity and quality.

5. Conclusion

To sum up, the online and offline mixed teaching model provides a new perspective and development direction for physical education and sports training in colleges and universities. It not only overcomes the limitations of traditional teaching mode but also realizes the diversification of teaching content, the innovation of teaching form, and the optimization of teaching effect by integrating online resources and offline practice. The application of this model not only improves students' learning enthusiasm and participation but also injects new vitality into college physical education.

Disclosure statement

The author declares no conflict of interest.

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Research on Teaching Mode of Programming Course

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Abstract:

With the application and development of information technology, Internet applications have to be popularized in all walks of life. Under the background of “Internet+”, the teaching mode of computer programming course is discussed. At present, the teaching mode is diversified. In programming courses, case teaching plays an important role, and the influence of learning mode on teaching quality is particularly important. Here, different students learn programming knowledge at different levels, including beginner, intermediate, and advanced. For beginners, passive learning is an option to teach these students the basics. For intermediate-level students, choosing a semi-active learning mode to get programming knowledge points better. For advanced learners, active learning is necessary to better understand the process of problem-solving, which contributes to the acquisition of relevant complex skills.

Keywords:

Teaching mode
Programming language
Python
C++

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1. Introduction

The teaching mode is an important part of the teaching process^[1]. The traditional teaching mode mainly focuses on teaching by teachers and learning by students. The relationship between teachers and students is instilled by one side and accepted by the other, but this will bring about a series of problems, such as whether students can absorb most of the content taught by teachers and whether the knowledge taught by teachers can improve students' cognition and inspire them or encourage students to explore the spirit of learning knowledge. Nowadays, with the development of “Internet +”, the traditional teaching mode is no longer suitable for today's teaching, and it is

necessary to enhance the learning efficiency of students through the combination of different teaching modes^[2]. In computer programming courses, the subjects taught can be divided into three levels: beginner, intermediate, and advanced. For learners at different levels, the corresponding blended teaching mode and different courses should be selected for teaching exploration, to achieve the teaching objectives for various learners^[3-4].

2. Design of teaching model

2.1. Preview self-study

Before teaching, students can learn new knowledge

by themselves in different ways. The self-study stage can be either self-study and practice of learning content under the guidance of teachers in the face of designated problems, or individual free learning without teacher guidance and content assignment ^[5]. Nowadays, with the development of Internet technology, there are many ways to learn, including textbooks, materials consulted by the library, and resources searched on the Internet, including text page content, videos, and so on. This combination of online and offline learning modes enables students to have a better understanding of basic concepts when learning on their own ^[6]. At the same time, teachers will provide preview questions. Students with learning tasks will have a goal, conscious of learning, and improve the efficiency of learning. The development and application of artificial intelligence can also be used for students to self-study with better guidance, improving the self-study effect ^[7].

2.2. Mutual discussion

The discussion teaching method is generally regarded as one of the most effective ways to promote students' thinking and understanding. In recent years, it has been the focus and hot spot in the reform of education and teaching ^[8-9]. For problems that are difficult to understand or representative in class, the knowledge points can be understood and mastered through discussion. The participants in the discussion can be teachers and students, or students can be guided to form small groups to discuss with each other. When orally expressing their views, they will quickly grasp the key points of knowledge in the description process. The other students listening to the discussion by other participants will also gain new knowledge.

2.3. Internal and external exercises

For the knowledge involving calculation or formula derivation, students can strengthen the knowledge points through exercises. The exercises can be completed in the form of homework assigned by the teacher after class, or in the form of a quiz assigned in class. The teacher should correct the exercises in time so that students can timely know whether they master the knowledge points.

2.4. Question and answer

Questioning is an effective way to lead students to think,

promote the development of students' thinking, and promote students' thinking innovation ^[10]. For simple knowledge points or knowledge points that need to be understood by analogy, classroom teaching can be conducted by asking students questions, which can improve students' learning enthusiasm and awareness of active participation, to promote the overall development of the whole learning effect in a good direction.

2.5. Teacher lecturing

In classroom theory teaching, teachers can teach knowledge points that students cannot fully understand through self-study based on students' pre-study and self-study, and make students understand the deep connotation of knowledge more clearly through concepts, principles, derivations, calculations, and so on. In a sense, teachers need to fully prepare lessons before teaching and understand the difficulty of teaching materials. The teachers should be aware of the students' understanding and gradually deepening way of thinking, and choose appropriate teaching methods based on objective factors such as students' adaptability to teaching materials ^[11-12].

2.6. Summary and analysis

Mind mapping can be used by both teachers and students in all stages of teaching to make the explanation of boring knowledge vivid so that students can better grasp and digest the acquired knowledge, better establish the corresponding knowledge system structure, and learn to use knowledge to solve new problems ^[13-15]. In the programming course, the teacher can summarize the knowledge points of each chapter and tell them to the students before teaching, so that the students can have a goal in the learning process. After learning, the students can review the knowledge they have learned and summarize the knowledge points of the whole chapter with a mind map, which will make the learning context clear.

2.7. Experimental verification

Some knowledge points are too theoretical so students cannot properly understand. Teachers can verify it through experiments, as experimental teaching is also an important way and method to achieve teaching goals ^[16]. Theory guides practice, and practice can also strengthen

theoretical cognition. Students need to cooperate, set up a suitable experimental development environment, and conduct practice operations according to the rules of learning, which require a certain amount of time to verify after class.

3. Implementation of teaching model

Different students learn at different levels, including beginner, intermediate, and advanced. For beginners, passive learning is an option to teach these students the basics. For intermediate-level students, choose a semi-active learning mode to get the programming knowledge points better. For advanced learners, adopting an active learning style can lead to a better understanding of problem-solving, which helps to acquire relevant complex skills. By designing graded learning tasks, teachers can help students establish a scientific thinking mode in different learning stages, gradually improve their ability to analyze, reasoning, problem-solving, and innovation, and lay a solid foundation for students' long-term learning and comprehensive quality improvement.

3.1. Teaching mode for beginners

For beginners, they are unfamiliar with the knowledge they have learned and need to learn in a passive way. The learning mode for beginners can be introduced by the teacher, as shown in **Figure 1** below. Based on the teacher's teaching, the teacher's simple questions and the students' answers are further used to strengthen their understanding. Meanwhile, the corresponding simple exercises and experiments are assigned after class to strengthen their mastery of the programming language.

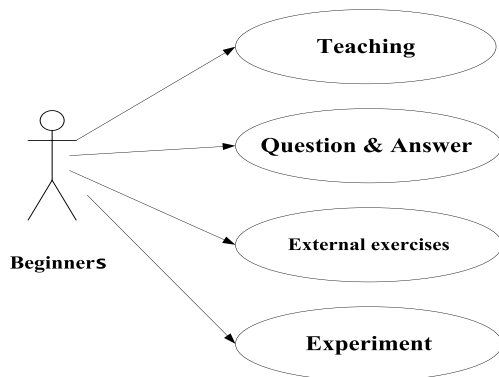


Figure 1. Study mode for beginners

3.2. Teaching mode for intermediate learners

When beginners learn through passive learning mode, they have mastered the basic knowledge of program design. For intermediate learners, the content of the primary learning mode can be made more difficult, and at the same time, students' self-study mode can be added, as shown in **Figure 2** below.

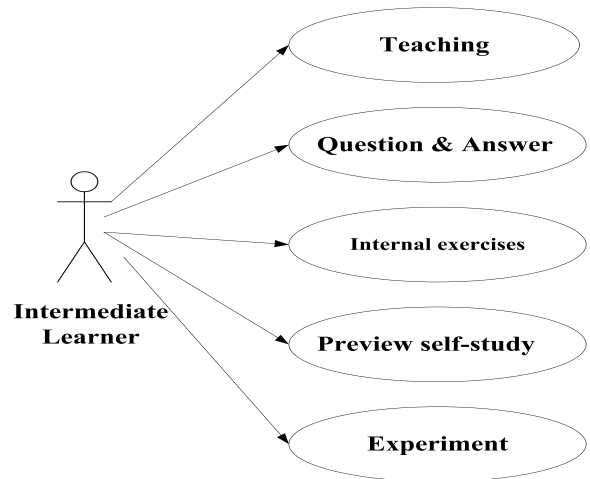


Figure 2. Study mode for intermediate learners

3.3. Teaching mode for advanced learners

After taking programming courses, advanced learners can enrich the teaching content of high-level language programming, such as Python or C/C++ language, by choosing classic algorithm cases, competition projects, and other forms^[3]. In terms of teaching mode, in addition to the above teaching mode, they can add mutual discussion and summary analysis. Students can explain their understanding of knowledge through discussion, and use tools such as mind mapping to summarize and analyze, as shown in **Figure 3**.

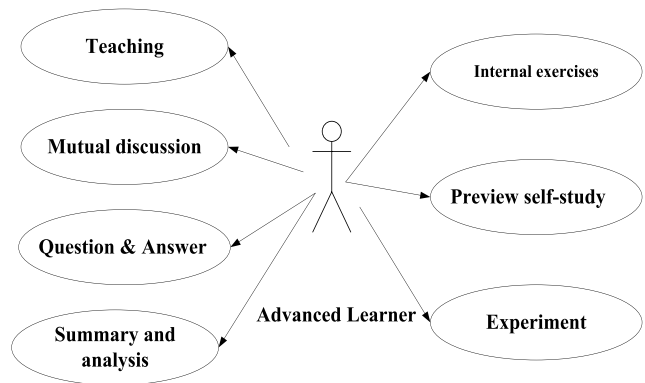


Figure 3. Study mode for advanced learners

4. Summary

This paper summarizes the characteristics of several teaching modes and adopts different teaching modes according to the learning characteristics of different students to improve the teaching quality and teaching

effect. In the course of computer programming, students with different foundations are taught according to their aptitude, so that students can better learn follow-up courses.

Disclosure statement

The author declares no conflict of interest.

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Discussion on the Application of Innovative Teaching Methods in the Vocal Course of Middle and High Pre-school Vocational Education Majors

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Abstract:

With the deepening of education reform in recent years, the importance of middle and high vocational education has been highlighted. The middle and high vocational integrated preschool education major is an important position for cultivating preschool teachers as its curriculum and teaching methods will directly affect the quality of future early childhood education. In this context, as an important course of preschool education majors, vocal music class can not only improve students' music literacy and artistic expression ability but also improve the teaching level of teachers. However, the traditional vocal music teaching method is single, lacks interactivity and innovation, and it is difficult to stimulate students' learning interest and potential, so it is a hot topic for the teaching industry to explore the vocal music teaching reform strategy for middle and high school integrated preschool education majors.

Keywords:

Innovative teaching methods
Middle and high school integration
Preschool education
Vocal music program

Online publication: December 16, 2024

1. Introduction

As an important part of the integrated teaching mode of middle and higher vocational education, how effective the teaching is will directly affect the learning experience of students and the cultivation of their vocational ability in the whole teaching stage. Therefore, the use of modern educational technology, innovative teaching concepts, reform, and optimization of the vocal music course is not only a necessary way to improve the quality of teaching

but also an important means to improve the students' vocational quality and competitiveness. Therefore, it is of great significance to explore the reform strategy of the vocal music teaching of middle and high school vocational integration preschool education majors.

2. Advantages of innovative teaching methods applied in middle and high vocational pre-school vocal music course

2.1. Improve students' interest and participation in learning

The application of innovative teaching methods in middle and high vocational preschool vocal music teaching can significantly improve students' learning interest and participation. These methods often break through the single traditional teaching mode and adopt a variety of teaching methods, such as multimedia technology and interactive classroom activities, so that students' learning enthusiasm is greatly improved. With the help of modern technology, virtual reality technology and interactive whiteboard technology have injected new vitality into vocal music teaching, so that students have a more intuitive and vivid understanding and mastery of vocal music knowledge ^[1]. Such a teaching mode can not only stimulate students' desire for knowledge but also allow students to learn in a relaxed and pleasant atmosphere, improving the overall efficiency of the classroom. In addition, innovation in teaching methods makes students more actively participate in learning. Traditional indoctrination often allows students to passively receive information, while the "innovative teaching method" emphasizes the student's main position, encouraging students to actively participate in classroom discussions, practical activities, and teamwork. This teaching method is conducive to the development of student's independent learning ability so that students become participants in the classroom and develop good learning habits and a good attitude towards learning.

2.2. Promote personalized learning

The use of creative teaching methods in vocal music teaching can also effectively promote students' individualized learning. The traditional teaching mode often ignores students' individual differences, resulting in unsatisfactory teaching results. In the process of personalized teaching, teachers can better understand and grasp the learning characteristics and needs of each student, and develop targeted teaching plans accordingly. Learning management systems, intelligent teaching platforms, and other modern educational technologies can monitor and analyze the learning status of students

in real time, helping teachers adjust the teaching content and strategies according to the learning needs of different students. At the same time, the implementation of personalized learning also enables students to learn at their own pace and in their way, giving full play to their initiative and creativity. In this kind of teaching environment, students can choose their own learning contents and methods according to their own interests and abilities, to improve their vocal knowledge and skills. This can not only improve students' academic performance but also enhance students' self-confidence and motivation to learn so that students will be more competitive in their future studies and careers.

2.3. Enhance students' practical ability

The use of innovative teaching methods in middle and high vocational vocal teaching can significantly improve the practical application of students' abilities. Hence, modern vocal teaching should not only focus on the teaching of theoretical knowledge but also pay attention to the cultivation of students' hands-on ability. Through the use of innovative teaching methods such as situational teaching, simulation training, project-based learning, and other innovative teaching methods, students can carry out practical operations in real or simulated environments to improve their hands-on ability and the ability to solve practical problems, and this mode of teaching enables students to link theoretical knowledge with practical operations and improve their skills in practice ^[2]. In addition, the innovative teaching method also focuses on cultivating the comprehensive quality of students through a variety of practical activities. Students can learn the knowledge of vocal music and cultivate team spirit, communication, and leadership skills. Modern workplaces not only have high requirements for specialized knowledge but also have high requirements for practical ability and comprehensive quality.

2.4. Cultivate comprehensive quality

Creative teaching methods applied to middle and high school pre-school vocal music teaching can also effectively improve the comprehensive quality of students. Modern education emphasizes the all-round development of human beings, who not only need to master professional knowledge and skills but also need

to have better comprehensive quality, such as innovation ability, critical thinking ability, communication ability, teamwork ability, and so on. Teachers should innovate teaching methods and carry out colorful classroom activities and practical activities to improve students' comprehensive quality. Through project learning, students can be trained in the skills of planning, organizing, and executing through complete projects, and learn how to communicate and cooperate effectively with others in teamwork. Such a teaching mode can help students consolidate their vocal knowledge as well as develop their problem-solving skills and lay a good foundation for their future careers.

3. The application strategy of innovative teaching methods in middle and high vocational preschool vocal music courses

3.1. Multimedia teaching

The use of multimedia technology, such as video, sound, animation, interactive software, and so on, can create a more vivid and intuitive learning environment for students ^[3]. Multimedia teaching resources can provide students with a wealth of music materials and singing demonstrations to help students deepen their understanding and mastery of vocal techniques. Teachers can use multimedia technology to create courseware to show the historical background of the musical work, the composer's biography, the artistic characteristics of the work, and so on, to strengthen the student's ability to perceive the vocal works. Multimedia teaching also facilitates the teacher's timely feedback and evaluation, helps students correct their mistakes in time, and ensures that the learning effect is maximized.

For example, in the case of the "children's singing skills" class, teachers can use multimedia equipment to play children's songs and singing videos. At the beginning of the teaching, the teacher first played "Little Star", "Bugs Fly", and other classic children's songs, so that students could appreciate the songs and feel the melody of the song, the rhythm, and the facial expression when singing. Then, the teacher can use multimedia to play a clip of a children's song sung by a professional singer. After each playback, the teacher will pause the playback and give a detailed explanation. The teacher can point out

the breathing methods and vocalization methods used by the singer in a particular passage, and how these methods help the singer's emotional expression. Then, using the slow playback function of the video, the mouth changes and breath control of the singer's singing will be analyzed frame by frame, so that the students can have a more intuitive understanding and mastery of the singing skills. To further improve students' hands-on ability, teachers can use multimedia technology to make live recordings of students' singing practice process. In this way, students will be able to clearly recognize the shortcomings of their singing, and then improve.

3.2. Situational teaching

Situation teaching is a situation as the carrier of the teaching method, can create a close to the actual singing situation for students so that students are personally involved in it. Students can experience the emotion and performance of music through role-playing and situation simulation, thus enhancing their performance skills and confidence ^[4]. Contextual teaching method also helps students understand how different musical works are expressed in different contexts, thus deepening their understanding of musical expression. Through contextual discussion and analysis, students' music appreciation ability and aesthetic interest can be improved.

For example, in the course of children's musical singing and playing, the teacher can create a simulated children's music situation, so that students can sing and perform in a specific situation. At the beginning of the lesson, the teacher will first introduce the background and characterization of the musical to the students, and then play a short music video to let the students understand the whole plot. Then, the teacher will set up the classroom as a simple stage for students to play different roles. Each student will have their role and perform the corresponding lines and songs. Teachers can provide students with simple costumes and props to make it easier for them to integrate into the situation. If the music is set in the forest, the teacher can provide some leaves, flowers, and other ornaments for the students to wear to create the atmosphere of the forest. When singing, the teacher can use lighting and sound effects to create a realistic stage effect to enhance the students' "immersion" feeling. After the end of the performance, the teacher can organize

the students to change roles, so that each student to experience different roles and scenarios, so that not only can improve students' singing skills but also to strengthen the students' stage performance and cooperation ability.

3.3. Group cooperative learning

In vocal music teaching, group cooperative learning is an effective teaching method. Taking the group as a unit, students are encouraged to complete vocal exercises and tasks together to develop team spirit and communication skills. Cooperative group learning enables students to communicate with each other, inspire each other, and improve together in the process of mutual communication and discussion^[5]. Cooperative learning enables students to practice vocal music in a more relaxed environment, reduces tension, and improves motivation for learning. Teachers can design some cooperative vocal activities to stimulate students' creative thinking.

For example, taking choral technique and cooperative singing as an example, the teacher can divide the students into groups and each group will sing a song. At the beginning of the teaching, the teacher will introduce the basic concepts and techniques of choral singing, and then play some videos of classic choral singing to let students experience the charm of choral singing. Then, the teacher divides the students into groups, assigns a song to each group, and asks each group of students to perform a song within the designated time. Teachers can give students certain guidance in group activities, such as teachers can assist group members in assigning singing parts so that each student can find a suitable range and voice part. In the process of teaching, teachers should strengthen the guidance on harmonic practice so that they can better master the harmonic skills and methods. In practice, the teacher can observe the progress of each group at any time and give timely feedback and suggestions. In the group presentation, each group shows their choral works to the whole class. After the presentation, the teacher can organize students to evaluate and discuss with each other, so that each group of students can know their strengths and weaknesses. Through group cooperative learning, students can not only improve their choral skills but also strengthen their teamwork and communication skills.

3.4. Individualized teaching

Personalized teaching is a kind of teaching method designed for students' individual differences and needs. Teachers can tailor-make teaching plans and objectives according to students' different music fundamentals, learning progress, and interests. In personalized teaching, teachers can provide targeted guidance and instruction according to the characteristics of different students, helping students to overcome learning difficulties and bottlenecks, to improve the level of vocal music. Personalized teaching can also stimulate students' learning potential and creativity so that students can find ways of self-expression in music. In the teaching process, teachers can adopt different teaching methods, such as individual tutoring, tiered teaching, and assigning different homework to meet students' individualized needs.

For example, in the course "Individualized Singing Styles and Techniques", teachers can tailor-make individualized teaching plans for each student's voice characteristics and singing styles. Before the lesson, teachers can learn about each student's voice characteristics, singing style, and learning needs through interviews and questionnaires. On this basis, teachers can choose songs and practice materials suitable for different students. For example, students with good voices can sing children's songs that are light and fast, and students with soft voices can sing lullabies that are soft and gentle. During the lesson, teachers can personalize the coaching for each student. Teachers can teach students with good voices to practice the treble part and teach them how to keep stable and clear pronunciation in the treble part. Students with softer voices can be instructed to practice the bass part so that they can better master the vocalization and resonance skills in the bass part. In the process of personalized teaching, teachers can also use audio and video equipment to record each student's singing process and analyze and feedback in class, so that students can see their progress and shortcomings, and make timely adjustments and improvements.

3.5. Project-based learning

Project-based learning refers to the student-centered, practical project-based learning approach to develop students' comprehensive quality and hands-on ability

in vocal music teaching. In the process of project-based learning, teachers can design practical projects related to vocal music, such as musical production, concert planning, musical composition, and so on, so that students can learn and apply vocal music knowledge and skills in practical activities^[6]. Project-based learning can stimulate students' interest in learning, motivate them to learn, and improve their comprehensive quality and ability while solving practical problems. Students will have a strong sense of achievement when participating in activities, which can enhance their self-confidence and sense of responsibility.

Take "Children's Concert Planning and Performance" as an example, teachers can organize students to participate in the whole process from planning and rehearsal to performance. At the beginning of the project study, the teacher should first introduce the general objectives and tasks of the topic to the students, and then divide the students into groups, with each group being responsible for one group's content. For example, one person is responsible for the planning and choreography of the program, and one person is responsible for the stage setup and props production. During the program, the teacher may hold regular group meetings to assist students in reporting and communicating the progress of the program. In each session, the teacher will provide some advice and guidance to the students. For example, in the program planning group, the teacher may assist the students in selecting songs suitable for young children to perform, and guide them in rehearsal and singing skills. In the final stage, teachers can organize a mock performance

so that students can have a complete rehearsal process. During the rehearsal, the teacher needs to carefully observe every link and guide the students to solve the problems arising in the actual performance. Finally, students will complete a real children's concert under the teacher's guidance.

Through the project, students can not only improve their vocal skills but also strengthen their organizational planning, teamwork, and practical skills, laying a good foundation for their future career development.

4. Conclusion

To summarize, applying innovative teaching methods to middle and high school integrated preschool vocal music teaching can not only enrich the teaching means, but also improve students' learning interest and participation, and more effectively improve students' comprehensive quality. This innovative teaching method allows students to have more opportunities to show themselves, improve students' musical literacy, and improve the level of teaching. With the continuous improvement of the level of educational technology and the constant updating of teaching concepts in the future, the reform of vocal music teaching is bound to develop in the direction of diversification and personalization. Teachers should constantly explore new teaching methods to adapt to the needs of the times, cultivate a more creative and practical experience for preschool education professionals, and make greater contributions to the cause of preschool education in China.

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Exploring the Role of Drama and Theatre in Moral Education: Theories and Practices

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Abstract:

Moral education plays a crucial role in personal development. A Chinese saying aptly illustrates its importance: “A man cannot stand without integrity; a country cannot prosper without morality.” Similarly, England emphasizes the significance of moral education in children’s growth. According to Section 78 of the UK Education Act of 2002, schools are responsible for promoting “the spiritual, moral, cultural, mental, and physical development of pupils at the school and in society.” Under this Act, the Department for Education has proposed non-statutory guidance for schools on actively promoting fundamental values. This guidance includes moral principles such as: (1) Encouraging students to respect and tolerate people of all faiths, races, and cultures; (2) Cultivating students’ self-knowledge, self-esteem, and self-confidence; (3) Motivating students to take responsibility for their actions and understand how they can contribute to their schools and society; (4) Ensuring students recognize the importance of combating discrimination. These points, among others, demonstrate the emphasis British education places on students’ moral development. Therefore, educators must consider how to achieve these objectives—how to instill belief in moral standards and encourage adherence to moral rules. However, this task is challenging due to differing opinions on moral education. As Joe Winston highlights, morality is a complex area that elicits profound disagreement.

Keywords:

Moral education
Drama study
Rules

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1. Introduction

In Michael Hand’s book *A Theory of Moral Education*, two distinct societal claims regarding moral education are debated and analyzed^[1]. The first claim suggests that “morality is caught rather than taught,” implying that

moral education is unnecessary and that children’s moral development does not require deliberate adult facilitation. However, this claim is flawed. Hand argues that moral direction and guidance are integral to parenting and teaching, forming a universal feature of upbringing. From

a young age, children learn through parental responses, such as punishment for violent behavior, dishonesty, or disrespect, helping them understand that these actions are wrong and fostering feelings of guilt and regret. As David Gauthier emphasizes, rewards for success, admonitions, or punishments for failures are principal methods to cultivate moral dispositions in children, helping them acquire moral virtues. Furthermore, Gauthier highlights the moral significance of emotions like guilt and shame, which enable children to resist temptations, such as taking things that do not belong to them, through moral training and incentives ^[2,3].

The second claim argues that “morality is innate rather than acquired.” This perspective posits that human beings, as social animals, are biologically predisposed to moral behavior. Hand acknowledges that humans derive happiness from friendship, social interaction, cooperation, and empathy, which form the basis of moral consciousness. Similarly, Gauthier asserts that social interaction provides the raw material for developing moral awareness, as seen in children’s natural desire to please others and their sympathetic responses to others’ emotions ^[2]. However, Hand warns against conflating innate prosocial tendencies with morality, emphasizing that morality involves actions regulated by subscribed standards, which differ from behaviors driven by sympathy alone ^[1].

The distinction between morality and sympathy lies in motivation. Helping others out of discomfort caused by their pain is driven by sympathy, not morality. Joe Winston elaborates that morality, unlike sympathy, is governed by a moral code—a set of standards that dictate what individuals should or should not do ^[3]. Moral actions stem from adherence to these codes rather than natural empathy. Hand underscores that morality requires training, much like language acquisition. While humans are biologically equipped for morality, individuals must be introduced to moral codes and guided to follow them. Hand concludes:

“Morality and language are rule-governed social practices into which infant human beings must be initiated... morality is acquired rather than innate and must be taught as well as caught.”

For educators, the goal of moral education is not to impose moral rules directly but to develop

children’s ability to think independently and evaluate the legitimacy and rationality of moral standards. George Carey, the Archbishop of Canterbury, highlights that the toughest moral decisions often involve conflicts between competing rights rather than simple distinctions between right and wrong ^[4]. Knowing moral rules does not guarantee adherence, and Hand emphasizes the importance of fostering independent moral judgment in children ^[5]. Just as religious education seeks to cultivate religious autonomy rather than faith, moral education requires impartial guidance rather than imposition ^[6].

As early as 1984, educational pioneer Nellie McCaslin advocated the benefits of drama study in moral education ^[7]. McCaslin argued that drama strengthens critical thinking, fosters moral and spiritual values, promotes understanding and appreciation of diverse cultural values, encourages cooperation, and highlights the necessity of rules. While the goal is not to claim that drama inherently makes children more moral, it is vital to explore the relationship between drama and moral education. This includes examining the role drama and theatre play in moral education, how they contribute to children’s moral development, and the specific skills and values children can acquire through drama practices.

2. Dramatic play, rules, and moral education

According to Winston, while dramatic activity is shaped by culture, it originates from the innate human tendency to play. Play is a natural ability that humans exhibit from childhood. Roger Wooster suggests that the ability to play is a “prerequisite” for drama and theatre, serving as a cornerstone of individual development ^[8]. One of the greatest obstacles to personal development is the fear of failure. Way identifies that drama can address this issue by offering situations of “what happens if...?” This underscores the moral potential of dramatic play, which provides a safe space for children to explore both physical practice and moral reflection without fear of making mistakes. As Jerome Bruner notes, “play is an activity that is without frustrating consequences for the child even though it is a serious activity” ^[9].

An illustrative example is the game “Keep the Key.” Participants form a circle to create the play area, and once

the game begins, silence is mandatory. One participant in the center protects the key under their chair, while a challenger attempts to steal it undetected. In a drama session, this game was played twice in a dramatic context, offering distinct moral experiences.

In the first version, the central character was a guard who would be executed by the king if the treasure key was stolen. The challenger was a farmer who needed the key to access jewels to save his critically ill wife. This scenario presents a moral dilemma: if the guard allows the farmer to steal the key, he faces death; if he prevents the theft, he fulfills his duty but at a moral cost. Similarly, the farmer's act of stealing is driven by noble intent, but the morality of his actions is questionable. This setup raises critical questions: What defines right and wrong? How are moral choices made? Winston emphasizes that when children face moral dilemmas in drama, the value lies not in the decisions they make but in their ability to articulate reasons for their choices.

The second version took place in a forest, with participants playing as animals. The key keeper was a hunter who had captured a small bear, and the objective was to rescue the bear by stealing the key. A humorous incident occurred during this version: the game's rules specified silence, yet some participants deliberately made noises to distract the hunter, who was blindfolded. Surprisingly, the teacher did not intervene. Initially, this rule-breaking surprised and confused me, but as more students joined in, I noticed their actions were motivated by empathy. When asked about the decision to make noise, one student explained, "I don't know, I just did it. I felt nervous and wanted to free the little bear." This response reflects Winston's claim that "moral action is determined as much by feeling as it is by reason, and the two operate together to inform the agency." The drama fostered moral reflection and action through active engagement in role-playing and contextualized games.

Jean Piaget posits that children learn to respect rules during games while simultaneously understanding how to adapt them, a foundation for moral development^[10]. In the example above, breaking the rules to rescue the bear demonstrated moral growth. The motivation to act was not rooted in a desire to disrupt the game but rather in compassion and a moral compass. Richard Sennett notes that "rules are not immutable truths but

conventions"^[11,12]. However, this does not suggest that rules can be changed arbitrarily. Sigmund Freud asserts that when play becomes socially essential—such as in theatre or sports—participants and observers must adhere to agreed-upon rules to ensure the success of the interaction. For drama audiences, this requires a code of social conduct^[13]. Émile Durkheim further emphasizes that respect for discipline, group collaboration, and an understanding of moral and social rules are integral to moral development^[14].

3. Drama as a learning medium

Forum Theatre is a participatory theatre technique created by Augusto Boal, which holds significant potential for moral education due to its emphasis on active participation. According to Tony Jackson, Forum Theatre is also referred to as "oppressed theatre," where the protagonist, identified as the "oppressed," faces specific challenges^[15]. The drama revolves around the problems the protagonist encounters, and spectators are invited to resolve these issues by recalling and identifying key moments of the performance. In simpler terms, the audience can empathize with the protagonist by saying "stop" and proposing alternative ways to address the crisis. This form of participation is valuable for enhancing moral experience because it fosters reflection. For instance, when someone observes immoral behavior that harms others, they may reflect on their own actions and consider what constitutes appropriate behavior.

Participation in drama is crucial to moral education for several reasons. It aligns closely with experiential learning. According to David A. Kolb, experiential learning plays an increasingly significant role in individual development^[16]. This type of learning allows participants to construct their own meaning rather than passively receive knowledge. Participation in drama encourages individuals to take responsibility for their learning process. Freire emphasizes that the degree of participation, effort, and "two-way dialogue" inherent in drama activities helps to embed learning, develop a sense of ownership, and empower learners. These principles align with the goals of moral education, which aim to cultivate moral autonomy in students.

Additionally, participation in drama serves as a

rehearsal for reality, preparing individuals for real-life moral decision-making. However, as John Dewey suggests, “experience on its own is not necessarily educational,” meaning that mere participation does not automatically result in learning ^[17,18]. More importantly, if participants’ engagement is unstructured, disorganized, or unreasonable, their experiences may become chaotic and devoid of meaning. Thus, the structure and guidance within participatory drama are essential to ensure that the experience contributes effectively to moral education.

4. Conclusion

Moral education has always been a central focus in the field of education due to its profound impact on personal development. Many countries have introduced relevant regulations to encourage schools to enhance students’ moral capacities. This article primarily addresses moral education within the UK. Given that morality is a complex and often divisive topic, the discussion begins by exploring two opposing debates about moral education.

The first debate questions whether “morality is caught rather than taught.” This perspective is not supported here, as moral education, albeit informal, begins in childhood through parents’ rewards or punishments, which act as a form of moral guidance. The second claim posits that morality is innate rather than acquired. However, this argument conflates natural human compassion with morality, which is motivated by distinct factors. For educators, the focus should be on cultivating children’s ability to think independently and assess the rationality of moral concepts—a goal that aligns with drama pedagogy, which emphasizes critical thinking and the exploration of moral and spiritual dimensions through dramatic activities.

To explore the relationship between drama and

morality, the discussion emphasizes the role of stories and dramatic narratives. Historically, stories have served as a tool for conveying moral lessons and teaching behavioral norms. The visual and auditory elements of dramatic narratives enhance moral engagement, allowing individuals to immerse themselves in the dilemmas faced by characters and reflect on moral issues. The unique shifts in time, space, and character within a theatrical performance further intensify the moral experience. The stage’s flexibility—where years can unfold in moments—highlights the motivations and consequences of actions with clarity, making moral issues more accessible. Drama distills the complexities of moral life into a refined and engaging form, allowing audiences to derive moral insights through actors’ performances and symbolic elements.

The article also examines the significance of play and forum theatre for moral education, using examples from drama sessions to illustrate the interplay between games, drama, and morality. In the safe environment offered by play and drama, children develop their moral reasoning, learn the importance of rules, and understand the value of collaboration. Forum theatre, in particular, fosters moral reflection by allowing the audience to address the protagonist’s moral crises in various ways, providing opportunities to evaluate the rationality of their moral choices.

This article acknowledges certain limitations. It does not address the shortcomings of using drama as a medium for moral education, nor does it delve deeply into the moral dilemmas presented in the games due to knowledge constraints and length restrictions. These aspects warrant further exploration in future research to deepen the understanding of ethical dilemmas and their resolution in drama-based moral education.

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Approaches to Integrating Ideological and Political Education into Student Management in Colleges and Universities

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Abstract:

With the rapid development of higher education in China, the number of college students is increasing year by year, and the importance of ideological and political education in colleges and universities is becoming increasingly prominent. It is a crucial aspect of talent cultivation in higher education institutions and an essential measure to ensure the smooth implementation of national development strategies. However, traditional management modes in colleges and universities are no longer sufficient to meet current educational demands. This paper examines the implementation of ideological and political education from the perspectives of external environments, information channels, and educational reform. It emphasizes reinforcing foundational structures, strengthening the Party branch, fostering closer ties between teachers and students, and promoting democratic practices within the Party. The goal is to enhance the guiding role of ideological and political education in student management while strengthening students' capacities for self-education, self-service, and self-management.

Keywords:

Ideological and political education
Student management work
Talent training

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1. Introduction

With the rapid development of China's national economy, the education sector has experienced significant progress, particularly in higher education, which plays a vital role in improving national quality and advancing societal development. As the reform of China's education system deepens, colleges and universities are transitioning from

elite to mass education. This shift has rendered traditional management models inadequate for addressing the new demands of education. Integrating ideological and political education into college student management is a key aspect of fully implementing the Party's educational policies and fulfilling the fundamental task of moral education. It is also essential for promoting the healthy

development of higher education institutions, maintaining campus security and stability, and enhancing students' overall quality in the current context ^[1].

Building on this, the paper explores the challenges of incorporating ideological and political education into student management, examines the principles underlying this integration, and discusses strategies to address these challenges. These strategies include expanding perspectives, solidifying foundational structures, and fostering closer relationships between teachers and students. By outlining practical implementation pathways, this study aims to support the healthy development of higher education institutions in China.

2. The dilemma of integrating ideological and political education into student management in colleges and universities

In recent years, colleges and universities have increasingly emphasized ideological and political work, providing favorable conditions for the smooth execution of student management tasks. Concurrently, these institutions have sought to integrate ideological and political education concepts into student work and improve their management systems, leading to notable enhancements in the quality of their operations. However, various factors have made it challenging for ideological and political education to fully integrate into student management. These challenges are outlined as follows:

2.1. The influence of the external environment

Significant changes in China's economic and social development have necessitated corresponding adjustments in the management systems of colleges and universities. Yet, in some institutions, the student management systems remain outdated and rigid, failing to adapt to actual demands. This lack of flexibility and humanization in student management hinders the holistic development of students ^[2]. Consequently, some students develop resistance to management practices, question the system, and undermine the effectiveness of student management. This, in turn, adversely impacts the quality and effectiveness of teaching in these institutions.

2.2. The influence of information channels

Under the current circumstances, the management of college students faces increasingly complex challenges, particularly due to the varied psychological profiles of students. The rapid advancement of information technology, especially mobile communication technology, has provided students with unprecedented access to diverse information. While this has its advantages, it also brings negative influences that can complicate student management. Furthermore, the fast-changing social environment exacerbates the difficulties of managing students, diminishing the effectiveness of traditional methods. In this context, continuing with outdated teaching methods makes it challenging to achieve the desired educational outcomes.

2.3. The impact of education reform

As reforms in China's education system accelerate, the educational philosophies of colleges and universities are also evolving. However, despite this progress, the ideological and political education of students has not seen substantial development. Traditional education practices tend to prioritize professional knowledge while neglecting students' ideological and political education. This oversight has prevented ideological and political education from achieving its full potential, significantly reducing its impact. While institutions recognize these issues, they often lack clear strategies to address them. Thus, when implementing ideological and political education, it is essential to deeply analyze the deficiencies of traditional teaching models and reform student management in alignment with contemporary societal developments. This approach will enable colleges and universities to better serve their students.

3. The principle of integrating ideological and political education into student management in colleges and universities

3.1. The principle of proceeding from reality

Under the new circumstances, the management of students and ideological and political work in colleges and universities has undergone significant changes. Particularly for the generation of students born after 2000, integrating ideological and political education into student

management is not only a component of ideological and political work but also an essential part of student management. Therefore, actual work must prioritize students as the central focus, adhering to the principle of reality and leveraging students' subjectivity and initiative.

Firstly, educational efforts in colleges and universities should begin by considering the characteristics, interests, and needs of students to foster a positive learning environment, thereby mobilizing their enthusiasm. Secondly, institutions should reform and optimize student management models, enhancing current ideological and political work systems based on students' needs. This approach enables students to find joy in the process, promoting the smooth integration of ideological and political education with student management.

3.2. The principle of teaching students in accordance with their aptitude

Student managers in colleges and universities must thoroughly understand the physical and psychological conditions of their students and adapt management practices to cater to their diverse characteristics. This integration allows for a more effective combination of ideological and political education with management work. Educational administrators should carefully plan and optimize the allocation of campus educational resources, identifying their relevance to students' needs. Developing fair and efficient resource allocation strategies ensures their optimal utilization. This approach helps meet the distinct requirements of different student groups, ultimately improving the overall educational standards in colleges and universities.

3.3. The principle of gradual progress

Student management in colleges and universities should follow a scientifically structured plan implemented within institutional operations. It is also essential to identify and prioritize the ideological and political education needs of students while leveraging various online teaching resources for instructional purposes.

Firstly, understanding and establishing clear objectives for ideological and political work is crucial, forming the foundation of effective student management. Simultaneously, methods and approaches to ideological and political education must be thoughtfully designed

and continually refined to ensure the content aligns with contemporary societal requirements while resonating deeply with students. This strategy enhances the effectiveness and appeal of ideological and political education.

Secondly, recognizing the importance of online ideological and political work is essential. Universities must actively build and improve the digital environment for such education by providing technical support and innovating content, formats, and delivery methods. Through the rational integration and utilization of abundant online educational resources, institutions can broaden educational channels while increasing the engagement and effectiveness of ideological and political education.

4. The implementation of integrating ideological and political education into student management in colleges and universities

4.1. Broadening perspectives and implementing moral education

University administrators should align their efforts with the broader societal context, enhancing the current moral education system for students and adopting the concept of moral education as the primary guideline for students' ideological and political education and management. Based on this foundation, the content of ideological and political education should be refined and supplemented to improve its overall effectiveness. To achieve these objectives, university administrators need to focus on the following aspects:

First, integrate school management with teaching activities. Ideological and political education shares a common educational goal with student management and maintains a close interconnection. Administrators in colleges should aim to seamlessly integrate these two domains to achieve harmonious development. This requires a structured approach where daily teaching activities and student management efforts interact positively, embedding moral education content into the core of subject education during course instruction. Such integration enhances the educational value of both domains^[3]. Moreover, colleges and universities should

provide regular training programs for subject teachers and ideological and political counselors to facilitate effective collaboration and ensure the mutual reinforcement of these efforts.

Second, increase the emphasis on practical courses. Given the current educational landscape, Chinese colleges and universities need to focus on developing students' practical skills. This involves establishing internship bases and fostering communication with various enterprises and institutions to create a conducive environment for student internships. Alongside this, universities should actively promote innovation and entrepreneurship education, laying a robust foundation for student development in these areas. Colleges and universities can also strengthen students' ideological and political education by organizing campus cultural activities. Events such as red song parties, themed class meetings, and other moral education initiatives help inculcate correct values and life perspectives in students while enhancing their practical abilities.

Third, balance online ideological and political education with classroom teaching. The rapid development of network information technology has made the Internet a central part of college students' academic and personal lives, presenting a new avenue for learning. Therefore, university administrators must leverage this technology to enhance the delivery of ideological and political education. Simultaneously, efforts should be made to integrate online and classroom teaching, maximizing the educational potential of both modes. Colleges can also incorporate ideological and political education into various extracurricular activities, such as group travel, social investigations, and public service initiatives. By understanding and addressing the ideological and behavioral traits of college students, administrators can more effectively implement comprehensive ideological and political education.

4.2. Consolidating the foundation and continuously strengthening grassroots Party branches

Colleges and universities should ensure that the guidance on ideological and political work from relevant authorities is effectively conveyed to teachers of various subjects and ideological and political courses. This will

enable these educators to develop a clear understanding of their responsibilities. Additionally, the requirements of "two studies and one action" should be thoroughly implemented, leveraging the Party organizations' role as a core leadership entity. The following approaches can be taken:

First, colleges and universities must thoroughly understand and communicate the specific requirements of ideological and political work to subject teachers and ideological and political counselors. This ensures that both groups recognize the importance of integrating ideological and political elements into teaching and guidance. By doing so, educators can go beyond knowledge transmission to emphasize value shaping and cultural development.

Ideological and political counselors should innovate their methods and tailor the course content to align with the characteristics of their disciplines, ensuring these courses are engaging and thought-provoking. Subject teachers, on the other hand, should explore ways to present political theory in relatable and vivid formats, connecting the content to students' daily lives. This approach encourages students to reflect on national development and social progress. Collaboration between the two groups is essential to optimize the ideological and political work model, enhancing its impact and ensuring that each teaching activity becomes an opportunity for ideological education. This enables students to absorb these lessons in a subtle yet profound manner.

Second, colleges and universities should foster enthusiasm among student Party members, encouraging their active participation in ideological and political education initiatives. This involves adhering to the national principles and policies governing ideological and political work while embedding Party-building elements into campus culture, academic activities, and other student engagements. By doing so, students can experience the influence of the Party and socialist core values in their daily lives, achieving a meaningful integration of theory and practice.

Third, colleges and universities should focus not only on imparting professional knowledge but also on enhancing students' overall development. This includes fostering ideological and moral cultivation, teamwork skills, innovative thinking, and social responsibility. These

elements are critical for students' sustainable development and represent essential soft skills for future workplace competition. By adopting a comprehensive education and training model, colleges and universities can establish a robust foundation for their students, equipping them with the tools needed for long-term success.

4.3. Staying close to teachers and students, and continuing to promote the democratic style of the Party

In the current era of diversified international ideologies, colleges and universities should consistently uphold and enhance the democratic practices of inner-party life, ensuring a comprehensive understanding of the ideological perspectives of both teachers and students. This can be achieved through the following measures:

First, actively promote the modernization of the Party branch's democratic evaluation mechanism. This involves refining and improving the evaluation process to provide clear guidance and support for teachers and students engaged in ideological and political education. By creating a transparent and inclusive platform, every Party member can contribute effectively, collectively advancing the healthy development of campus culture. Additionally, efforts should be made to establish exemplary models within the Party, fostering a positive and energetic political atmosphere. By steadfastly implementing the principles of collective leadership and individual responsibility under democratic centralism, the cohesion and combat effectiveness of the Party branch can be strengthened, laying a solid foundation for its future development.

Second, alongside enhancing education and training for Party members, colleges and universities should focus on further strengthening the growth and effectiveness of Party branches. This can be achieved by organizing a series of well-structured activities and courses designed to deepen Party members' understanding of both theoretical and practical aspects of Party knowledge. Furthermore, in student management—especially for those who demonstrate disciplinary issues or face academic challenges—institutions should utilize ideological and political education activities to help them develop a correct worldview, life philosophy, and values. This dual approach not only strengthens students' moral frameworks

but also fosters their holistic personal development.

Finally, it is essential to fully implement the principles of inner-party democracy by actively engaging in constructive criticism and self-criticism. Such practices provide opportunities to enhance collaboration between teaching staff and student Party branches. This collaborative effort fosters better communication and understanding between teachers and students, creating a harmonious and constructive learning environment. Such an environment can unleash students' potential while simultaneously enabling teachers to refine their professional skills and teaching methodologies through practical educational engagement. This two-way interaction is invaluable for fostering harmonious teacher-student relationships and advancing the overall goals of education.

5. Conclusion

In the new era, colleges and universities serve as critical platforms for cultivating national talent, with the ideological and political development of college students directly influencing the quality of this talent cultivation. To effectively enhance the level of ideological and political education in higher education institutions and seamlessly integrate it with students' professional learning and personal growth, colleges and universities must uphold a "people-oriented" educational philosophy. This entails fostering strong relationships between teachers and students, enriching the content of student education management, and refining student management systems.

Furthermore, by broadening working strategies, consolidating foundational efforts, and engaging closely with the lives of teachers and students, institutions can stimulate students' enthusiasm for learning. These efforts contribute to enhancing the overall quality of college students, preparing them to serve the nation as well-rounded individuals characterized by both competence and integrity. Through such comprehensive initiatives, colleges and universities can more effectively fulfill their mission of nurturing the next generation of leaders and contributors to society.

Disclosure statement

The author declares no conflict of interest.

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The Role of Teacher-Student Interaction in Enhancing Learning Outcomes in College Music Education

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Abstract:

In college music education, teacher-student interaction plays a critical role in enhancing learning outcomes. It not only enriches teaching content but also stimulates students' creativity, fosters cooperation, and deepens their understanding of music culture. Based on the current state of music education in colleges and universities, this paper analyzes several methods of teacher-student interaction. Furthermore, the profound impact of such interaction on students' learning outcomes is discussed. The research demonstrates that optimizing teacher-student interaction is a vital approach to advancing college music education, significantly contributing to the cultivation of music talents with exceptional comprehensive qualities.

Keywords:

College music education
Teacher-student interaction
Learning outcomes

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1. Introduction

Music education in colleges and universities serves as a crucial avenue for fostering artistic accomplishment and practical musical skills, with its effectiveness directly influencing students' overall development. Within this framework, teacher-student interaction functions as the central component of teaching. It is not only a medium for the exchange of information in classroom instruction but also an essential method for stimulating students' interest in learning, improving their musical abilities, and cultivating artistic literacy.

However, with evolving educational models and

the increasing diversity of students' individual needs, the dynamics of teacher-student interaction in college music education face new challenges. For instance, in traditional teaching methods, interactions are often limited in form, the relationship between teachers and students remains distant, and the classroom atmosphere is insufficient to fully engage students, leading to suboptimal teaching outcomes.

Recent studies indicate that high-quality teacher-student interaction significantly enhances students' learning outcomes, particularly in the field of music education, which demands a high degree of practicality.

Such interaction is not limited to the transmission of knowledge but also involves the cultivation of emotional resonance and artistic expression. Consequently, exploring strategies to enhance music education through improved teacher-student interaction has become a focal point for educators.

2. Research status of college music education

2.1. Domestic research status

Currently, most domestic research focuses on the integration and innovation of theory and practice, emphasizing the importance of education reform and its practical implementation. Qi ^[1] pointed out that, in the context of quality-oriented education, college music education must overcome the limitations of traditional teaching models and prioritize innovative developmental pathways. In her “Research on the Teaching Theory and Reform of College Music Education,” she highlighted the gradual shift in college music education toward a student-centered approach and comprehensive quality training. Her research also suggests that students’ artistic accomplishment and creativity can be effectively enhanced through diversified curricula and practical activities. This indicates that domestic scholars recognize the importance of music education reform and have proposed strategies to deepen its connotation within the framework of quality education.

Zhu and Liu ^[2] discussed the practical innovations in contemporary college music education. They argue that music education should extend beyond classroom instruction and integrate with real-world needs, such as organizing music practice activities and engaging in social performances. Additionally, they analyzed challenges in the current reform process, such as the gap between outdated teaching theories and insufficient practical application. They proposed improving teaching outcomes through school-enterprise cooperation and interdisciplinary exchanges, offering concrete implementation strategies for the reform of music education in Chinese colleges and universities.

Li’s research ^[3] focused on the integration of vocal music teaching and stage practice. She argued that vocal music teaching should not be limited to technical training

but should also be closely connected with stage practice to help students accumulate performance experience and develop artistic expression. The integrated teaching model, she proposed, better aligns with modern society’s demand for musical talent. Furthermore, her study emphasized the importance of individualized student development to enhance overall teaching quality.

2.2. Foreign research status

In foreign contexts, research on college music education tends to focus on the application and impact of diverse environments, such as omnimedia technologies and special education settings. In his study, Bilige ^[4] examined the integration of vocal music teaching with traditional music culture, emphasizing the importance of an all-media perspective. He highlighted that all-media technology offers new opportunities for university music education, such as showcasing traditional music culture through digital platforms and increasing students’ engagement with folk music. The research suggests that the all-media environment fosters a deeper understanding of music culture, enabling music education to combine cultural heritage with an international outlook.

Grimsby and Armes ^[5] studied the current state of music teaching within special education settings. Their research employed a mixed-methods approach to investigate the teaching experiences and challenges faced by music education majors working in special education. The study found that online practical courses positively influence the interaction between students and those with disabilities, enhancing teachers’ inclusive teaching capabilities. However, they also identified obstacles to integrating special education with music education, including insufficient resources and limited teaching experience. This research offers valuable insights for music educators working in the field of special education.

3. Method analysis of teacher-student interaction in college music education

3.1. Art co-creation interactive teaching

Art co-creation is a teaching method where teachers and students collaborate as equals to create musical works, emphasizing cooperative engagement in the creative process. In college music education, teachers can guide

students through the development of a musical piece, encompassing composition, arrangement, performance, and even recording. In this process, teachers and students transition from being mere transmitters and recipients of knowledge to becoming creative partners. This method, based on art co-creation, maximizes students' initiative and creativity^[6].

For instance, teachers can introduce creative themes, such as "Four Seasons on Campus," to encourage students to express their ideas through musical language. Teachers provide technical guidance and artistic oversight throughout the creative process. Through collaboration, students gain a deeper understanding of music creation while also developing skills in communication, teamwork, and problem-solving.

Modern technology further enriches the possibilities of art co-creation^[7]. Using digital music creation platforms, teachers and students can collaborate on arrangements and exchange ideas online, overcoming spatial and temporal limitations. This approach proves especially effective in scenarios like pandemic-era education or blended teaching modes. Art co-creation not only represents an innovation in teaching methodology but also embodies a student-centered philosophy aimed at enhancing artistic literacy.

3.2. Situational immersive interactive teaching

Situational immersive interactive teaching involves constructing specific musical contexts where students and teachers explore and learn together. This method focuses on improving students' perception and expressiveness in music through interactions rooted in realistic scenarios.

For example, teachers can organize a "Classical Music Salon" or "Folk Music Night," where students assume roles as composers, performers, or audience members. Together with teachers, they explore the stories and cultural backgrounds behind musical works. This immersive approach diversifies the roles of teachers and students while enriching interaction forms. Teachers can guide students into these scenarios through questioning, discussions, and role-playing^[8].

As an example, when studying Beethoven's *Symphony of Destiny*, teachers could simulate the societal backdrop of its composition, prompting students to reflect on its expressive purpose. Contextual teaching stimulates

students' empathy, deepens their understanding of musical meaning, and enhances the frequency and quality of interactions with teachers.

Modern technology further expands the scope of situational immersive teaching. Virtual and augmented reality can create virtual concert halls, recording studios, or music creation spaces, enabling students to engage with music in highly immersive environments. This innovative approach overcomes the limitations of traditional classrooms and significantly enhances the depth of teacher-student interaction.

3.3. Disciplinary collaborative interactive teaching

Disciplinary collaborative interactive teaching integrates music education with other disciplines to create new learning scenarios and interaction models. This method emphasizes interdisciplinary connections, merging music with science, literature, history, and other fields to cultivate comprehensive literacy and foster deeper teacher-student interactions.

For example, a course combining music and literature might explore the narrative function of music by analyzing the relationship between poetry and melody. In practice, teachers could invite colleagues from other disciplines to co-teach or guide students in interdisciplinary teams to complete projects^[9]. For instance, students might compose a song inspired by a literary work and present it in class. Such collaboration not only stimulates students' creativity but also enhances their teamwork and communication skills.

This interdisciplinary approach encourages mutual growth, as teachers update their own knowledge while working alongside students. The interaction extends beyond music, incorporating perspectives from other disciplines to make the teaching process more multidimensional and enriched.

Internet resources further amplify the possibilities of interdisciplinary collaboration. Platforms like MOOCs enable teachers and students from various universities to participate in joint projects, fostering broader collaboration and exchange. Through this approach, students not only gain a deeper understanding of music but also perceive the interconnectedness of disciplines, broadening their educational experience^[10].

4. The influence of teacher-student interaction on learning effect in college music education

4.1. Stimulating deep creativity in music works

Teacher-student interaction is not merely a medium for transferring knowledge but also a vital channel for stimulating creativity. In college music education, meaningful interaction encourages students to move beyond traditional teaching frameworks and explore new possibilities in music. For instance, when teachers pose heuristic questions, such as, “How can a melody be expressed using a non-traditional instrument?” students are inspired to experiment with timbre, rhythm, and emotion. Such interaction transforms students from passive learners into active creators, fostering their interest in music composition.

Deep interaction often relies on an equal dialogue between teachers and students ^[11]. Through open-ended questions and creative workshops, teachers can collaboratively explore ideas with students and even contribute to their creative works. This approach not only makes students feel respected and supported but also sparks inspiration through the exchange of diverse perspectives. Research indicates that when students receive constructive feedback and recognition from teachers during the creative process, their creativity and enthusiasm for creation are significantly enhanced, ultimately improving their learning outcomes.

Modern technology further expands the scope of interactive creativity. For example, artificial intelligence composition software enables teachers and students to jointly explore the intersection of music and technology, integrating traditional teaching with innovative methods to diversify the creative experience ^[12].

4.2. Enhancing multidimensional understanding of music culture

High-quality teacher-student interaction in music education provides students with a multidimensional understanding of music culture. This comprehension extends beyond the background of a musical work, encompassing its cultural, historical, and philosophical dimensions. For instance, during a discussion on the differences between traditional Chinese music and Western classical music, teachers can guide students to

analyze cultural symbols in musical works and explore their connections to social contexts. Such interaction helps students develop a multicultural perspective, avoiding a narrow, monolithic view of music ^[13].

While appreciating African drum music, for example, teachers can lead students to investigate the tribal culture, religious rituals, and social roles embedded in the music. Through this interactive process, students not only learn the structural aspects of music but also understand its significance as a cultural carrier. This approach closely connects music with culture and society, fostering deeper learning outcomes.

Interactive teaching also encourages students to critically examine cultural integration in music, such as the effects of globalization on folk music. Through discussions and debates with teachers, students can form their own opinions and judgments. By fostering multidimensional understanding, students gain not only music knowledge but also cross-cultural critical thinking skills, which are essential for their future development ^[14].

4.3. Cultivating collaborative ability in music practice

A core objective of college music education is to develop students' music creation abilities, with collaboration being a fundamental component. Effective teacher-student interaction significantly enhances students' teamwork skills in music practice. In practical settings such as orchestras and choirs, teacher-student interaction greatly influences the outcomes of rehearsals and performances. Teachers can guide students to understand their roles within the group and collaborate effectively with other players in aspects such as rhythm and timbre.

Through interactive teaching, teachers can cultivate a sense of teamwork by assigning collaborative tasks. For example, during rehearsals of complex pieces, teachers might encourage students to suggest adjustments to individual parts or take the initiative to coordinate rhythm and intonation with peers. Such interactions help students learn the importance of cooperation, as well as experience the unique value and joy of collective creation—an experience that theoretical learning alone cannot provide.

Teacher-student interaction also positively impacts students' psychological well-being during music practice ^[15]. To alleviate performance anxiety, teachers can provide

encouragement and constructive feedback after rehearsals, helping students feel supported and more confident. Additionally, fostering a positive interactive atmosphere improves communication among team members, leading to smoother collaboration and a stronger sense of camaraderie.

5. Conclusion

In college music education, the interaction between teachers and students serves not only as a vital component of the teaching process but also as a crucial pillar for enhancing learning outcomes. Through meaningful

interaction, students can unleash their creativity, deepen their understanding of cultural contexts, and develop teamwork skills, ultimately achieving the educational objective of holistic quality development.

Simultaneously, teachers benefit from such interactions by continuously reflecting on and improving their teaching methods, thereby enhancing the overall teaching framework. With the advancement of educational technology and the evolution of pedagogical philosophies, teacher-student interaction will become increasingly diverse and profound. These developments will bring new possibilities and dynamics to the field of college music education, enriching its practices and outcomes.

Disclosure statement

The author declares no conflict of interest.

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Research on the Innovation and Development of the Teaching Management Mode of Primary Education from the Human-oriented Perspective

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Abstract:

This paper explores the innovation and development of primary education teaching management models through a human-oriented perspective. It begins by analyzing the current state of teaching management in primary education, highlighting its shortcomings. Building on the people-oriented concept, the paper proposes practical approaches to innovate primary education management models, such as transforming management concepts, fostering a harmonious management environment, and innovating evaluation mechanisms. Furthermore, it offers strategies for improving primary education management, including enhancing managerial quality, strengthening teacher-student interactions, deepening family-school cooperation, and optimizing resource allocation. The study aims to provide both theoretical insights and practical guidance for advancing teaching management models in primary education.

Keywords:

Human-oriented
Primary school
Education and teaching management
Model innovation
Management strategy

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1. Introduction

In modern society, the ongoing deepening of educational reforms has introduced new challenges to the management of primary education^[1]. Traditional management models often overemphasize standardization and uniformity, making it difficult to accommodate students' diverse developmental needs and teachers' professional growth. The human-oriented approach emphasizes respect for individual subjectivity and focuses on fostering holistic

and personalized development^[2], providing crucial theoretical guidance for innovating primary education teaching management models.

This study seeks to explore the innovation and evolution of primary education teaching management from a human-oriented perspective. Its objective is to offer theoretical references and practical guidance for enhancing management models in primary education, contributing to the creation of a more harmonious and

effective educational ecosystem.

2. Theoretical basis and current situation analysis

2.1. Theoretical basis

The people-oriented concept emphasizes respect for individual differences, attention to holistic development, and fostering personal growth. In education and teaching management, this is reflected in a student-centered approach that addresses individual needs and provides a suitable learning environment and growth space. Simultaneously, the approach prioritizes the professional development and career advancement of teachers by offering them a supportive working and learning environment. The basic principles of education and teaching management ^[3], including scientific, democratic, systematic, and developmental approaches, require management activities to adhere to the principles of education and the physical and mental development of students. These principles promote democracy, consider the broader picture, aim to facilitate students' all-around development and encourage continuous reform and innovation.

2.2. Analysis of the current situation

China's primary education and teaching management has achieved significant progress in areas such as management system development, teacher training, teaching quality enhancement, information technology integration, moral education, and the establishment of home-school cooperation mechanisms ^[4]. However, several challenges persist, as outlined below:

- (1) Rigid management mode and lack of individual care: The traditional management approach places excessive emphasis on standardization and uniformity, neglecting individual differences among students. This approach struggles to meet the diverse developmental needs of students ^[5]. For example, teaching plans, curriculum structures, and evaluation methods often lack flexibility, making them unsuitable for accommodating various learning styles and ability levels.
- (2) Insufficient support for teacher development: The

absence of effective mechanisms for teachers' professional development and career growth inhibits their potential. For instance, limited opportunities for training, coupled with an unreasonable title evaluation system, reduce teachers' enthusiasm for work, hindering their ability to fully utilize their initiative.

- (3) Inadequate home-school cooperation: Communication between schools and parents remains underdeveloped, resulting in low parental participation and insufficient collaboration in educational efforts. For example, the lack of an effective communication mechanism means parents have a limited understanding of school education concepts and methods, making it difficult to support the schools' educational initiatives ^[6].
- (4) Lack of innovation in management modes: The current management approach relies heavily on administrative orders and institutional constraints, with minimal incentives or guidance for students. This limits the stimulation of students' learning motivation. For instance, the student evaluation system focuses excessively on examination results, overlooking students' comprehensive qualities and personality development, thereby hindering their all-round development.
- (5) Uneven resource allocation: Educational resources are unevenly distributed across regions and schools, leading to disparities in education quality. For instance, high-quality educational resources are primarily concentrated in urban and economically developed areas, while rural and remote areas suffer from resource shortages, undermining educational equity.

3. Innovations in the teaching management mode of primary education from a people-oriented perspective

3.1. Changing the management concept and strengthening humanistic consciousness

Administrators should redefine their roles, shifting from traditional directors to guides and service providers,

and focus more on fostering teachers' subjectivity and creativity. Additionally, they should strive to cultivate teachers' humanistic education concepts ^[7], ensuring that they fully respect students' individuality and needs in teaching practice, placing students' development at the core of education. This conceptual shift not only demands that managers adopt advanced educational philosophies but also requires them to practice these principles in their daily work, leading the development of education and teaching activities with a humanistic spirit.

3.2. Building a harmonious management environment and improving management efficiency

Efforts should be made to optimize the campus's physical environment, making it safer, more comfortable, and aesthetically pleasing to provide students with a conducive space for their physical and mental development. Concurrently, fostering positive relationships between teachers and students is essential. This includes encouraging teacher-student interactions and cultivating a teaching atmosphere characterized by equality, respect, and trust ^[8]. In such an environment, students' agency is maximized, and teachers' teaching enthusiasm is stimulated, thereby significantly enhancing the overall effectiveness of education and teaching.

3.3. Innovating the evaluation mechanism and focusing on students' growth

A diversified evaluation system should be established, one that considers not only students' academic achievements but also their comprehensive qualities and personality development. Introducing the concept of developmental evaluation involves viewing evaluation as a process to promote students' growth rather than merely judging outcomes. This approach allows the evaluation mechanism to more comprehensively and objectively reflect students' developmental trajectories ^[9], offering scientific feedback for educational and teaching management. It also guides teachers to pay greater attention to students' individual differences and developmental needs during the teaching process.

4. Teaching management strategies for primary education from a people-oriented perspective

4.1. Improving managerial quality to drive management reform

To advance education and teaching management, emphasis is placed on enhancing the professional competence of managers. Regular professional training programs are implemented to strengthen managers' expertise in educational theories and leadership. These programs include updating educational concepts, refining management skills, and employing simulated management scenarios and practical exercises to ensure managers gain hands-on experience and improve their performance in real-world settings ^[10]. Such initiatives not only enhance managers' decision-making capabilities but also boost their practical skills, providing a robust intellectual foundation for the innovation and reform of management practices.

4.2. Strengthening teacher-student interaction for mutual growth

Guided by the people-oriented educational philosophy, efforts are focused on fostering stronger interactions between teachers and students. Activities such as themed class meetings and interest-based groups are organized to deepen mutual understanding and enhance emotional connections ^[11]. Additionally, students are encouraged to actively engage in classroom discussions and project-based learning, thereby stimulating their interest and creativity. This interactive approach allows students to grow academically and personally while teachers improve through communication, fostering a harmonious environment conducive to mutual development in teaching and learning.

4.3. Deepening home-school cooperation to build an educational community

Home-school collaboration is a vital component of educational ecosystem construction. Various methods, such as the establishment of online platforms and hosting open days for parents, are employed to strengthen connections between schools and families ^[12]. Parents are invited to participate in developing and implementing school education plans, allowing them to better

understand the school's educational philosophy and teaching methods. This collaborative approach ensures that parents and educators collectively focus on the holistic development of students^[13]. Such a model of co-education fosters a favorable educational ecosystem that supports students' comprehensive growth.

4.4. Optimizing resource allocation to enhance management efficiency

Educational resource allocation is prioritized based on teaching needs, with careful planning to prevent resource wastage. By advancing digital infrastructure, schools utilize modern management systems to maximize the efficiency of resource use^[14]. This approach ensures the seamless operation of educational activities while laying a foundation for enhanced school management^[15]. Optimizing resource allocation aims to deliver improved educational services for both teachers and students, contributing to the continuous enhancement of the quality

of school education and teaching.

5. Conclusion

This study, from a people-oriented perspective, provides an in-depth analysis of the current state and limitations of the teaching management mode in primary education. It proposes pathways and strategies for innovative development, including changing management concepts, fostering a harmonious environment, innovating evaluation mechanisms, enhancing managerial quality, strengthening teacher-student interaction, deepening home-school cooperation, and optimizing resource allocation. These measures aim to establish a more harmonious and efficient educational ecosystem, support the holistic development of students, and drive the innovation and advancement of primary education teaching management.

Disclosure statement

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