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Enhancing the Comprehension Level of Key Stage 2 Learners Through Multimodal Reading Strategies in Calatagan Sub-office

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Abstract: This study examines the reading comprehension level of Key Stage 2 learners using multimodal reading strategies in Calatagan Sub-office. The study involved 77 reading teachers from 21 public elementary schools. A descriptive research method was used to examine the relationship between the extent of multimodal strategy use, learners' comprehension levels, and challenges faced by teachers. Data was analyzed using statistical tools such as mean, standard deviation, frequency, percentage, and correlation tests. Findings of the study suggest that all multimodal reading strategies were widely used. Visual Worksheets and Audio-Visual Input received the highest ratings. Other strategies, including Modeling and Guided Practice, Reflective Discussion, Play-based Learning, and Questioning Technique, also had strong ratings. Read Aloud was slightly lower but still effective. On the other hand, this study highlights that the reading comprehension levels of learners significantly improved after employing these strategies based on the result of the Philippine Informal Reading Inventory (Phil-IRI) SY 2023–2024. The pre-test revealed few independent readers, more at the instructional level, many at the frustration level, and some are nonreaders. After implementation, the post-test showed significant progress with an increased number of independent and instructional readers, while a decrease in frustrated readers, and very few remaining as nonreaders. The higher utilization of these strategies correlates with better comprehension outcomes for learners. Furthermore, this study identified the challenges met by teachers in the implementation of multimodal reading strategies. These include learner distractions, limited parental support, and difficulty in crafting effective assessments. Given the alarming reading comprehension levels, an action plan was proposed to enhance multimodal strategy use, improve comprehension, facilitate interactive instruction, engage parents, and evaluate progress. Collaboration among teachers, parents, and schools is essential for success.

Keywords: Comprehension level; Key stage 2 learners; Multimodal reading strategies

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1. Introduction

Multimodality is an everyday occurrence since the multimodal character of the twenty-first century is modern society, according to Reidenbach et. al. The perception of daily life is multimodal, encompassing sight, sound, and movement. Even the simplest talks involve the use of language, tone, and gesture ^[1].

Teachers need to implement teaching and learning strategies that encourage learners to acquire comprehension skills. Madani argued that, as many readers have a distorted understanding of comprehension as they settle on shallow levels of analysis, the use of effective reading comprehension strategies is essential in achieving readers' improved comprehension and learning from the material ^[2]. Guichon and Cohen claimed that all learning activities are multimodal. Today's reading researchers agree with Guichon and Cohen in their claim that comprehension is a complex process and that readers benefit from employing a variety of reading comprehension strategies to sharpen their thinking. The most effective multiple strategy to teach reading comprehension is multimodality. Multimodality is the use of a combination of multiple semiotic resources (e.g., image, language, music, and sound) in communicative events and practices ^[3].

The term multimodality refers to both a phenomenon in human communication and a broad and developing field of study cited by Adami. Multimodality was first used in a technical sense to describe how different sensory perceptions interact. The application of multimodal reading strategies to improve comprehension and engagement has been the subject of numerous research ^[4].

Recent studies have highlighted the importance of multimodal reading strategies in improving the comprehension level of learners as well as the challenges encountered by teachers in the implementation of these strategies. According to a study by Alatalo and Westlund, read-aloud was viewed as a tool for literacy and language development. Teachers thought of reading aloud as a flexible tool with a variety of uses. They stressed how important it is for language development, particularly for vocabulary growth and understanding. The idea behind reading aloud was to improve pedagogical content and contemporary interests. Read-aloud can improve social skills and atmosphere. They believed it would be better to prepare learners for future educational contexts ^[5]. Research by Bezemer and Kress highlighted that questioning technique fosters deeper interaction with multimodal texts, improving critical analysis and comprehension. To properly decode complicated, multi-layered information, they advise readers to think about how modes interact ^[6]. Hobbs stated that multimedia presentations, documentaries, and movies are examples of audio-visual inputs that can foster critical thinking by encouraging viewers to recognize biases, evaluate messages, and draw conclusions. Using narrative and storytelling, these multimedia resources not only hold the attention of the audience but also encourage critical reflection on the material. Students can improve their media literacy by using audio-visual resources to challenge and more thoroughly examine the information ^[7]. Lai cited that multimodal tools such as charts, graphs, and visuals are used in reflective discussion to improve critical thinking abilities. Students' ability to analyze and synthesize information from many sources is enhanced when they are tasked with evaluating visual material in addition to text. By connecting text and images, reflective conversations help readers get a deeper comprehension of the subject matter ^[8]. Smith and Jones investigated how well worksheets and other visual learning resources, including graphic organizers, can improve reading abilities. It shows how these tools can help with understanding, organization, and information retention by providing evidence and techniques for implementing them into teaching practices. The study provides useful advice on how to use graphic organizers and worksheets in educational contexts, spotlights different kinds of them, and talks about their advantages in reading training ^[9]. The significance of play-based learning in strengthening comprehension is emphasized by

Berk and Winsler. Play-based exercises involve enacting stories or visualizing ideas using building blocks aid in the internalization and reinforcement of the content in a practical, engaging manner ^[10]. To support students' engagement with multimodal texts, Kelley and Miller emphasized the value of modeling and guided practice. They recommended that educators employ interactive exercises, such as creating digital stories or analyzing multimedia, to assist students in developing critical reading skills like questioning and summarizing. These exercises give students the skills they need to evaluate and synthesize data from a variety of text formats on their own ^[11].

On the other hand, challenges hinder the success of utilization. The challenge of accommodating auditory, visual, and kinesthetic learners in a condensed amount of teaching time was highlighted by Fleming and Baume, who explore learning style theories. They advise incorporating multimodal teaching techniques to promote inclusion ^[12]. Bezemer and Kress stressed that challenges such as resource constraints, technological barriers, and the need for teacher training may hinder the widespread implementation of multimodal reading strategies. Multimodal learning is beneficial when incorporated into reading comprehension matrices because it caters to diverse learning preferences and improves accessibility for learners with varying needs ^[13].

Moreover, DepEd continues to create innovative ways to teach learners reading skills constantly, along with other macro skills, because reading is fundamental to all skills. The DepEd reinforced Every Child A Reader Program (ECARP) in light of the pressing need to address the reading and literacy challenges and encouraged all offices to respond to the Hamon: Bawat Bata Bumabasa (3Bs Initiative) to make every learner a reader at his or her grade under DepEd Memorandum No. 173, s. 2019, dated November 22, 2019. To address the gaps, there is a need to strengthen the reading proficiency of every learner and to nurture a culture of reading, which is a requisite skill in all content areas.

In conclusion, this research dealt with the utilization of multimodal reading strategies to enhance comprehension. The literature mentioned served as a guide in crafting the necessary information to address reading issues and to pinpoint the challenges encountered by teachers in the utilization process. Lastly, the intended output was an action plan in teaching reading with reading comprehension, which focused on how to teach reading in different modes to improve and develop learners' reading skills.

2. Research questions

This study was undertaken to assess the reading comprehension level of Key Stage 2 learners using multimodal reading strategies in the Calatagan Sub-office. Specifically, this study sought to answer the following questions:

1. What is the extent of utilization of multimodal reading strategies in teaching reading relative to:
 - 1.1. reading aloud;
 - 1.2. questioning technique;
 - 1.3. audio-visual input;
 - 1.4. reflective discussion;
 - 1.5. visual worksheet;
 - 1.6. play-based strategy and
 - 1.7. modeling and guided practice?
2. What is the reading comprehension level of key stage 2 learners based on the Philippine Informal Reading Inventory (Phil-IRI) result?

3. Is there any significant relationship between the extent of utilization of multimodal reading strategies and the reading comprehension level of learners?
4. What are the challenges encountered by teachers in the utilization of multimodal reading strategies?
5. What action plan may be proposed to improve the reading comprehension level of learners?

3. Significance of the study

This study would be of great significance to the following:

To school administrators. The findings would assist administrators in enhancing educational programs that prioritize the development of reading skills, which serve as the foundation for all macro skills. This study would support them in refining reading methodologies and improving curriculum design to foster literacy advancement.

To teachers. The study would provide valuable insights to teachers, enabling them to align their instructional strategies with learners' needs for more effective reading instruction. It would also contribute to the enhancement of their teaching methods, potentially leading to innovative pedagogical approaches in reading education.

To learners. This study would directly benefit learners by introducing innovations in reading programs that enhance reading proficiency and comprehension. Improved reading skills would, in turn, support their overall academic performance.

To future researchers. This study would serve as a valuable reference for future researchers seeking to explore and expand on multimodal reading strategies to further improve reading comprehension.

4. Scope and limitations

This study investigated the effectiveness of multimodal reading strategies in enhancing reading comprehension among Key Stage 2 learners in Calatagan Sub-office public elementary schools. The data was collected from Key Stage 2 reading teachers during the academic year 2023–2024. The research focused on how these teachers utilized multimodal strategies and their perceptions of the impact on comprehension, particularly during the transition from mother tongue to English as the medium of instruction.

This study was limited to the perspectives of Key Stage 2 reading teachers in Calatagan Sub-office public elementary schools. It did not directly assess changes in reading comprehension among learners. Additionally, the use of Google Forms restricted data collection to quantitative responses and may not have captured the nuances of teacher experiences with multimodal strategies.

5. Literature review

This literature review presents key related literature and studies relevant to the study that provides the researcher with sufficient ideas and insights that served as a frame of reference and, the insights that led to the conceptualization and formulation of the research.

5.1. Multimodal reading strategies

According to Fountas and Pinnell, reading aloud helps students learn to employ expressive intonation and pay

attention to punctuation. Using pauses, intonation, and inflection, learners can have a greater understanding of how punctuation affects tone and meaning in a narrative. In addition to improving their fluency, this method helps them become more expressive readers who can express their feelings and intentions in their own words ^[14].

Wiseman focused on how learners have the chance to express their ideas, consider how they have interpreted the text, and clarify their ideas. Because of this active engagement, reading aloud creates opportunities for learners to share their thinking, clarify misunderstandings, and build meaning together for enhancing literacy and collaborative learning ^[15].

Guthrie and Wigfield stated that reading aloud fosters motivation and comprehension, supporting the idea that reading aloud with multimodal elements are widely and effectively used. It also demonstrates the effectiveness of reading aloud strategies in fostering comprehension and vocabulary development ^[16].

Structured questioning strategies help students connect deeply with the evidence offered in various formats and foster analytical abilities by encouraging them to critically examine the context and content of multimodal materials examined by Miller and McVee ^[17].

According to Kuh and Kinzie, multimodal strategies play a crucial role in fostering deeper learning by giving students numerous ways to acquire and comprehend the material. Incorporating several learning modes, like interactive media, video, and real-world applications, enables students to approach knowledge in different ways ^[18].

According to Mercer et al., learners can co-construct meaning and critically engage with texts through structured reflective discussions that are frequently aided by digital resources. They draw attention to techniques like inquiry and group reflection that encourage students to go beyond comprehension by analyzing claims, combining concepts from various sources, and formulating logical interpretations ^[19].

McTigue and Abbott highlighted that adding visual elements to reading instruction can boost motivation. To make the text more interesting, visual aids assist students in organizing and recalling information, which increases their attentiveness and enjoyment of the reading process ^[20].

Van Oers and Wardekker investigated how play-based learning fosters creativity by motivating students to creatively modify what they already know. Students think critically about the subject matter and build on their prior knowledge to generate fresh concepts and answers when they engage in activities like dramatic play or building new objects ^[21].

McGee and Richgels contended that one of the most important ways to enable students to develop into critical and independent readers is through guided reading, in which the teacher demonstrates techniques for evaluating and understanding texts. They claimed that children develop the capacity to critically analyze and interact with texts on their own when they watch and practice these techniques in a supportive environment ^[22].

5.2. Reading comprehension

Reading comprehension is related to the convergence of the reader's and the author's brains, according to Byrnes and Wasik ^[23]. Three main components interact during the meeting of the mind process: the reader, the activity, and the text in a socio-cultural setting ^[24]. As stated by Saifullah, reading comprehension entails the difficult process of deriving meaning from the text being read ^[25]. Inquiring about text structure, connecting texts to prior knowledge, and encouraging learners to ask questions all help to increase their reading comprehension, as stated by Ukranetz ^[26].

The purpose of reading is to comprehend the writer by simulating their mental space. Reading

comprehension is easy for a proficient reader and develops organically as reading comprehension skills increase, as claimed by Castles et al. But even when the content is clear-cut and easy to understand, this comforting feeling can be misleading since it hides the difficulties involved in reading. Numerous linguistic and cognitive processes are at work, ranging from identifying specific words to concluding situations that aren't fully explained in the text ^[27].

According to Rawang Wan and Yawiloeng, language proficiency, metacognition, and complex cognitive processes are all necessary for reading comprehension ^[28]. Therefore, it is typical for readers to have comprehension issues while reading materials. Furthermore, vocabulary and syntactic knowledge are necessary for reading comprehension, thus, readers must be able to understand the precise nature of the text being conveyed by Salem ^[29].

5.3. Challenges in utilizing multimodal reading strategies

Jones explained that the semiotics and grammar of visual communication face serious issues considering the more recent emergence of digital communication, which is facilitated by a variety of Internet and social media platforms ^[30]. People are now required to deduce meanings from visual representations of reality. Gambrell and Morrow emphasize that the use of multimodal reading strategies might occasionally overload students, resulting in distractions and fragmented attention. Match students' attention spans by setting clear goals, removing unnecessary components from multimedia resources, and using leveled text to their grade to address and lessen this challenge ^[31].

Alexander and Jetton discussed how to improve the understanding of complicated texts that require connecting and activating existing information. They recommend techniques like pre-reading talks and K-W-L (Know, Want to Know, Learned) charts to connect new information with what is already known. This method encourages critical thinking and improves multimodal content assimilation ^[32].

To give students more resources and mentorship, Bryk and Schneider examined the value of cooperation and collaboration between schools and community organizations ^[33]. According to Black and Wiliam, formative assessments that are adapted for multimodal learning are crucial. To capture a wider range of student abilities and knowledge, they recommend employing a variety of assessment formats, including collaborative projects, reflective journals, and visual analysis activities ^[34].

Fisher et al. explored that leveled literacy teaching seeks to accommodate a range of requirements. Addressing the diverse variety of skills and interests present in a typical classroom can be difficult due to the inflexible structure of some methods, which can limit adaptability ^[35].

5.4. Reading comprehension plan

Multimodal techniques can be successfully integrated into reading comprehension plans, as research has shown. Wang and Gearhart used a plan-based strategy to scaffold comprehension abilities in struggling readers including interactive chats, audio recordings, and visual prompts ^[36]. Similarly, Li and Edwards used a multimodal reading program that included visual organizers, films, and group exercises to improve comprehension of learners ^[37].

According to the study of Smith and Johnson, multimodal techniques are found to be useful in enhancing reading comprehension. They investigated how the integration of several modalities, such as interactive activities, audio components, and visual aids, can affect learners' comprehension of written texts. Their study

was carried out within the framework of Matrix Education ^[38].

Furthermore, Thompson and Garcia examined the effects of multimodal reading styles on matrix comprehension. They investigate how textual information combined with visual aids like diagrams and pictures affects comprehension. Participants in the study read matrices both with and without visual aids, and then their comprehension was tested. The findings imply that multimodal reading improves comprehension, especially when reading complicated materials ^[39].

Chen and Wang investigated a multimodal strategy for matrix reading that combines textual and visual components to improve understanding. They contend that the advantages of using visual cues in reading are overlooked by conventional text-based approaches. In order to enhance comprehension, the authors suggest a framework that integrates verbal and visual components, such as graphs, diagrams, and drawings. To evaluate the efficacy of this strategy, they ran research on college learners and discovered that those who employed the multimodal technique showed superior comprehension versus those who only used text. The study emphasizes how crucial it is to consider a variety of representational modalities while teaching reading to enhance comprehension outcomes ^[40].

6. Research design

This study employed a descriptive method of research. Descriptive research aims to accurately and systematically describe a population, situation, or phenomenon. Descriptive research can provide answers to questions about what, where, when, and how, but it cannot answer questions about why ^[41].

This research design could use a wide variety of research methods to investigate one or more variables. It also aimed to explain the link between two or more variables without establishing a cause-and-effect relationship. To determine whether there was a relationship between at least two variables, data about them were gathered and evaluated ^[42].

The researcher collected information to clarify the factors of interest and determine their relationships. The primary objective was to provide a comprehensive explanation of the variables and their relationships without altering them or assuming that one thing caused another. No variables were altered, nor were relationships between causes and effects sought. Instead, the relevant variables were observed and quantified, and the patterns and correlations that emerged in the data were analyzed.

The researcher investigated the connections between elements such as the extent of utilization of multimodal reading strategies, learners' reading comprehension levels, the significant relationship between the extent of utilization and comprehension levels, and the challenges faced by teachers in utilizing multimodal reading strategies. The data was collected using research instruments.

7. Data collection

This study employed a descriptive research design, aiming to accurately and systematically describe the relationship between the extent of utilization of multimodal reading strategies and learners' reading comprehension levels, as well as to identify the challenges encountered by teachers. The respondents were 65 Key Stage 2 reading teachers selected from 21 public elementary schools under the Calatagan Sub-office. Non-probability purposive sampling was employed to select participants, with Slovin's formula (5% margin of error) used to determine the appropriate sample size from the total population of 77 teachers.

7.1. Research instrument

The primary data-gathering instrument was a researcher-made survey questionnaire composed of three parts:

Part I: Extent of utilization of multimodal reading strategies; Part II: Learners' reading performance based on Philippine Informal Reading Inventory (Phil-IRI) results, and Part III: Challenges encountered by teachers in utilizing multimodal reading strategies.

7.2. Instrument validation and reliability

The survey underwent content validation by three educational experts. A pilot test was conducted with seven reading teachers, and reliability testing was performed: Extent of utilization of multimodal reading strategies: Cronbach's Alpha ranging from .708 to .896, indicating acceptable to good internal consistency, and challenges encountered: Cronbach's Alpha of .820, indicating good internal consistency.

7.3. Administration of the instrument

Formal permission was obtained from the appropriate education authorities, including the Schools Division Superintendent and Public Schools District Supervisor. Upon approval, the questionnaire was distributed via Google Forms, and responses were retrieved after several weeks.

7.4. Scoring of responses

Responses were scored based on a four-point Likert scale:

- 3.50–4.00: Great Extent/Strongly Agree
- 2.50–3.49: Moderate Extent/Agree
- 1.50–2.49: Slight Extent/Disagree
- 1.00–1.49: Least Extent/Strongly Disagree

8. Data analysis

To answer the problem posed in the study, the following statistical treatments were used:

Weighted mean and standard deviation. The weighted mean was used to answer research question number one (1), which dealt with the extent of use of multimodal reading strategies; and for research question number four (4), which found out the challenges met by teachers in the utilization of multimodal reading strategies.

The formulas for weighted mean and standard deviation were:

$$\text{Mean: } \bar{x} = \frac{\sum x}{n} \quad \text{Standard deviation: } s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

Frequency and percentage. Frequency and percentage statistics should be used to represent the reading performance of key stage 2 learners based on the result of Phil-IRI SY 2023-2024.

In order to respond to research question number two (2), which measured the reading performance of learners based on Phil-IRI results, frequency and percentage were used. The formula used was:

$$\text{Percentage} = \frac{\text{frequency}}{\text{number of respondents}} \times 100\%$$

Pearson product-moment correlation coefficient (r). The data from research question number three (3) was treated to determine whether there was a significant relationship between the extent of utilization of multimodal reading strategies and the reading performance of learners using Pearson r .

The Pearson product-moment correlation coefficient (r) measures the strength of the linear relationship between the paired x and y values in a sample. The formula for the Pearson correlation coefficient was:

$$r = \frac{\sum XY - (N\bar{X}\bar{Y})}{\sqrt{(\sum X^2 - N\bar{X}^2)(\sum Y^2 - N\bar{Y}^2)}} \text{ or } r = \frac{\sum (x - \bar{X})(y - \bar{Y})}{\sqrt{[\sum (x - \bar{X})^2][\sum (y - \bar{Y})^2]}}$$

9. Discussion

9.1. Extent of utilization of multimodal reading strategies in teaching reading relative to

9.1.1. Reading Aloud

This strategy was described by the respondents as having a great extent. Emphasizing punctuation and phrasing and improving fluency and expression got the highest mean rating of 3.84. Encouraging discussion and interaction came in second rank with a mean rating of 3.79. Assessing and identifying the learner's areas for improvement received the third rank with a mean rating of 3.78. Lastly, the indicator pairing with visuals like pictures, diagrams, or acting out scenes to create a richer understanding received the lowest mean rating of 3.62. Overall, the extent of utilization of multimodal reading strategies in teaching reading relative to Reading Aloud gained an average weighted mean rating of 3.72 and was described with great extent. This showcases that this strategy is widely and effectively used in reading instruction.

9.1.2. Questioning Technique

The respondents agreed that this strategy was described as having a great extent. The indicator that received the highest rating of 3.84 was encouraging readers to reflect on their reading process, making them more strategic consumers of multimodal information. The indicator that received the second rank, with a mean rating of 3.81, was prompting readers to connect information across modalities. The indicators challenge assumptions or ask for evidence and push readers beyond passive consumption, tied for the third rank with a mean rating of 3.74. Lastly, the indicator that got the lowest mean rating of 3.66 was uncover deeper layers of meaning embedded within multimodal texts. In general, the extent of utilization of multimodal reading strategies in teaching reading relative to Questioning Techniques gained an average weighted mean rating of 3.73 and was described as having a great extent. This suggests that multimodal reading strategies are employed significantly in teaching reading, particularly in questioning techniques.

9.1.3. Audio Visual Input

This strategy was described by the respondents as having a great extent. Making learning more engaging through storytelling, narration, and visuals, and encouraging critical thinking and analysis as viewers process information by identifying biases and forming conclusions, received the highest mean rating of 3.83. Both exposing learners to proper pronunciation, intonation, and vocabulary usage and providing support for struggling readers, offering enrichment for advanced learners, and catering to different learning styles received the second rank with a mean rating of 3.82. Grasping concepts, improving pronunciation, and building vocabulary with visuals, narration, and subtitles in the target language, and clarifying concepts, bringing them to life, and fostering deeper understanding came next, with a mean rating of 3.79. Providing alternative pathways

to grasp information and improve comprehension received the lowest mean rating of 3.68. Overall, the extent of utilization of multimodal reading strategies in teaching reading relative to Audio-Visual Input gained an average weighted mean rating of 3.78 and was described as having a great extent. This suggests that teachers who continue to adopt and use a variety of teaching methods suit the needs of every learner and use audio-visual aids to foster a love of reading.

9.1.4. Reflective Discussion

According to the respondents, this strategy was described as having a great extent. Encouraging readers to go beyond simply comprehending the text and to actively analyze, synthesize, and evaluate information was the indicator with the highest mean rating of 3.84. Two indicators with a mean rating of 3.81 came next, helping readers to make connections between the text and develop critical thinking skills, such as problem-solving, decision-making, and communication. The indicators that received the third rank were promoting deeper text understanding through kinesthetic activities, like role-playing or simulations, had a mean rating of 3.78. Additionally, allowing struggling readers to clarify their understanding of the text with the help of their peers highlighted the lowest mean rating of 3.60. The total mean rating for the extent of utilization of multimodal reading strategies in relation to Reflective Discussions was 3.75, which indicates a great extent. This shows a sincere commitment to give learners a rich, engaging reading experience.

9.1.5. Visual Worksheet

This strategy was described by the respondents as having a great extent. With a mean of 3.86, enhancing critical thinking skills by prompting learners to analyze and identify key features received the highest rating. Two indicators got the second rank with a mean of 3.84 were: helping learners visualize the structure and organization of a text and increasing learners' motivation and focus, and making the reading process more enjoyable. This was followed by the third rank, improving vocabulary development and comprehension using matching exercises with images and text, with a mean of 3.83. The lowest mean rating was drawing or illustrating their understanding to promote active engagement with the text, with a mean of 3.69. Overall, the extent of utilization of multimodal reading strategies in teaching reading relative to the Visual Worksheet gained an average weighted mean rating of 3.79 and was described as having a great extent. This rating demonstrates the usefulness and popularity of using visual worksheets in teaching reading to improve reading comprehension, vocabulary building, and critical thinking.

9.1.6. Play-Based Strategy

According to the respondents, this strategy was described as having a great extent. Creating a fun and engaging environment and increasing motivation to read and explore different aspects of the topic attained the highest mean rating of 3.84. The second rank, at the mean rating of 3.83, was fostering active participation with texts and encouraging learners to explore information through movement, building, and role-playing. Promoting creative expression and critical thinking as learners interpret, adapt, and build upon existing knowledge ranked third in the highest rating, with a mean of 3.82. The lowest mean rating of 3.64 was reinforcing understanding of information presented in various forms. The ratings on the extent of utilization of multimodal reading strategies in teaching reading relative to Play-Based Strategy have an average weighted mean rating of 3.75 and are categorized as having a great extent. This suggests that play-based learning is an effective teaching strategy

that involves learners in hands-on activities and active discovery.

9.1.7. Modeling and Guided Practice

According to the respondents, this strategy was described as having a great extent. The indicator that received the highest rating was empowering learners to become confident and critical readers, with a mean rating of 3.84. Providing learners with opportunities to practice the strategies modeled by the teacher, establishing reading strategies, or create interactive activities that guide learners through multimodal texts and demonstrating effective reading behaviors that include visualizing, questioning, making connections, and summarizing were the three indicators that tied for the second rank, with a mean of 3.81. Helping learners deconstruct the meaning across different modalities and providing a clear framework for understanding complex concepts presented in various ways were the indicators that got the third rank with a mean rating of 3.77. Addressing specific challenges in multimodal text had the lowest mean rating of 3.68. Modeling and guided practice combined with multimodal reading strategies received an average weighted mean rating of 3.76, which is referred to as having a great extent, indicating that this strategy effectively supports reading teaching. Modeling and guided practice help learners practice new skills in a supervised environment by offering important guidance and feedback. With the teacher's help, learners can acquire and apply multimodal reading skills.

9.2. Reading comprehension level of Key Stage 2 learners based on the Philippine Informal Reading Inventory (Phil-IRI) result

Among the 2,406 Key Stage 2 learners who took the pre-test, only 335 (13.92%) were classified as independent, 751 (31.21%) as instructional, 1074 (44.64%) as frustrated, and 246 (10.23%) as non-readers. Significant progress was seen in the post-test results, such as the independent level increased to 721 (29.97%), the instructional level increased to 950 (39.48%), while the frustration level decreased to 683 (29.39%), and the non-readers decreased to 52 (2.16%). These findings show that the learners' reading comprehension has significantly improved by employing multimodal reading strategies in teaching reading.

9.3. Significant relationship between the extent of utilization of multimodal reading strategies and the reading comprehension level of learners

There is a significant relationship between the extent of utilization of multimodal reading strategies and the reading comprehension level of learners, $r=.477$, $n=77$, $p<.001$. There is a significant medium positive correlation between the paired variables, that is, the extent of utilization of multimodal reading strategies tends to have higher reading comprehension.

9.4. Challenges encountered by teachers in the utilization of multimodal reading strategies

Among the listed challenges, distractions and learners' attention span received the highest rating and were characterized as strongly agree, with a mean rating of 3.84. Three other challenges were rated as strongly agree and ranked as the second highest rating with a mean score of 3.71, including student prior knowledge, Limited parental support and craft effective assessments. The indicator leveled literacy instruction came next with a mean score of 3.70. Finally, time constraints had the lowest mean rating of 3.55. However, the verbal interpretation of strongly agree with an average weighted mean of 3.69 indicates that the majority of respondents concur that there were challenges in the utilization of multimodal reading strategies in teaching

reading. This implied that the challenges teachers encountered hinder learners' ability to acquire reading skills.

9.5. Proposed action plan to improve the reading comprehension level of learners

The problem regarding the reading skills of learners in terms of their comprehension level was still alarming. Almost half of the total learners were assessed at the frustration level and as non-readers. There were many learning gaps that needed to be addressed. The researcher prepared an action plan to assist teachers in teaching reading using multimodal reading strategies. The action plan aims to equip teachers with knowledge of multimodal strategies, enhance learners' comprehension, promote interactive teaching, involve parents, and monitor students' progress. The objectives align with specific, time-based activities. Successful implementation requires collaboration among teachers, parents, learners, and support from the school.

10. Conclusion

The following conclusions were drawn based on the highlights of the findings revealed in this study.

Respondents agreed that the utilization of visual worksheets was the most frequently used multimodal reading strategy in teaching reading. It was followed by Audio-Visual Input, Modeling and Guided Practice, then Reflective Discussion, Play-based Strategy, Questioning Technique and the least extent was Reading Aloud.

Learners' reading comprehension level had significantly improved based on the result of the Philippine Informal Reading Inventory (Phil-IRI).

There was a significant relationship between the extent of utilization of multimodal reading strategies and the reading comprehension level of learners. Higher utilization of these strategies correlates with better comprehension outcomes for learners.

Distractions and learners' attention span were the topmost challenges encountered by teachers in the utilization of multimodal reading strategies. On the other hand, time constraints obtained the lowest rating.

Implementation of the proposed action plan in teaching reading with comprehension was deemed necessary.

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Foucault's Engagement with Kant: A Critical Analysis of Enlightenment Philosophy

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Abstract: This paper delves into Michel Foucault's critical examination of Immanuel Kant's philosophy of enlightenment, primarily through Foucault's essay *What is Enlightenment?* It summarizes Kant's conception of enlightenment as the liberation from self-imposed immaturity through the courageous use of reason, and highlights Kant's distinction between public and private reason. Foucault critically assesses Kant's views, questioning the universality of enlightenment and the dichotomy between public and private reason. By integrating insights from Charles Baudelaire on modernity, Foucault reframes enlightenment as a critical spirit intrinsic to modernity, emphasizing perpetual questioning, innovation, and identity formation. The paper concludes that Foucault's critical ethos advocates for an ongoing, radical examination of enlightenment and rationality, safeguarding against complacency and fostering independent thought.

Keywords: Foucault; Kant; Enlightenment; Modernity; Critical ethos

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1. Introduction

In 1984, Foucault published an essay titled *What is Enlightenment?* in which he offers a distinctive critique of Immanuel Kant's perspectives on enlightenment. In this essay, Foucault deftly summarizes Kant's principal theses concerning enlightenment, poses critical inquiries regarding Kant's philosophy, and assimilates the essence of Kant's thought. Through this analytical process, Foucault reexamines the fundamental nature, significance, and practical application of enlightenment. While scrutinizing the interplay between enlightenment and modernity, Foucault also references the insights of Charles Baudelaire, who perceived modernity as a dynamic and ever-evolving force that embraces the novel, the fleeting, and the ephemeral. Baudelaire celebrated the urban landscape, the rapid pace of life within the city, and the uninterrupted transformations that characterize modern society. This paper endeavors to compare and contrast Foucault's perspectives on enlightenment and modernity with those of Kant and Baudelaire, thereby illuminating the stakes involved in comprehending

these concepts within contemporary society. Through this examination, the study aims to achieve a deeper understanding of the evolving nature of enlightenment and modernity, along with their respective influences on our worldview.

2. Philosophy of enlightenment

Foucault highlights two pivotal aspects of Kant's enlightenment thought. First, Kant broadly conceptualizes enlightenment as the liberation of individuals from self-imposed tutelage, advocating for the imperative that individuals "have the courage to use your own reason" ^[1]. From Foucault's perspective, the crux of Kant's advocacy for the exercise of reason resides in individuals' willingness to consistently apply their rational faculties, even in the absence of external guidance or encouragement. This endeavor ultimately facilitates their gradual emancipation from an immature condition. In this context, Foucault underscores that Kant emphasizes the internal spiritual prerequisite necessary for individuals to shed immaturity and cultivate a will for freedom, characterized by the will for self-determination ^[2].

Secondly, Kant distinguishes between the public and private use of one's reason. Kant contends that when individuals engage in specialized occupations or are tasked with specific duties (as members of society or as components of a mechanism), they must adhere to the directives of their superiors (private use of reason). However, fulfilling these tasks does not impede individuals from reflecting on their actions. In other words, individuals can execute tasks according to instructions while simultaneously articulating their doubts and opinions regarding them (public use of reason). For Kant, "the public use of one's reason must always be free", as it has the potential to "bring about enlightenment among men" ^[1]. From Foucault's vantage point, Kant's discourse on the public and private use of reason centers on the contexts provided by systems and power structures. Consequently, Foucault concludes that enlightenment is intricately linked to "will, authority, and use of reason" ^[2].

Foucault subsequently identifies three perplexing issues in Kant's essay. Firstly, Kant employs the grand term "Menschheit", portraying enlightenment as a historical process that ostensibly pertains to "the entire human race" ^[1]. However, Foucault questions whether enlightenment truly impacts all mankind or rather interrogates the notion of "what constitutes humanity" ^[1]. He stresses that enlightenment ought to be an act ultimately executed by and within an individual. Furthermore, Foucault notes that while Kant views enlightenment as a "way out", he introduces this concept ambiguously, viewing it both as a process and an obligation ^[1]. Lastly, Foucault expresses dissatisfaction with Kant's distinction between the public and private use of reason, marking a significant divergence between their viewpoints.

In Foucault's judgment, Kant proposes two modes of reason utilization, which may also be perceived as two forms of freedom exercise. One mode allows individuals to raise doubts and objections without ideological constraints; the other mandates that individuals actively impose boundaries on their exercise of reason (freedom). Nevertheless, Foucault argues that the free use of reason and the articulation of objections should not undermine obedience. He contends that "the public and free use of autonomous reason will be the best guarantee of obedience" and that "the political principle must obey itself be in conformity with universal reason" ^[1]. Adopting a relatively radical stance, Foucault believes that a truly free individual should not constrain or limit themselves based on moral considerations, but rather contemplate methods of resisting power and oppression. Once individuals impose limitations upon themselves, they are unable to fully exercise their freedom or sustain

the spirit of criticism. For Foucault, freedom inherently involves the transgression of boundaries, as this is the sole means through which individuals can transcend established norms.

Despite their differing opinions, Foucault uniquely identifies the peculiarity of Kant's stance on enlightenment: "regard the reflection on 'today' as difference in history and as motive for a particular philosophical task"^[1]. Kant does not endeavor to "understand the present on the basis of a totality or of a future achievement" but rather seeks to discern "what difference does today introduce with respect to yesterday"^[1]. At this level, Kant prompts individuals to contemplate the significance and uniqueness of the "present": who we are, what we are doing, and how we find ourselves in our current situation. Foucault further extends these inquiries to examine various "relationships" within contemporary reality. He scrutinizes the dynamics between the present and the past, between the individual and their times, and between the individual and their inner self. Foucault posits that to thoroughly observe "modernity", one must possess the courage and capacity to form judgments grounded in one's reason, disregarding the prejudices of others and the pressures of popular opinion. Furthermore, it requires the fortitude to confront reality and strive for independent transformation of existing circumstances. In this context, Foucault manifests his critical spirit, effectively reorienting the discourse on "enlightenment" into an exploration of the essence of the "critical spirit", highlighting the intrinsic connection between "enlightenment" and "modernity"^[3].

The importance of the critical spirit within "contemporary reality" is intricately associated with the characteristics of modernity. Foucault illustrates this connection by referencing Baudelaire's perspective on modernity. Firstly, modernity is characterized as "fleeting and contingent", situating individuals in a state of perpetual change, compelling them to break from traditional constraints while simultaneously inspiring creativity and innovation^[1]. Secondly, modernity urges individuals to capture "heroic moments" in real life, fostering the will to "heroize" the present. Lastly, individuals in modern contexts are prompted to scrutinize the relationship between themselves and reality, as well as the relationship with their inner world, to constantly investigate their own strengths and shape their identities.

Foucault resonates with Baudelaire's views on modernity while elaborating on them further. Through the concept of the "flâneur", Baudelaire reveals a fascination with instantaneity, advocating for a playful mentality that embraces and appreciates the pleasures arising from spontaneous events. Moreover, Baudelaire posits that individuals should engage in creative endeavors while confronting a "sleeping world" in solitude. Foucault places significant emphasis on this latter notion, asserting that a modern individual should aspire to an objective loftier than that of a mere flâneur—an aspiration that transcends the ephemeral pleasures of circumstantial events.

Indeed, Foucault underscores that "heroic temperament" and "modern courage" encompass two distinct stages. Initially, individuals should immerse themselves in the "present" moment, endeavoring to extract the eternal and poetic elements from transient experiences. Subsequently, utilizing these elements, they should re-engage with reality to reconstruct and reshape it. For Foucault, mere passive participation in a flowing reality, characterized by transient enjoyment, is insufficient. What is paramount is that individuals capture the potentially eternal beauty and inspiration from these fleeting moments, or grasp the characteristics of such a dynamic reality, and then re-immense themselves in this reality to engage in ongoing creation. This process of creation not only preserves the vitality of these instantaneous experiences but also empowers individuals to shape their identities, albeit in a manner that, according to Baudelaire, can embody both creativity and self-torture.

Ultimately, for Foucault, modernity signifies a critical approach through which individuals observe, construct, and reconstruct themselves. The imperative for such individuals is not merely to explore what exists or what may remain unknown but to persistently observe, refine, question, innovate, construct, and rebuild.

Foucault derives a distinctive critical ethos from his interpretation of Kant's enlightenment thought and his evaluation of the characteristics of modernity. The uniqueness of his critical disposition lies in his focus on concepts of "ceaselessness" and "permanence." In this framework, Foucault not only inherits Kant's critical tradition but also transcends it. By emphasizing the relentless nature of criticism, Foucault elevates his critical ethos to a positive and radical dimension. While Kant's critical spirit primarily seeks to delineate specific boundaries and promote rational thought within those confines, Foucault's critical perspective endeavors to illuminate the processes by which such boundaries are constructed and to explore possibilities for transcending them ^[4]. For Foucault, the aim of enlightenment is not to confine humanity within a static and rigid framework, but to inspire individuals to consistently examine, question, critique, and, crucially, create. enlightenment is not conceived as a singular event; rather, the process and outcomes of enlightenment should remain open-ended. Ongoing criticism necessitates an examination of enlightenment and rationality themselves, preventing individuals from erroneously accepting the "fixed outcomes" of enlightenment and the dominance of rationality, while also safeguarding against the complacency and conservatism that can accompany enlightenment. On the other hand, such perpetual criticism may compel humanity to actively engage with modernity, critically scrutinizing the relationship between the contemporary moment and their own identities, ultimately fostering a diligent approach to identity formation. The critical ethos espoused by Foucault serves both as a safeguard for individual liberty and as a vigilant response to various forms of human control. Such control may arise from power, technology, or even from enlightenment and modernity themselves. In this regard, Foucault's insights into enlightenment maintain their relevance in contemporary discourse, prompting individuals within this era to reflect upon whether the space for critical and independent thought is expanding or contracting.

3. Epilogue

In the first half of the twentieth century, intellectuals such as Walter Benjamin and Theodor Adorno began to examine the impact of mass culture on humanity and the arts. Despite their apparent differences in attitude, they articulated similar concerns: as mass culture assumes a preeminent role in the emergence of modernity, do individuals, overwhelmed by mass culture, possess more or fewer choices regarding aesthetic preferences and spiritual attachments? Although mass culture presents individuals with an array of exotic "material products" and diverse messages, they frequently encounter second-hand or third-hand "life experiences" orchestrated by others. In this epoch, modernity appears not only as "fleeting" but also as "fragmented". When contemporary individuals immerse themselves in these "fragments" with a paralyzed mindset and diminished cognitive capacities, they inevitably forfeit their ability for independent thought, judgment, and critique, thereby losing the vitality to observe and shape both reality and their own identities ^[5]. Baudelaire's notion of "heroism" may resonate with greater significance in this context, as humans appear to require heightened courage and wisdom to navigate various appearances, maintain a critical distance from contemporary society, and constantly engage in the processes of self-critique, recreation, and intellectual enlightenment.

Disclosure statement

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Reform and Exploration of Nursing Education in the Context of Lifelong Health Services

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Abstract: With the intensifying aging of the population, the increasing burden of chronic diseases, and the diversification of health needs, lifelong health services have become the core objective of modern healthcare systems. As a critical component of health service talent cultivation, nursing education faces new challenges and opportunities. Based on the core of lifelong health services and their new requirements for nursing education, this article explores the current difficulties and issues in nursing education. Accordingly, it proposes reform strategies and exploration directions for nursing education in the context of lifelong health services, such as constructing an integrated curriculum system that breaks the segmentation of the life cycle, innovating the “scenario-practice” teaching model to strengthen capability development, and building a “dual-qualified and interdisciplinary” teaching team to enhance teaching transformation capabilities. The aim is to cultivate “warm, capable, and responsible” nursing talents for the Healthy China strategy in the new era.

Keywords: Lifelong health services; Nursing education; Reform and exploration

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1. Introduction

With the global transformation of population structure and significant changes in the disease spectrum, the prevalence and burden of chronic non-communicable diseases are becoming increasingly severe^[1]. The medical model centered on “disease treatment” is gradually shifting towards “lifelong health services.” Lifelong health services emphasize providing continuous, comprehensive, and personalized health services to individuals from the beginning to the end of life. The “Healthy China 2030” Planning Outline clearly requires “focusing on the entire population and the entire life cycle, comprehensively and continuously maintaining and protecting people’s health, and strengthening health services for key populations”^[2]. In this context, as an important component of the health service system, nursing has continuously expanded its service scope, covering not

only disease treatment and nursing but also preventive healthcare, rehabilitation nursing, health promotion, and other fields. Its education model needs to shift from traditional “disease nursing” to “full-cycle health services”, cultivating nursing talents with cross-stage and cross-scenario service capabilities. However, current nursing education still faces issues such as disconnection from practical needs in terms of curriculum systems, teaching models, and teaching teams, urgently requiring systematic reform to meet the challenges of the times and satisfy society’s demand for nursing talents in lifelong health services.

2. The core of lifelong health services and their new requirements for nursing education

2.1. The core of lifelong health services

Lifelong health services are oriented towards individual health needs, integrating services such as prevention, treatment, rehabilitation, care, elderly care, chronic disease management, and palliative care to form a continuous support system covering various stages of life from birth to death^[3-4]. The “Healthy China 2030” Planning Outline proposes “covering the entire life cycle, identifying priority areas based on major health issues and influencing factors at different life stages, strengthening interventions, and achieving continuous health services and health security from fetus to end of life.” Lifelong health services emphasize a systematic, continuous, equitable, and accessible approach from the perspectives of the entire population and the entire life cycle, with the goal of improving the health level of the entire population^[5]. At the practical level, lifelong health services cover three core areas: early life health promotion (such as perinatal healthcare and child development monitoring), adulthood health maintenance (such as occupational health management and chronic disease prevention), and elderly health care (such as disability prevention and palliative care). This service model places new demands on the capabilities of nursing staff, who not only need to master traditional clinical skills but also require health assessment, risk intervention, interdisciplinary collaboration, and community resource integration abilities.

2.2. New requirements of lifelong health services for nursing education

2.2.1. Diversification of knowledge structure

Nursing staff need to master knowledge covering multiple disciplines such as physiology, psychology, sociology, preventive medicine, and rehabilitation medicine to meet the needs of individuals of different ages and health statuses^[6]. For example, when providing nursing services to the elderly, apart from basic medical nursing knowledge, it is also necessary to understand aspects such as geriatric psychology and geriatric sociology to better comprehend the psychological and social needs of the elderly and provide comprehensive nursing support.

2.2.2. Improvement of capability requirements

Firstly, health management capabilities. Lifelong health services involve collaboration among multiple professional fields. Nursing staff need to closely cooperate with doctors, rehabilitation therapists, nutritionists, etc., to develop scientific and reasonable health management plans for individuals and oversee their implementation. Secondly, job competency. In the entire life cycle, facing precise, population-wide, full-cycle, and personalized health service needs, nursing staff must possess job competency covering the entire life cycle of nursing to achieve high-quality and excellent nursing talent development^[7].

2.2.3. Strengthening of professional quality

Lifelong health services require nursing staff to have a high level of responsibility, professionalism, and humanistic care ^[8]. Through simulated scenarios and practical teaching, students are guided to experience the feelings of patients at different health stages, cultivating their empathy and humanistic spirit, enabling them to provide personalized nursing services to patients.

3. Current dilemmas and issues in nursing education

3.1. Curriculum system: Fragmented design and misalignment of needs

3.1.1. Distinct subject boundaries

On one hand, in traditional nursing education courses, basic medical courses such as anatomy and physiology are separate from professional nursing courses. Basic medical courses are taught according to the system and logic of medical disciplines, emphasizing the integrity and systematicness of subject knowledge, while professional nursing courses focus on nursing skills and clinical applications. This makes it difficult for students to integrate basic medical knowledge with nursing practice during their learning process. On the other hand, traditional nursing education has incomplete course content, with a small proportion of nutrition and psychology knowledge ^[9]. The content is often limited to basic nutrition knowledge and general psychology theories, and involves less content on nutritional needs for specific diseases and psychological nursing knowledge closely related to clinical nursing. This makes it difficult for students to analyze health issues from a social determinant perspective, limiting the development of comprehensive intervention skills.

3.1.2. Fragmented lifecycle knowledge

Firstly, in nursing education courses, there is no systematic framework for nursing knowledge about different stages of the lifecycle, and the integration of course construction and “lifecycle” theory is inadequate ^[10]. For example, traditional courses are segmented into “pediatric nursing”, “adult nursing”, and “geriatric nursing”, ignoring the cross-stage correlation of health issues. There is a lack of organic connection and progression between nursing knowledge at different stages, making it difficult for students to grasp the changing patterns of physiological, psychological characteristics, and nursing needs at different life stages from a holistic perspective. Secondly, the course content mainly focuses on disease nursing, with less emphasis on preventive healthcare, rehabilitation nursing, and health promotion courses. This cannot meet the demand for nurses’ knowledge structure in full-lifecycle health services. Students cannot make a smooth transition and connection during the learning process, leading to an insufficient understanding of the continuity of each stage in the lifecycle.

3.2. Teaching model: Disconnect between theory and practice, insufficient innovation drive

3.2.1. Limited practical teaching scenarios

On one hand, nursing practical teaching is mostly concentrated in traditional medical settings such as hospital wards and operating rooms, with students having limited exposure to other nursing scenarios like community health service centers, rehabilitation institutions, and elderly care facilities. However, with the diversification of people’s health needs, the demand for nursing talent in areas such as community nursing, rehabilitation nursing, and geriatric nursing is increasing. Conducting practical teaching only in hospitals does not allow students to fully understand the characteristics and needs of nursing work in different settings. On the other hand, the

construction of simulation laboratories in some schools is relatively lagging, with simple equipment and scene settings. These laboratories can only simulate basic nursing operations and cannot realistically reproduce complex clinical scenes and emergency situations, resulting in a gap between students' practical operations and actual clinical work ^[11].

3.2.2. Insufficient depth of situational teaching

Although simulation teaching technologies (such as VR nursing systems) are gradually becoming popular, they are mostly limited to single scenarios, such as emergency rescue. Nursing teachers generally lack the ability to design and evaluate scenario simulations ^[12]. The situational settings of practical cases are relatively homogenous, with students mainly exposed to common diseases. They have limited exposure to rare diseases, complex diseases, and multidisciplinary crossover cases, lacking consideration for individual differences, special needs, and unexpected situations of patients. In addition, students mainly play the role of nursing staff in practical teaching and have limited opportunities to experience the roles of other medical team members, such as doctors, nutritionists, and rehabilitation therapists, which is not conducive to cultivating students' critical thinking and innovation abilities.

3.3. Teaching faculty: Dual shortcomings in practical experience and interdisciplinary abilities

3.3.1. Lack of full lifecycle practical experience

Among the nursing education faculty, teachers with rich clinical experience and a practical background in full lifecycle health services are relatively scarce. Most teachers lack practical understanding of the connection between health issues across the “early life — adulthood — old age” spectrum, such as the impact of nutritional management during pregnancy on metabolic diseases in adulthood or the long-term effects of childhood trauma on mental health in old age. They are unable to guide students to establish a mindset of “cross-generational and cross-stage intervention for health issues” in their teaching. In addition, some teachers lack diversified practical training, with clinical experience concentrated in hospital settings ^[13]. They lack practical experience in nursing homes and community home care centers, are not familiar with long-term care for the elderly, such as daily life care, behavior management for patients with cognitive impairment, and communication skills for end-of-life care. As a result, their teaching tends to focus on disease nursing techniques while ignoring core care concepts such as “maintaining quality of life” and “dignified care.”

3.3.2. Insufficient interdisciplinary knowledge reserve

Some teachers lack cross-practice with disciplines such as psychology, nutrition, sociology, and law ^[14]. It is difficult for them to combine the “life cycle health service theory” with multidisciplinary knowledge, and there is insufficient interdisciplinary integration. They cannot design comprehensive cases based on life cycle characteristics (such as play therapy for children and frailty assessment for the elderly), making it difficult for students to master assessment tools and skills for specific populations. In addition, teachers' insufficient practical participation in the core areas of the full life cycle, such as “health promotion, disease prevention, and rehabilitation care”, has led to a teaching emphasis on “disease treatment nursing” while ignoring the concept transmission of “health maintenance throughout the life cycle.”

4. Reform path of nursing education in the context of full lifecycle health services

4.1. Building an integrated curriculum system to break the segmentation of the lifecycle

4.1.1. Integrating course content

Firstly, break down disciplinary boundaries and build a curriculum system centered on full lifecycle health services. For example, integrate basic medical courses such as physiology, pathology, and pharmacology with nursing courses for different lifecycle stages, enabling students to systematically master health knowledge and nursing skills at different stages. Secondly, increase core courses in full lifecycle health services and interdisciplinary fields, offering courses such as geriatric nursing, mother and child nursing, community nursing, rehabilitation nursing, health management, introduction to full lifecycle health services, and intelligent health technology applications. This will integrate multidisciplinary theories and methods to enrich students' knowledge structures. Simultaneously, emphasize the practicality and cutting-edge nature of course content, incorporating the latest research findings and practical cases.

4.1.2. Reconstructing course modules based on lifecycle stages

Firstly, establish three core modules: “Early Life — Adulthood — Old Age”, with each module covering physiological, psychological, and social adaptation aspects. For instance, the “Early Life Module” integrates perinatal care, child development assessment, parent-child communication skills, and incorporates developmental psychology and nutrition knowledge, enabling students to understand the long-term impact of prenatal nutrition on children's future health. Secondly, strengthen the connection between prevention, treatment, and rehabilitation. For example, introduce “health risk assessment” (such as cardiovascular risk scoring and frailty screening for the elderly) in basic nursing courses, and integrate “continuous care plan development” (such as home visits for postoperative patients and self-management education for chronic disease patients) into specialized nursing courses.

4.2. Innovating the “Scenario-Practice” teaching model to strengthen capability development

4.2.1. Innovating a multi-scenario practice system

Firstly, strengthen cooperation between schools and hospitals to carry out joint teaching projects. In addition to general hospitals, establish partnerships with specialized hospitals, rehabilitation hospitals, and geriatric nursing homes to expose students to different types of patients and nursing needs, such as pediatric nursing in specialized children's hospitals and rehabilitation nursing in rehabilitation hospitals. Design practical teaching projects with hospitals, such as the “Clinical Nursing Case Competition” and “Nursing Innovation Practice Projects”, which are oriented towards actual clinical problems, enabling students to enhance their practical abilities and innovative thinking through collaboration. Secondly, establish practice bases in community health service centers, arranging students to participate in community health surveys, chronic disease management, home nursing guidance, and other work to understand the characteristics and needs of community nursing. Thirdly, improve the construction of practical teaching bases, update facilities and equipment, and create a practical teaching environment that meets the needs of full lifecycle health services, providing students with authentic practical scenarios.

4.2.2. Conducting full lifecycle scenario simulation teaching

Firstly, develop a “Virtual Simulation Platform for Full Lifecycle Health Services” with three major scenario

modules, including family scenes (such as simulating home care for premature infants), community scenes (such as simulating management of chronic diseases in the elderly), and cross-stage scenes (such as tracking the health status of specific individuals from pregnancy to postpartum and developing continuous intervention plans). This platform assesses students' knowledge mastery, skill integration, and humanistic care, cultivating their systematic thinking. Secondly, introduce advanced simulation technology, virtual reality (VR), and augmented reality (AR) to simulate various complex conditions and operational scenarios beyond conventional disease nursing scenarios, such as virtual surgical nursing processes and intensive care unit scenes, allowing students to familiarize themselves with nursing work in different settings ahead of time.

4.3. Building a “Dual-Qualified + Interdisciplinary” teaching team to enhance teaching transformation capabilities

4.3.1. Cultivating practice-oriented teaching forces

Firstly, establish and implement a system for teachers to regularly participate in clinical practice, requiring them to rotate through different departments, including pediatrics, obstetrics and gynecology, geriatrics, etc., for a certain period every year to gain practical experience in full lifecycle nursing. Secondly, encourage teachers to participate in frontline positions such as community health service centers, elderly care institutions, and home nursing teams, focusing on full lifecycle health service projects (such as chronic disease management for the elderly and pregnancy health guidance), to understand the characteristics and needs of full lifecycle nursing in different settings and integrate them into the curriculum as teaching materials. Thirdly, establish long-term and stable cooperation with various medical institutions, hiring senior nurses with full-cycle nursing experience from the industry as part-time teachers to undertake tasks such as scenario simulation and practical teaching, sharing challenges and coping strategies from real work experiences.

4.3.2. Building an interdisciplinary teaching and research team

Firstly, an interdisciplinary team consisting of teachers from nursing, public health, psychology, and other fields will be formed to jointly develop new courses such as “Lifecycle Health Service Data Management” and “Intelligent Monitoring of Elderly Home Safety.” Interdisciplinary content will be integrated into the nursing professional curriculum system to optimize course design. Secondly, interdisciplinary workshops will be held regularly, inviting experts from different disciplines to give academic lectures and hold exchanges. Nursing teachers will be encouraged to collaborate with teachers from other disciplines on research projects to jointly solve complex problems in nursing. Thirdly, teachers will be supported in pursuing interdisciplinary master's or doctoral degrees or participating in short-term refresher courses. This will allow them to deeply study interdisciplinary theories and research methods, broaden their knowledge horizons, and enhance their interdisciplinary knowledge level.

5. Conclusion

The reform of nursing education in the context of lifecycle health services is essentially a practical response to the concept of “health-oriented, life first.” Through reforms and explorations in the nursing education curriculum system, teaching models, and teaching staff, educators can cultivate nursing talents with diversified knowledge structures, strong practical abilities, and good professional literacy. This will promote the development of the nursing industry. In the reform process of nursing education, it is necessary to have collaborative promotion among governments, schools, medical institutions, and communities. Educators aim

to build an education system that is “life-oriented and health-focused”, achieving a historic leap from “disease nursing” to “health guardianship.”

Disclosure statement

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A Study on the Training Mode of Compound Talents in Business English in Colleges under the “Belt and Road” Initiative

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Abstract: With the in-depth implementation of the “Belt and Road” initiative, the demand for compound talents in business English is increasing. However, the existing business English talent training model has not been able to fully meet this demand, and there are problems such as insufficient integration of interdisciplinary knowledge and weak innovation and entrepreneurship capabilities. To this end, this paper introduces the “integration” compound talent training model, which solves the problems of a single goal of business English talent training, lagging behind in training content and methods by optimizing the curriculum system, strengthening practical teaching, and deepening the integration of industry, academia, and research. This study focuses on how to improve students’ comprehensive abilities, especially in cross-cultural communication, international business practice, and minority language skills, through interdisciplinary integration and the introduction of an international vocational skills certification system. Ultimately, by updating talent training goals and innovating teaching methods, students’ professional abilities and employment competitiveness in the field of business English are improved, providing a practical solution to the talent needs under the “Belt and Road” initiative.

Keywords: “One Belt, One Road” initiative; Compound talents; Interdisciplinary integration; Combination of industry

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1. Introduction

In the last few years, the swift advancement of new technology such as artificial intelligence and the Internet of Things has also provided new opportunities and challenges for business English education. The innovation of educational technology not only provides new means for teaching methods but also provides technical support for students’ ability assessment and personalized training. Therefore, how to cultivate compound talents who have both language skills and are competent for international business work through educational innovation

under the “Belt and Road” initiative has become an important topic in the current higher education reform.

This study aims to explore the model of cultivating compound talents in business English in colleges and universities under the background of the “Belt and Road Initiative”, and analyze how to improve the overall caliber and practical aptitude of pupils by deepening the integration of industry, academia and research, optimizing talent training goals, and innovating teaching methods. Through theoretical analysis and the support of experimental data, this study hopes to provide practical references and references for colleges and universities in the field of business English education, so as to promote the systematic and scientific development of cultivating compound talents in business English.

2. Related work

With the continuous advancement of global education reform, especially in the fields of vocational education and English teaching, more and more research has begun to focus on how to improve students’ abilities and comprehensive qualities through innovative education models. Tian et al. explored the relationship between the outcome-based education (OBE) principle and the entrepreneurial intention of English major students, and analyzed the role of psychological factors in shaping students’ entrepreneurial psychology at different academic stages. Through a questionnaire survey, the study revealed factors such as gender differences and family influence, and proposed a business English talent training model based on the OBE framework ^[1]. An proposed evaluation application strategies by constructing an evaluation index system including “teaching philosophy, teaching content, teaching mode, teaching effect and teaching characteristics”, such as reconstructing the teaching objectives of English writing, following the evaluation principles of OBE concept, and stimulating students’ enthusiasm and participation in writing ^[2]. Luo analyzed the three major problems in the training of cross-border e-commerce talents in Zhejiang Province: the lag between industry development and technical talent training, the mismatch between enterprise talent requirements and the university training system, and the uneven distribution of industry demand and talent. Corresponding solutions were put up in response to these issues with the goal of offering fresh concepts for Zhejiang Province’s international online business talent training ^[3]. A talent training paradigm that incorporates multi-professional and multidisciplinary components was investigated by Jia et al. By revamping the curriculum system, enhancing hands-on instruction, and developing innovative training techniques and organizational structures, they supported the reform and pilot of the financial technology talent training model ^[4]. Yi proposed that the reform of business English practical teaching should be promoted through school-enterprise cooperation, solving problems in teaching, formulating teaching standards, and putting forward relevant suggestions to improve the quality of business English practical teaching ^[5]. Anqi et al. found that Chinese college athletes should learn sports English to improve their English proficiency and meet their learning needs. They suggested incorporating English for Specific Purposes (ESP) elements into college English courses to help SAs better cope with current and future English learning needs, especially ESP needs in sports English ^[6]. Although the target student group possessed high talents and a vivid imagination, Ma discovered that they lacked innovation awareness. In order to raise the target group’s degree of originality, he suggested a number of talent training pathways ^[7]. Devasena explored how to teach English through AI-based educational software and emphasized the importance of the experimental process in teaching. The application of AI technology can help teachers improve teaching effectiveness and promote innovation in educational models by combining practical experience with computer-generated experience ^[8]. Puspendari

explored the shift from teacher-led to student-led learning in education and studied teachers' preparation for using technology to teach in an online education environment during the pandemic. He found that teachers consider goal setting, student analysis, teaching activity planning, and technology tool selection when designing technology-integrated courses^[9]. Coronel described how teachers can use technology tools to improve English learners' comprehension and engagement, and innovate teaching methods by translating texts, digitizing paper teaching materials, and projecting tablet content onto large screens^[10]. Adewale proposed eight key steps to introduce bilingual approaches into Technical and Vocational Education and Training (TVET) courses, and encouraged researchers to conduct empirical research on bilingual education in African TVET institutions. The introduction of bilingual policies will help increase enrollment rates, simplify admission procedures, and promote economic development in Africa, helping numerous talented locals who are multilingual^[11]. Although existing research has made some progress in educational models and talent training, it still faces bottlenecks in how to effectively integrate interdisciplinary disciplines, meet personalized needs, and promote innovative educational models in practical applications.

3. Method

3.1. Update and optimize talent training goals

3.1.1. In-depth understanding of market demand

Before carrying out university and higher education instruction in business English should have a deep understanding of the specific needs of the "Belt and Road" initiative for business English talents^[6]. By communicating with the human resources manager of the enterprise or searching for relevant information on the Internet platform, the demand direction of the "Belt and Road" initiative for talents can be grasped^[7]. For example, talents are required to have cross-cultural communication skills, international vision, and solid international business knowledge.

3.1.2. Clarify talent training goals

Efficient business English talent training goals should be set according to the needs of the "Belt and Road" initiative. The overall goal is to cultivate more compound talents that meet the needs of the "Belt and Road", including: solid international business knowledge, strong cross-cultural communication skills, and high humanistic qualities. In addition, targeted training goals should provide clear guidance for teaching [8–9].

3.1.3. Regularly update training objectives

The demands for trade as well as economic collaboration among the nations along the Belt and Road initiative are evolving as it progresses. In order to meet evolving demands, colleges and universities should promptly modify their training goals. For example, after some countries join the initiative, business English talents should have other minority language skills, or need to cultivate international thinking, and have the ability to comprehensively analyze problems and propose innovative solutions.

3.2. Optimizing the business English student evaluation system

3.2.1. Introduction of the intelligent academic evaluation system

As artificial intelligence technology advances, colleges and universities should adopt advanced intelligent systems for academic performance evaluation, which can formulate evaluation criteria based on students'

personalized needs. Using natural language processing, image and video analysis, and speech recognition technology, intelligent systems can not only grade homework and provide feedback but also recommend relevant learning materials and generate detailed learning reports, thereby helping teachers understand students' learning status more comprehensively ^[10].

3.2.2. Extension of evaluation content

The traditional business English evaluation system should be expanded to evaluate not only the talents of kids in languages other than English but also their interdisciplinary abilities. This includes but is not limited to abilities in the fields of international trade, economics and finance, and artificial intelligence. It should assess the comprehension of learners in reading oral communication, comprehension of music, financial investment, and global trade operation skills in various business contexts ^[11].

3.3. The Connotation, positioning, and training specifications of “integrated” compound talents

3.3.1. Professional content and curriculum system construction

The “integrated” compound talent training model relies on the “1+X” certificate system of the Ministry of Education to break the barriers between business English courses and international professional skills certificates, build an interdisciplinary curriculum system, and solve the problems of course duplication and insufficient cross-disciplinary studies. Specific measures include the following.

Construction of an interdisciplinary curriculum system: By combining language skills with international business knowledge, the curriculum system covers multiple fields such as business English, cross-cultural communication, and international trade. Students not only improve their language skills, but also acquire the professional knowledge required for international business and have comprehensive international business literacy.

Course content integration and knowledge reconstruction: Integrate international professional skills certification courses into the subject design, and by integrating interdisciplinary content, avoid course duplication and improve the practicality and comprehensiveness of the course. Students not only learn English but also obtain globally recognized certification and improve their workplace competitiveness.

Optimize course structure and innovate teaching methods: Use project-oriented, case analysis, simulated training, and other teaching methods to allow students to apply what they have learned in real business situations. At the same time, use modern information technology to enhance teaching effectiveness and cultivate students' cross-cultural communication skills and global vision.

Cultivation of interdisciplinary professional skills: Strengthen the integration with economics, management, and other disciplines to cultivate students' necessary interdisciplinary skills in international business. The course content should include international marketing, multinational company operations, etc., so that students have comprehensive international business capabilities.

Curriculum and certification system that meets international standards: The curriculum system is in line with international standards, and school-enterprise cooperation projects are carried out to enhance students' practical ability. With the support of the international certification system, students are provided with global employment competitiveness, and international career development paths are opened up.

3.3.2. Professional positioning and talent training direction

The “integration” compound talent training model takes language ability as the core, strengthens innovation and entrepreneurship ability, relies on the international vocational skills certification course system, integrates multi-channel, multi-form, international education resources, implements school-enterprise cooperation with well-known companies, and innovates the education mechanism. This model aims to enhance students’ innovation and entrepreneurship ability and employment competitiveness.

3.3.3. Training specifications and professional needs

This model is aimed at emerging professions and positions, responding to the country’s “Belt and Road” initiative and the “going out” strategic needs. Through a multi-level and diversified talent training model, it solves the problem of a single training target for business English majors and cultivates compound business English talents who can adapt to emerging markets.

4. Conclusion

This paper discusses the “Belt and Road” initiative’s method of teaching business English to students at colleges and institutions, and proposes an innovative plan to optimize business English education by combining relevant domestic and foreign literature and experimental data. The research content covers the updating and optimization of talent training goals, the strengthening of interdisciplinary capabilities, the deepening of the integration of industry, academia, and research, and the innovation of teaching methods. However, this study also has certain limitations. First, the study mainly focuses on theoretical discussion and data analysis, lacking larger-scale field research and long-term follow-up data. Second, the sample size of the experimental data is limited and may not fully reflect the diversity of business English education reform in different universities, regions, and backgrounds. Therefore, future studies can confirm the efficacy and adaptability of various educational paradigms in various contexts by combining more comprehensive empirical data and broadening the sample range.

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An Exploration of the Innovation of College Mathematics Teaching Models in the New Media Environment

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Abstract: With the deepening of educational reform, college mathematics teaching should be further optimized. Teachers need to actively introduce new educational concepts and teaching methods to arouse students' interest, strengthen their understanding and application of knowledge, and improve the educational effect. As a much-concerned form of educational assistance at present, new media technology can greatly enrich the teaching content of college mathematics, broaden the educational path, and play a significant role in promoting students' all-around development. In view of this, this article will analyze college mathematics teaching in the new media environment and put forward some strategies for the reference of colleagues.

Keywords: New media; College mathematics; Teaching; Innovation

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1. The value of innovating college mathematics teaching models in the new media environment

1.1. Enriching teaching resources

In the new media environment, innovating college mathematics teaching models can greatly enrich the teaching resources of current mathematics teaching, helping students to form a more complete mathematics knowledge system during the process of knowledge exploration. When innovating college mathematics teaching models in the new media environment, teachers can not only expand and analyze textbook knowledge but also use new media technology to introduce interesting elements into the classroom, providing students with more knowledge content that combines fun and education. This is of great significance for improving the educational effect^[1]. In addition, with the development of the times, the forms and contents of digital teaching resources will become more abundant, which can effectively meet the knowledge exploration needs of different types of students and

lay a solid foundation for teachers to carry out more in-depth and extensive mathematics teaching in the future.

1.2. Broadening teaching paths

Different from traditional college mathematics teaching, innovating mathematics teaching models in the new media environment can effectively break down the barriers between students and mathematics knowledge, improve their knowledge learning efficiency and depth of understanding, and enable students to better use the learned knowledge to solve practical problems ^[2]. Moreover, innovating mathematics teaching models in combination with new media technology can effectively expand the current teaching paths, deepen students' understanding of the learned knowledge, and improve the quality of education. What is more, teachers can introduce micro-courses, media videos, etc. into the classroom when innovating mathematics teaching models, providing more convenience for students' mathematics knowledge learning activities, offering them better teaching services, helping students develop good habits of exploring mathematics knowledge, and thus greatly enhancing the effect of mathematics teaching reform.

1.3. Enriching interaction forms

In the new media environment, innovating college mathematics teaching models can effectively enrich the interaction forms between students and mathematics knowledge, deepen their understanding and application of the learned knowledge, and greatly promote students' long-term development. In addition, the introduction of new media technology can open up a new educational path for teachers, enabling more in-depth communication between students and teachers based on mathematics knowledge, which is of great significance for improving students' knowledge exploration efficiency ^[3]. In previous mathematics teaching, students rarely had the opportunity to express their opinions and views in class. By introducing new media technology, they can express their opinions during discussions, effectively highlighting students' dominant position in the classroom and promoting their long-term and comprehensive development.

2. Analysis of the current situation of college mathematics teaching

2.1. Backward teaching concepts

At present, many teachers fail to innovate and optimize their teaching concepts in line with the requirements of the new media era when carrying out college mathematics teaching. As a result, the educational concepts adhered to by many teachers are relatively single and backward, which is not conducive to the innovation and development of subsequent mathematics teaching models. In previous mathematics teaching activities, many teachers had a certain exam-oriented mindset. When teaching mathematics knowledge in the classroom, they mainly focused on theoretical knowledge and rarely led students to explore and learn mathematics knowledge in combination with practical problems, cases, or projects. This will greatly hinder the improvement of subsequent teaching effects ^[4]. In addition, teachers do not expand textbook content enough when teaching college mathematics, which will affect the formation and development of students' good mathematical knowledge systems. Moreover, in the new media environment, teachers do not introduce enough high-quality ideas and concepts, and their teaching work lacks clear goals, which will also hinder the development and improvement of students' knowledge systems and is not conducive to the improvement of their comprehensive abilities.

2.2. Single-mode teaching

To further improve the innovation effect of college mathematics teaching models, teachers should choose appropriate methods for daily teaching activities, which can help students understand the learned knowledge more deeply and improve their practical application level of mathematics knowledge^[5]. However, in current college mathematics teaching, teachers do not innovate their mathematics teaching models enough and often adopt single-mode teaching methods. Although this can help students master certain mathematical knowledge, it is not beneficial for them to understand deeper-level knowledge content. It may even cause some students to develop resistant and confrontational emotions, which is not conducive to the formation and development of their more complete mathematics knowledge systems. What is more, single-mode teaching models also make it difficult for teachers to optimize the teaching atmosphere, which is not conducive to students' better appreciation of the charm of mathematics knowledge and hinders their long-term development.

2.3. Lack of student interest

College mathematics knowledge is highly complex. Some mathematical knowledge points are abstract and boring for students to learn, and the forms of knowledge expression are diverse. This requires students to have strong learning abilities. In college mathematics activities, many students do not have a high level of learning initiative. Some students even get distracted or play with their mobile phones in class, which greatly hinders the improvement of their mathematics knowledge learning efficiency^[6]. In addition, students' low participation also hinders teachers from creating a good teaching atmosphere and enhancing their teaching confidence. Due to the lack of high learning interest, students are likely to give up easily when exploring college mathematics knowledge, making it difficult for them to think more deeply about the learned knowledge and greatly affecting the improvement of college mathematics teaching effects.

3. Strategies for innovating college mathematics teaching models in the new media environment

3.1. Using online videos to stimulate students' interest

In the new media environment, to further improve the innovation effect of college mathematics teaching models, teachers should focus on stimulating students' interest, which can lay a solid foundation for subsequent teaching work and is also a prerequisite for teachers to create a high-quality classroom environment^[7]. Therefore, when innovating college mathematics teaching models, teachers should ensure the rationality and scientificity of their educational methods so that students can better experience the charm of mathematics knowledge and improve the innovation effect of college mathematics teaching models. In the practice of innovating college mathematics teaching models, teachers can search for some new media pictures and videos related to the teaching content on the Internet, effectively expanding the teaching content, fully mobilizing students' audio-visual senses, enabling them to understand and think about the learned mathematics knowledge from different angles and directions, stimulating their interest in knowledge exploration, and laying a solid foundation for the subsequent innovation and reform of college mathematics teaching models^[8]. To ensure the compatibility between new media video resources and students' needs, teachers should analyze students' mathematics knowledge reserves, cognitive abilities, and thinking habits before introducing new media resources into the classroom, so as to improve the innovation effect of college mathematics teaching models.

For example, when teaching the knowledge of "numerical solutions of partial differential equations",

teachers can start from various solution methods, introduce some practical application problems in real life with the help of new media technology, and organize students to discuss and think about these problems. This can better attract students' attention to the classroom knowledge, enable them to have a deeper understanding of the learned knowledge, and enhance students' interest in knowledge learning ^[9]. By reasonably introducing media videos into the innovation of college mathematics teaching models, students' interest in knowledge exploration can be greatly enhanced, and they can enjoy a stronger spiritual experience while gaining knowledge reserves, which is of great significance for improving the innovation effect of college mathematics teaching models.

3.2. Introducing micro-courses to overcome difficulties and deepen students' understanding

In the new media environment, to further improve the innovation effect of college mathematics teaching models, teachers should pay attention to introducing new teaching methods and concepts, to further deepen students' understanding and application of the learned knowledge, and improve the educational effect. College mathematics knowledge is highly abstract, and some students have limited understanding abilities, which may lead to difficulties in understanding when they learn mathematics knowledge. This will greatly hinder their application of mathematical knowledge to solve practical problems in the future ^[10]. In previous college mathematics teaching, teachers mainly taught based on textbooks, which could help students master certain mathematical knowledge, but was not conducive to the improvement of their comprehensive abilities and practical qualities. Therefore, teachers can try to introduce micro-courses into the innovation of college mathematics teaching models, reform and expand the teaching model, deepen students' understanding efficiency and depth of the learned mathematics knowledge, and thus reconstruct and optimize the college mathematics teaching model. Teaching reform with micro-courses in the new media environment allows students to analyze and explore the learned knowledge from different angles and levels, enabling them to master more knowledge and problem-solving skills imperceptibly, which greatly promotes students' long-term development.

When designing micro-courses, teachers should control the length of micro-courses to ensure that students can concentrate on them and avoid students getting distracted due to overly long micro-courses. At the same time, teachers should ensure the interestingness of micro-course content so that micro-courses can be more attractive to students, prompting students to explore and learn knowledge more actively in combination with micro-courses. In the design process, teachers can introduce some interesting videos related to the teaching content with the help of new media technology, narrowing the distance between students and mathematical knowledge and reducing students' understanding difficulties ^[11]. Moreover, teachers can place some questions at the end of micro-courses, enabling students to think about these questions after watching the micro-courses. This can enhance the depth of teaching, further develop students' thinking and analysis abilities, and thus help improve students' mathematics knowledge learning effects.

3.3. Building a self-learning platform to construct a knowledge system

In the new media environment, to further improve the innovation effect of college mathematics teaching models, teachers should focus on cultivating students' self-learning abilities and helping them construct a more complete mathematics knowledge system, which greatly promotes students' long-term development in the future ^[12]. Therefore, when carrying out teaching reform, teachers can try to build a new media self-learning platform to help students carry out more efficient self-learning activities, enabling them to solve various

problems encountered in self-learning in a timely manner and improving their knowledge learning efficiency. In previous self-learning, students often encountered various problems, which hindered the smooth progress of their self-learning activities. Therefore, teachers can build a self-learning platform to help students solve problems encountered in self-learning in a timely manner, which is conducive to the formation and development of their more complete knowledge systems. When innovating college mathematics teaching models, teachers can organize students to carry out self-learning activities through the self-learning platform according to the actual situation of their schools. If students encounter problems during learning, they can upload their problems to the self-learning platform and then solve the problems with the help of classmates and teachers, which can greatly improve students' self-learning effects ^[13]. Moreover, to further improve the innovation effect of college mathematics teaching models, teachers can add an information-sharing function to the platform. Students can share some problems they encounter in daily life, which helps students learn from each other, promotes the formation of a more complete mathematics knowledge system, enhances the advancement of their knowledge, and ensures the innovative effect of college mathematics teaching models.

3.4. Conducting reasonable teaching evaluations to improve teaching problems

In the new media environment, to further improve the innovation effect of college mathematics teaching models, teachers should pay attention to improving and optimizing existing teaching problems, which requires the support of a complete teaching evaluation system. By conducting reasonable evaluations of students, they can have a correct understanding of themselves, which is conducive to their discovery of their own shortcomings and deficiencies. Teachers can also further optimize the content and form of their college mathematics teaching model innovation based on students' feedback and eliminate some potential problems. Before evaluating students, teachers can reasonably group them to ensure the pertinence and scientificity of the evaluation work ^[14]. For students with insufficient basic knowledge reserves, when evaluating them, teachers can focus on examining theoretical knowledge and encourage them to actively learn textbook knowledge to strengthen their mathematical foundation. When evaluating ordinary students, in addition to examining their mastery of theoretical knowledge, teachers should also evaluate them in combination with some practical problems and cases, so that students can master more knowledge and skills for solving problems and help them form a more complete mathematics knowledge system ^[15]. For students with strong professional abilities and solid knowledge reserves, when evaluating them, teachers can analyze some practical problems and projects and develop a more stringent evaluation mechanism for them, so as to better stimulate students' potential and promote their long-term and comprehensive development.

4. Conclusion

In conclusion, to improve the effectiveness of innovating college mathematics teaching models in the new media environment, educators should first clarify the value of optimizing college mathematics teaching, then analyze the current situation of college mathematics teaching, and finally conduct research from aspects such as using online videos to stimulate students' interest, introducing micro-courses to overcome difficulties and deepen students' understanding, building a self-learning platform to construct a knowledge system, and conducting reasonable teaching evaluation to improve teaching problems. Only in this way can the quality of innovative college mathematics teaching models be raised to a new level.

Disclosure statement

The authors declare no conflict of interest.

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“Smart Platform + Practical Training Base + Layered Training”: Practice and Exploration on the Cultivation of Clinical Practical Abilities in Infectious Disease Teaching

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Abstract: This study proposes an innovative clinical practice competency cultivation system for infectious diseases—“Smart Platform + Practical Training Base + Layered Training”—which aims to comprehensively enhance students’ practical abilities in infectious disease prevention and control through the integration of modern information technologies, practical teaching resources, and layered training approaches. By optimizing teaching content to incorporate new diagnostic and therapeutic technologies, public health emergency response, and cutting-edge advancements, the system establishes three-tiered practical training (foundational, intermediate, and comprehensive levels) to holistically improve students’ clinical competencies. Effectiveness evaluations demonstrate that the system has been widely acknowledged by students, faculty, and public health practitioners as significantly enhancing students’ practical skills and professional competencies. The future prospects section outlines optimization plans, including the integration of advanced technologies, expansion of practical training bases, and strengthening of international collaboration, aiming to better align with future public health needs.

Keywords: Infectious disease prevention and control; Clinical practice competency; Smart teaching platform; Practical training base; Layered training

Online publication: June 5, 2025

1. Introduction

Infectious diseases have persistently posed a major threat to global health. In the context of 21st-century globalization, the spread of infectious diseases is no longer confined by geographical boundaries. The continuous emergence of novel pathogens such as Ebola and Zika virus, coupled with the resurgence of

traditional infectious diseases like tuberculosis and malaria, has created unprecedented challenges for disease prevention and control efforts ^[1-2]. Against this backdrop, infectious disease education has gained increasing prominence as both a critical component of medical training and a cornerstone of global public health security. It plays an indispensable role in cultivating professionals capable of identifying, preventing, and controlling infectious diseases, while simultaneously enhancing public health awareness and strengthening societal resilience against emerging infectious threats ^[3].

To address the growing demand for professionals in healthcare and public health sectors, particularly those equipped with competencies in infectious disease prevention and control, researchers have developed an innovative clinical practice cultivation system—"Smart Platform + Practical Training Base + Layered Training." This system integrates modern information technologies, practical educational resources, and stratified training methodologies to holistically enhance students' practical capabilities in combating infectious diseases. This paper systematically examines the theoretical framework, implementation strategies, and empirical outcomes of this pedagogical innovation in advancing clinical practice competencies.

2. System construction

2.1. Construction of the smart teaching platform

The smart teaching platform incorporates multiple functionalities spanning teaching and learning, assessment, research support, and an educational resource repository. These features effectively address pedagogical challenges while enhancing educational quality and healthcare standards. As the core component of this training system, the platform's development and operational efficacy rely on the deep integration of modern technologies, including artificial intelligence (AI), big data analytics, and cloud computing. By analyzing student learning data, the platform dynamically adjusts instructional content and pacing, offering personalized learning recommendations in real time ^[4]. It transcends the spatiotemporal limitations of traditional classrooms, facilitates equitable access to high-quality educational resources, and precisely identifies individual learning difficulties. AI enables adaptive instruction based on individual learning patterns, big data systematically tracks and interprets learning trajectories, and cloud computing ensures seamless access to vast educational resources ^[5]. This integrated technological ecosystem creates an intelligent learning environment that unifies teaching, training, and assessment, significantly improving instructional interactivity, learning personalization, and evaluation rigor.

The platform tailors learning pathways to individual student proficiency levels, ensuring self-paced progression. Real-time performance feedback and formative assessments empower students to monitor their progress and optimize learning strategies. Additionally, the platform aggregates extensive digital resources—including e-books, video lectures, and online courses—to provide diversified learning materials.

2.2. Establishment of practical training bases

Practical training bases constitute another critical pillar of this cultivation system. Collaborative partnerships with hospitals, the Centers for Disease Control and Prevention (CDC), community health service centers, and other institutions have enabled the creation of multi-site training facilities. These bases immerse students in authentic clinical and public health environments, allowing them to operationalize theoretical knowledge. Within these settings, students engage in hands-on tasks such as epidemiological investigations, environmental disinfection protocols, and health education campaigns, thereby strengthening practical competencies. Guided

by experienced professionals, students receive immediate troubleshooting support during field operations, maximizing training efficacy ^[6].

2.3. Implementation of layered training

Layered training forms the operational backbone of this system. Students are stratified into three competency-based tiers—foundational, intermediate, and comprehensive—each with distinct objectives and curricula. Foundational level: At the foundational level, educators mainly conduct training on basic skills, such as donning and doffing isolation gowns, hand hygiene procedures, etc. Through standardized process training and real-time feedback, educators ensure that students can master the basic skills. Intermediate level: At the intermediate level, educators mainly conduct training of advanced skills, such as closed-loop management of cases and multidisciplinary consultation. Through virtual scene training and real case analysis, the advanced skills of students are improved ^[7]. Comprehensive level: At the comprehensive level, educators mainly conduct training in comprehensive abilities, such as epidemiological investigation and environmental disinfection. By participating in practical tasks such as on-site epidemiological investigation and disinfection, and health education and publicity, the comprehensive abilities of students are improved ^[8].

3. Implementation process

3.1. Optimization of teaching content

In order to ensure the precise connection between the teaching content and practical needs, the study first conducted an in-depth investigation to understand the current status and needs of infectious disease education. According to the clinical practice, the study reconstructed the teaching content and organically integrated the new diagnosis and treatment technology, public health emergency response and frontier progress into the curriculum.

Integration of new diagnosis and treatment technologies: With the rapid development of medical technology, new diagnosis and treatment technologies continue to emerge. Researchers incorporate these new technologies, such as gene sequencing and molecular diagnosis, into the curriculum so that students can master the latest diagnosis and treatment methods.

Public health emergency management training: In the face of public health emergencies, how to quickly and effectively deal with emergency response is an important link in the prevention and control of infectious diseases. Educators trained students on public health emergency response through case analysis, simulation exercises, and other means [9].

Introduction to cutting-edge developments: Epidemiology is a constantly evolving discipline, with new research results and theories emerging all the time. Through lectures, seminars, and other forms, educators introduce students to the latest research results and theoretical progress.

3.2. Enhancement of practical competencies

Researchers have built a hierarchical training system of “smart platform + practical training base + layered training”, aiming to comprehensively improve students’ practical ability through different levels of practical training.

Foundational-level training: Relying on the AI intelligent feedback system, standardize the skill operation and consolidate the foundation. Through standardized process training and real-time feedback, ensure the

accurate and practical operation of occupational protection skills.

Intermediate-level training: Through the closed-loop management training of virtual scenarios, participation in multidisciplinary consultations of real cases, and the ability to handle sudden epidemic situations is enhanced. VR/AR technology is adopted to simulate the prevention and control scenarios of severe infectious diseases, carry out closed-loop management training of cases, and conduct multidisciplinary consultations combined with real fever cases to comprehensively enhance the ability to deal with epidemic emergencies^[10].

Comprehensive-level training: Jointly establish practical teaching bases with the community and the Centers for Disease Control and Prevention, and carry out the “Infectious Disease Prevention and Control Practice Week.” Students participate in on-site epidemiological investigation, disinfection and sterilization, health education and publicity, etc., achieving an upgrade from theory to practice. Regularly organize the “Infectious Disease Prevention and Control Practice Week” activities, and students fully participate in practical tasks such as epidemiological investigation, environmental disinfection and sterilization, and health education and publicity, achieving an effective transformation from theoretical knowledge to practical ability.

4. Effectiveness evaluation

4.1. Student feedback

In the process of implementing this training system, the researchers collect feedback from students to understand their views and suggestions on the system. The students generally felt that they were able to apply what they learned in a real environment, which improved their practical ability, better understood the actual needs of infectious disease prevention and control work, and improved their professional literacy (**Table 1**).

4.2. Teacher feedback

The researchers also regularly collect feedback from teachers, who generally believe that this system enables them to better understand the actual needs of students, improve their teaching effectiveness, better understand the actual needs of infectious disease prevention and control work, and improve their professionalism (**Table 1**).

Table 1. Effectiveness feedback of the infectious disease clinical practice ability training system of “smart platform + practice base + hierarchical training” (n,%)

| Evaluation subject | Evaluation items | Very satisfied | Fairly satisfied | Average | Less satisfied | Very dissatisfied |
|---------------------|--|----------------|------------------|----------|----------------|-------------------|
| Students (n=120) | The knowledge is practical | 90 (75%) | 30 (25%) | 0 | 0 | 0 |
| | Improved clinical practice ability | 84 (70%) | 29 (24%) | 7 (6%) | 0 | 0 |
| | It is conducive to understanding the prevention and control of infectious diseases | 80 (67 %) | 28 (23%) | 12 (70%) | 0 | 0 |
| | Reduced fear of infectious disease | 80 (67%) | 22 (18%) | 18 (15%) | 0 | 0 |
| | Improved teamwork | 90 (75%) | 18 (15%) | 12 (10%) | 0 | 0 |
| Teachers (n=40) | Enriched teaching methods | 18 (45%) | 22 (55%) | 0 | 0 | 0 |
| | Know the actual needs of your students | 24 (60%) | 16 (40%) | 0 | 0 | 0 |
| | Improved teaching effectiveness | 24 (60%) | 15 (38%) | 1 (2%) | 0 | 0 |
| | Improved professionalism | 23 (58%) | 14 (35%) | 3 (7%) | 0 | 0 |

5. Future perspectives

With the continuous evolution of medical technologies and global health challenges, researchers commit to advancing the Clinical Practice Competency Development Framework for Infectious Diseases to better align with emerging public health imperatives. In the prevention and control of infectious diseases, talent is the most critical factor. Through the implementation of the “smart platform + practical training base + layered training” infectious disease clinical practice ability training system, the authors firmly believe that this training system will be able to more effectively meet the needs of public health in the future, and successfully train more outstanding public health talents, and make contributions to global health security.

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Gravity-inspired Classrooms and Magic Homework: An Exploration of High-school English Homework Design under the “Double Reduction” Policy

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Abstract: With the introduction of the “Double Reduction” policy, homework has attracted widespread attention from all sectors of society. As an important part of subject teaching, after-class homework in English learning needs to reflect the humanistic and instrumental nature of the language, and neither can be neglected. During the high-school learning stage, exploring how to effectively design after-class homework to reduce students’ homework burden, cultivate students’ literacy, and fulfill the task of fostering virtue through education has practical significance and long-term value.

Keywords: “Double Reduction”; High-school English; Homework design

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1. Research background

In 2021, the state issued the “Opinions on Further Reducing the Homework Burden and After-school Tutoring Burden of Students in the Compulsory Education Stage” (referred to as the “Double Reduction” policy). The document clearly puts forward requirements such as “comprehensively reducing the total amount and duration of homework to relieve students of their excessive homework burden” and “improving the quality of homework design.” Professor Gu Mingyuan also pointed out that “students’ heavy burden not only affects their physical health but also their mental health. Students bear heavy psychological pressure, lack interest in learning, and study passively^[1]. This not only leads to low efficiency but also distorts their psychology. They regard learning as a means of competition and their classmates as competitors, and lack the ability to withstand setbacks.” Therefore, exploring how to effectively design after-class homework to reduce students’ homework burden, cultivate students’ literacy, and fulfill the task of fostering virtue through education has practical significance

and long-term value ^[2].

2. The concept and extension of “homework”

The definition of “homework” in Cihai is: activities carried out to complete established tasks in production, learning, etc., such as industrial design, classroom assignments, etc. This definition reveals that “homework” covers not only education and learning but also production. Harris Cooper defined “homework” in his research as “tasks assigned to students by school teachers that are meant to be carried out during non-school hours”, that is, “homework is tasks assigned to students by school teachers and should be carried out outside of school time” ^[3].

The “homework” in the homework design explored in this article mainly refers to the learning tasks that learners complete after class. It is an important process of English subject learning. At the same time, it is also a key means for teachers to check teaching results and for students to test learning effects. After-class homework has important value and significance. It can not only help learners improve and consolidate the knowledge and skills they need to master in class but also provides students with a way outside the classroom to expand the application of what they have learned, cultivating students’ thinking qualities and cultural awareness ^[4].

3. The current situation of homework design

After-class homework is an important part of the subject teaching. If after-class homework is not assigned reasonably, it will not only fail to achieve the learning effect but also consume students’ time and energy, causing additional pressure and burden on students. Currently, there are mainly the following problems with after-class homework.

3.1. Single form of homework

Some teachers still use old-fashioned methods and assign mechanical “memorization, copying” tasks, such as copying or reciting words, phrases, and texts, or using the exercises in unified supplementary exercise books. Such mechanical and single-form homework is boring. It not only limits students’ thinking but also fails to arouse students’ interest and enthusiasm for learning ^[5].

3.2. Lack of hierarchy in homework, and mismatch between homework difficulty and students’ levels

There are inevitably differences in the abilities and levels of learners in a class. If teachers always assign homework at a unified level instead of designing hierarchical homework according to students’ levels, students with better foundations will find the homework too easy, unable to transform knowledge into ability, make little progress, lose interest, and not want to waste time. Students with weaker foundations, on the other hand, are likely to develop a fear of learning, give up, or be perfunctory because they think the questions are too difficult ^[6].

3.3. Random content of homework, and weak relevance to the classroom

Some teachers do not design homework but simply select ready-made teaching aid materials and assign them to students as homework tasks without screening. On the one hand, it is difficult for the content in teaching aid materials to match the knowledge taught in class on the same day, resulting in a situation where “what is practiced is not what is learned” and “what is practiced is not what is taught”, losing the meaning and value

of homework. On the other hand, it is necessary to carefully consider and screen whether the difficulty of all teaching aid materials is suitable for one's own students and whether all teaching aid materials are of high quality. It can be said that no ready-made teaching aid material can completely target a certain group of learners. All teaching aid materials, regardless of their quality, need to be repeatedly selected and redesigned by teachers to better suit their own students.

4. Innovation and practical exploration of homework design

The “English Curriculum Standards (2017 Edition)” points out that the English curriculum has a dual nature of instrumentality and humanism. As an important part of subject teaching, after-class homework also needs to reflect the humanistic and instrumental nature of the language in English learning, and neither can be neglected. In addition, the “Double Reduction” policy also requires “giving play to the functions of homework in diagnosis, consolidation, and analysis of students’ learning conditions” and “encouraging the assignment of hierarchical, flexible, and personalized homework”. The authors attempt to explore the innovative and practical methods of after-class homework from the following aspects.

4.1. Stimulating students’ interest, diversifying and “magnifying” the forms of homework

Interest is the best teacher. Only by mobilizing and stimulating students’ interest can learning occur spontaneously, and learning becomes a pleasure. When designing after-class homework, teachers can enrich the forms of homework, combine knowledge-based homework with open-ended homework, and maximize students’ interest and enthusiasm. By “enchanted” after-class homework, students will love doing homework ^[6].

For example, in the unit writing lesson of Unit 2 Sports and Fitness in the new textbook of Beijing Normal University Edition for Senior High School Grade 1, according to the characteristics of the class students, the after-class homework designed is: Using the structural elements of narrative learned in class, use an A4 paper to create a mini-storybook to tell a story and match it with illustrations.

In the process of completing this assignment, students need to first conceive the story and draft it. During this process, students will use the six elements of a narrative and necessary English sentence writing. When matching the illustrations, students will pay attention to depicting the environment, characters’ actions, and emotions. Matching illustrations for the story can not only stimulate students’ enthusiasm for completing the assignment but also guide students to pay attention to and add certain environmental and emotional descriptions.

Finally, students showed great enthusiasm for making mini-storybooks. They not only completed the narrative writing as required but also produced many mini-storybooks with wonderful writing and unique designs. Eventually, these mini-storybooks were displayed in the class and became an interesting scenery on the class culture wall. Excerpts from some students’ excellent homework are shown in **Figure 1** ^[7].

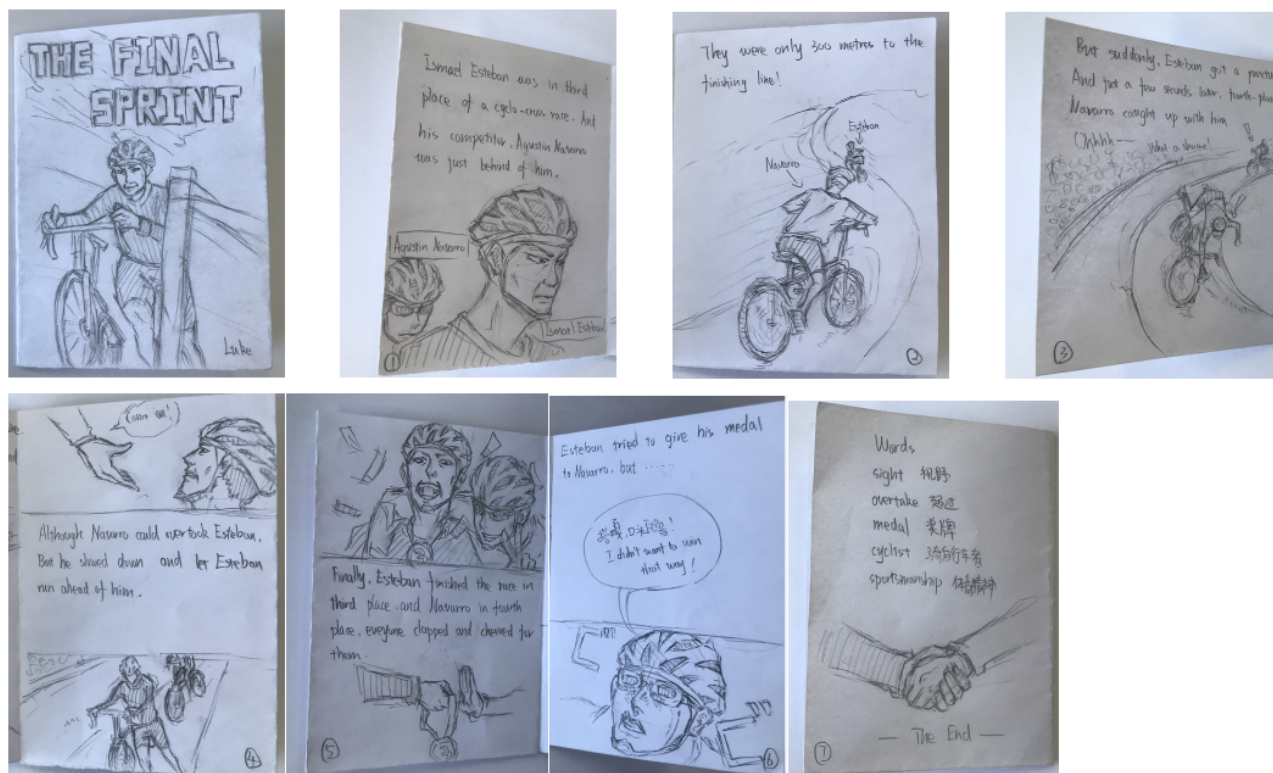


Figure 1. Picture book student homework works

4.2. Based on students' lives, applying what they have learned, and cultivating students' critical thinking

Teachers can give full play to the humanistic and instrumental nature of English and explore some homework topics close to students' lives, allowing students to do things in English in real-life situations. This can not only cultivate students' language abilities but also their thinking qualities, stimulate their interest in learning, and develop multiple intelligences.

For example, in Unit 3 Lesson 3 of the selective compulsory textbook of Beijing Normal University Edition for Senior High School Grade 1, after learning the analysis of the traffic situation in London, UK and the corresponding solutions in the textbook, students are guided to observe and think about the traffic situation in the E-town Economic and Technological Development Area where they live. The designed homework task is a research-based learning activity, and the specific content is: In groups, investigate "the traffic situation in Beijing E-town and the satisfaction of E-town residents." The investigation methods include online questionnaires and interviews. Each group can choose one of the research methods for investigation. After the investigation, an English-language investigation report is presented.

This open-ended research-based learning assignment, on the one hand, greatly mobilizes students' interest, enthusiasm, and participation. On the other hand, it also guides students to discover problems in life in a scientific way. Considering students' lack of research capabilities and experience, teachers guide students to use the two most common research methods: the questionnaire method and the interview method, when designing the assignment.

In the process of conducting questionnaires and interviews, students need to discover, analyze, and propose feasible solutions to problems, which requires mobilizing various abilities, such as group communication, task

division of labor, questionnaire design and distribution, application of modern information technology (online questionnaires, voice-to-text conversion), communication and interaction with respondents, and information acquisition and processing. The entire process of research-based learning can greatly promote the improvement of students' comprehensive abilities, especially their thinking qualities and learning abilities, and enhance students' subject thinking and subject literacy ^[8].

The specific content of students' homework is as follows:

Group research-based learning stage (Interview + Questionnaire + English investigation report). In groups, investigate "the traffic situation in Beijing E-town and the satisfaction of E-town residents." The investigation tasks include the following aspects, and each group can choose one of them.

Design an online questionnaire to investigate "the traffic situation in Beijing E-town and the satisfaction of E-town residents." At the same time, collect samples with a sample size of not less than 50. The group needs to communicate first to brainstorm the aspects to be investigated and then present them in the form of questions. The questions can include multiple-choice questions and fill-in-the-blank questions. Based on the results of the online questionnaire, write an English report to explain the questionnaire results.

Interview local E-town residents about "the traffic situation in Beijing E-town and their satisfaction." Four interviewees are required, representing different occupations and age groups, such as Didi drivers, office workers, students, and retired elderly people. Before the interview, an interview outline needs to be developed. The interview can be conducted face-to-face or online. The four interviews need to be recorded (note that recording requires the consent of the interviewees first). Based on the interview results, write an English report to explain the interview results.

Email-submission stage (English letter writing). To promote the construction of an "Ecological Green City", E-town New City solicits the top ten practical matters for 2022 from all residents in the district. "Recently, you and your classmates have conducted an investigation on 'the traffic situation in Beijing E-town and the satisfaction of E-town residents.' Please write an English email to the E-town District Mayor, putting forward practical suggestions on the traffic situation in E-town."

The content of the email includes: 1. Traffic situation in Beijing E-town Area. 2. Practical advice to solve the problems caused by the traffic. Note: 1. The number of words should be no less than 120. 2. Pay attention to communication skills.

4.3. Respecting individual differences and designing hierarchical homework

Only by respecting students' individual differences and designing hierarchical homework for students at different levels and with different abilities can the homework design meet the students' zone of proximal development, realize the value and significance of homework in "consolidating classroom knowledge, expanding and testing what has been learned in class", and thus improve students' subject literacy and learning abilities.

Hierarchical homework design shows multi-level and diverse characteristics in terms of homework quantity, difficulty, and goals. It can not only reduce students' learning pressure but also enable students to continue to develop and improve based on their individual characteristics. While gaining a sense of accomplishment, students can fully experience the joy of learning and enhance their learning initiative and enthusiasm ^[9].

For example, during winter and summer vacations, open-ended homework tasks are set in the form of a

“package deal”, allowing students to freely choose one task to complete according to their own foundations and interests. The specific homework design is as follows:

With the help of online listening and speaking resource platforms, read aloud two main texts (Lesson 1 + Lesson 3) from Unit 1, Unit 2, Unit 3, and Unit 4 of the textbook.

Select a theme of holiday life and shoot a vlog. It is required to be introduced in English with English subtitles and have a duration of more than 2 minutes. After production, publish it and collect at least 30 likes or followers, and save the screenshot^[10].

Watch an English drama (one is enough) or at least two English movies. Submit a PPT introducing the drama or movie. The PPT is required to be exquisitely made with pictures and English descriptions. Complete at least two dubbing works for the watched English dramas or movies.

Read an original English novel with a reading volume of at least 4000 words. Reading notes are required during the reading process (the notes can be made in the book or a notebook). After reading the novel, draw a mind map of the character relationships in the novel and complete a book report (with no less than 400 words).

Hierarchical homework design does not mean completely abandoning unified requirements. In the implementation of hierarchical homework design, in order to achieve good results, in addition to designing hierarchical homework, teachers also need to provide necessary guidance on homework requirements, monitor the process, and adopt diversified evaluation methods for homework^[11].

5. Conclusion

In conclusion, a scientific and reasonable after-class homework design can consolidate students' learned knowledge, expand their application of knowledge, and cultivate students' critical thinking and innovation awareness. Under the background of the “Double Reduction” policy, exploring the effective design of high-school English after-class homework is a positive, beneficial, and valuable exploration. This exploration conforms to the reform requirements of the new curriculum standards, helps to reduce students' learning burden, cultivate students' subject literacy, and fulfill the fundamental task of fostering virtue through education.

Disclosure statement

The authors declare no conflict of interest.

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Research on Strategies for Stimulating the Subjective Initiative of Power-related Higher Vocational Students in the Context of the “Double-high” Initiative: Taking the “Relay Protection Technology” Course as an Example

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Abstract: In the context of the “Double-high plan” promoting the high-quality development of vocational education, power-related higher vocational colleges urgently need to construct a student-centered strategy for stimulating students’ subjective initiative in learning, so as to solve problems such as insufficient learning motivation and weak self-learning ability among higher vocational students. This article proposes a four-dimensional collaborative stimulation system of “ideological and political education in courses as the guide-stratified teaching as the foundation-integration of industry and education as the driver-psychological empowerment as the support.” It reconstructs students’ professional value cognition through the organic integration of ideological and political elements and professional courses, activates learning motivation based on stratified teaching, strengthens practical drive relying on real-world projects from the integration of industry and education, and enhances self-efficacy by combining with a psychological intervention mechanism. Taking the professional course “Relay Protection Technology” as an example, this article designs the curriculum system, aiming to systematically improve students’ subjective initiative in learning, professional identity, skill mastery, and comprehensive qualities, providing theoretical references and practical paths for talent cultivation in power-related higher vocational colleges.

Keywords: Power-related higher vocational students; Subjective initiative in learning; Ideological and political education in courses; Stratified teaching; Integration of industry and education

Online publication: June 5, 2025

1. Introduction

Under the strategic background of the “Double-high plan” promoting the high-quality development of

vocational education, the power industry, as a pillar industry for national energy security and economic development, has an ever-increasing demand for high-quality technical and skilled talents. However, talent cultivation in power-related higher vocational colleges still faces prominent problems such as insufficient learning motivation, weak self-learning ability, and low professional identity among students. A survey shows that the classroom participation rate of power-major students is less than 30%, reflecting that the traditional teaching model is difficult to meet the requirements of “leading reform and supporting development” put forward by the “Double-high plan.” This contradiction is particularly significant in power-related professional courses. These courses have both theoretical depth and practical complexity, but there are common structural imbalances in the teaching process, such as “emphasizing theoretical instruction while neglecting value shaping”, “emphasizing unified teaching while neglecting individual differences”, and “emphasizing knowledge indoctrination while neglecting psychological empowerment.”

In recent years, vocational education researchers have carried out multi-dimensional explorations on stimulating students' subjective initiative in learning. Han Xianzhou pointed out that the in-depth integration of professional courses and ideological and political elements can effectively enhance students' professional identity and social responsibility ^[1]. Lei Ping and others, through the analysis of classical garden cases, combined flower culture with professional ethics education, which significantly enhanced students' cultural confidence and professional pride ^[2]. Hou Yuling proposed a project-based teaching model for ideological and political courses. Through the integrated design of “learning by doing”, students can internalize knowledge and achieve value recognition while completing specific tasks ^[3]. Yao Xiaoning adopted a gradient-topic-selection strategy in the PLC curriculum design. By combining basic tasks with expansion tasks, the learning needs of students at different levels were taken into account ^[4]. Zhu Xiangli, in the group teaching of the AutoCAD course, achieved an overall improvement in students' participation through the ability-matching and role-division of “good, medium, and poor” students ^[5]. Luo Wei found through the analysis of skill-competition cases that students participating in industry competitions had significantly improved their soft skills, such as professional qualities and innovation abilities ^[6]. Hu Ying and others, through the practice of the fluid mechanics course, found that the use of contextual teaching methods such as scientists' stories and real-life cases could significantly enhance students' learning interest ^[7]. Dong Hang and others' empirical research shows that there is a significant positive correlation between self-efficacy and learning initiative. Psychological interventions such as goal-setting and positive feedback can effectively enhance students' learning confidence ^[8]. Song Changhong explored the difficulties and influencing factors of stimulating the subjective initiative of higher vocational students in learning and proposed corresponding countermeasures from the three levels of society, school, and teachers ^[9]. Zhang Zheng enhanced students' learning enthusiasm by innovating teaching methods and improving the evaluation system ^[10]. Rodríguez Aura Stella and others increased students' interest in learning English by using computers and group work ^[11]. Rashidi AHA explored the potential of digital task-based instruction (DTBI) to enhance motivation among English as a foreign language (EFL) learners in Saudi Arabia based on activity theory ^[12]. Xiaofang Xiong found that there is a significant positive correlation between educators' teaching methods and students' learning engagement, and students' motivation during the learning process can be improved by improving teaching methods ^[13]. Wang R and others found that positive psychology (PP) can improve the well-being and learning enthusiasm of vocational education students from a multi-dimensional perspective ^[14]. Jiabao Wu explored the learning motivation of higher vocational art design students in an online PBL model based on the self-efficacy theory ^[15].

Most of the existing research focuses on single-dimension or shallow multi-dimension reform strategies, lacking the design of a systematic multi-dimensional collaborative mechanism, and there are few local explorations tailored to the characteristics of power-related majors. Based on the construction requirements of the “Double-high plan” and aiming at the characteristics of power-related majors, this study proposes a four-dimensional stimulation system of “ideological and political education in courses as the guide-stratified teaching as the foundation-integration of industry and education as the driver-psychological empowerment as the support”, providing a replicable solution for power-related higher vocational colleges to enhance students’ subjective initiative and facilitating the cultivation of high-quality technical and skilled talents.

2. Theoretical basis and problem analysis

2.1. Requirements of the “Double-high plan” for power-related higher vocational education

As a national strategy for the high-quality development of vocational education, the “Double-high plan” puts forward clear requirements for power-related higher vocational education. The plan takes moral education as its fundamental task and emphasizes the cultivation of technical and skilled talents with a craftsmanship spirit and innovation ability through deepening the integration of industry and education and school-enterprise cooperation. In the power industry, these requirements are specifically reflected in the “three-integration” goals: the integration of professional teaching and industrial needs, the integration of skill training and professional qualities, and the integration of knowledge teaching and value guidance. To achieve these goals, three key areas of reform need to be promoted: First, constructing a modular curriculum system oriented to job-related abilities to break through the traditional knowledge-indoctrination model; second, deepening the school-enterprise co-construction of training bases and the training mechanism for dual-qualified teachers to ensure that teaching content is updated in line with enterprise technical standards; third, establishing a full-chain psychological support system covering academic planning, skill training, and employment guidance to address the low self-efficacy of students caused by academic pressure and vague professional identity.

2.2. Main problems and challenges currently faced

Power-related higher vocational education faces challenges in multiple aspects during implementation. At the cognitive level, 78% of students think that professional courses are boring and abstract, and only 18% of students can actively analyze professional ethics issues, reflecting the problems of ideological and political education in courses being mere formalism and social cognitive biases in vocational education. In terms of ability cultivation, there are significant individual differences among students (20% have innovative potential, and 25% have a weak foundation). However, homogeneous teaching leads to 42% of students having difficulty completing practical tasks, and the single evaluation method, mainly based on written examinations (accounting for 50%), suppresses students’ innovative potential. In practical teaching, there is a dual dilemma of insufficient training resources and a lack of real-world projects. Only 12% of colleges and universities carry out in-depth school-enterprise cooperation, and most cooperation remains at the level of visit-based internships. In terms of psychological support, only 39% of students are confident in performing their jobs, and 85% of students think that career-planning guidance courses are empty and ineffective, forming a vicious cycle of “anxiety-avoidance-inefficiency-more anxiety.” These problems highlight the systematic challenges faced by power-related higher vocational education in improving the quality of talent cultivation.

3. Construction of the four-dimensional subjective initiative stimulation system

3.1. Framework of the four-dimensional subjective initiative stimulation system

Based on the existing problems in power-related higher vocational education, a four-dimensional subjective initiative stimulation system is constructed, including ideological and political education in courses as the guide, stratified teaching as the foundation, integration of industry and education as the driver, and psychological empowerment as the support. In terms of ideological and political education in courses, the focus is on developing three major theme case libraries of “safety responsibility”, “team cooperation”, and “innovation and problem-solving.” The “four-step penetration method” of case introduction → value conflict → ethical discrimination → behavior internalization is adopted to integrate the cultivation of professional value into the whole teaching process, and restructure the evaluation system, raising the right of professional attitude examination to 10%. In stratified teaching, based on Vygotsky’s “zone of proximal development” theory, a “diagnosis-stratification-adaptation” dynamic mechanism is established. Students are divided into different ability zones through a three-dimensional diagnostic scale, and differentiated teaching tasks are designed and dynamically adjusted. In the integration of industry and education, emphasis is placed on constructing a “teaching-research and development-application” closed-loop, and in-depth school-enterprise cooperation is achieved through real-job rotation training, dual-teacher collaboration, and project incubation. The psychological empowerment system constructs a “three-stage and six-dimension” support model covering the entire cycle of academic planning, skill training, and employment preparation.

3.2. Implementation paths and innovative measures of the system

At the specific implementation level, each dimension has been designed with innovative measures. In ideological and political education courses, a contextual teaching strategy is adopted. For example, role-playing of “substation mis-tripping accidents” is used to strengthen the awareness of safety responsibility. In stratified teaching, differentiated teaching tools such as the “protection configuration clearance game” and AR-assisted teaching are developed, and an advancement reward mechanism is established. In the integration of industry and education, the focus is on building a “teaching substation” real-scene platform, implementing the full-process training of “protection device wiring → debugging”, and introducing real-world enterprise projects into the classroom. The psychological empowerment system integrates technological means such as professional profiling tools, stress-fusing mechanisms, and HRV monitoring, and innovatively conducts situational simulation training such as “power protection accident hearings.” The coordinated effect of each dimension forms a complete closed-loop for stimulating students’ subjective initiative: Value guidance clarifies the development direction, stratified teaching consolidates the ability foundation, the integration of industry and education strengthens practical innovation, and psychological support ensures sustainable development, jointly promoting the improvement of the quality of talent cultivation in power-related higher vocational education.

4. Case of the “Relay Protection Technology” curriculum design

4.1. Implementation paths of ideological and political education in courses and stratified teaching

In ideological and political education in the “Relay Protection Technology” course, the teaching design mainly focuses on the main line of “value guidance-action internalization”. By introducing the deeds of model workers and real-world accident cases, such as the “ice-disaster-resistance and power-grid-protection” incident and

the wind-farm protection misoperation accident, and using forms such as video interviews and technical debates, students are guided to analyze problems from multiple dimensions such as technology, economy, and society, deepening their professional value cognition. In the implementation of stratified teaching, a three-level progressive task system is adopted: the basic group focuses on understanding protection principles and basic skills of parameter setting; the improvement group strengthens standardized operation ability and is required to complete practical tasks such as relay disassembly and assembly; the innovation group focuses on cultivating innovative abilities such as fault diagnosis and improvement suggestions. Through the design of differentiated tasks, it is ensured that students at all levels can improve based on their own ability levels.

4.2. Practical innovations in the integration of industry and education and psychological empowerment

The integration of industry and education is carried out through real projects, such as intelligent substation debugging. Through demand docking, scheme formulation, dual mentor review, and enterprise acceptance, it achieves deep integration between the teaching process and enterprise needs. Taking real-world projects such as intelligent substation commissioning as the carrier, through links such as demand docking, plan formulation, dual-tutor review, and enterprise acceptance, the in-depth connection between the teaching process and enterprise needs is achieved. At the same time, a “Relay Protection Maker Workshop” is established to promote the transformation of achievements. The psychological empowerment in this course constructs a “prevention-intervention-development” support system, implements the dual-tutor system, and the “monthly goal card” tracking mechanism. Through tools such as the “Relay Protection Work Competence Self-evaluation System” and “21-day Protection Log”, students can clarify their career positions and enhance their psychological resilience. This system integrates new technologies such as AI emotion analysis into mental health counseling to achieve full-process and precise support for students’ growth.

5. Conclusion and prospect

Based on the strategic requirements of the “Double-high plan” for the high-quality development of vocational education, this article takes the “Relay Protection Technology” course as the research object and constructs the theoretical framework of a four-dimensional collaborative stimulation system of “ideological and political education in courses as the guide-stratified teaching as the foundation-integration of industry and education as the driver-psychological empowerment as the support.” Starting from the core contradictions existing in power-related higher vocational education, this study systematically demonstrates the theoretical rationality and practical feasibility of the four-dimensional collaborative mechanism. By integrating the value-guiding function of ideological and political education in courses, the differential adaptation logic of stratified teaching, the practical-driving path of the integration of industry and education, and the full-process support mechanism of psychological empowerment, this article proposes, for the first time, a model for stimulating the subjective initiative of power-related higher vocational students, making up for the theoretical limitations of traditional single-dimension reforms. The four-dimensional system directly addresses the deep-seated contradictions of insufficient learning motivation among power-related higher vocational students, such as the lack of professional value recognition, homogeneous ability cultivation, virtualized practical scenarios, and fragmented psychological support. Through the coordinated action mechanism, it realizes the closed-loop

training logic of “value shaping → ability adaptation → practical strengthening → psychological escort.” From an interdisciplinary perspective integrating pedagogy, psychology, ethics, and engineering, it provides a new methodological framework for vocational education research.

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Disclosure statement

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Singing Breathing Techniques in 2nd-Grade Primary School Music: A Study Using “The Sea”

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Abstract: Under the guidance of the new curriculum standards, teachers should facilitate second-grade students’ music learning by enabling them to engage with and experience music more effectively during class. Singing constitutes a vital component of the curriculum at this academic stage, allowing students to experience the aesthetic value of music through active participation in singing activities. However, when second-grade students perform and sing songs they are more proficient in, they tend to express the music by shouting. When a teacher advises controlling the volume, students may inadvertently breathe too shallowly. This can lead to shorter note durations and a lack of coherence in phrasing, thereby hindering the ability to fully express the music and personally experience its beauty. Therefore, this article selects the piece “The Sea” from the second-grade lower-semester curriculum as an example for analysis. It integrates the teaching of singing respiration into the second-grade music classroom and applies it to this work, thereby enhancing students’ musical aesthetic sensibility and expressive capabilities, enabling a more profound interpretation of the piece, and allowing students to derive joy from their musical experiences.

Keywords: Second-grade primary school music; Singing breathing techniques

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1. Introduction

In first-grade music education, the majority of students are able to identify and sing basic musical notes, comprehend simple rhythmic patterns. In second-grade music education, in addition to reinforcing the aforementioned learning content, students’ understanding of music and the emotions derived from it becomes more profound compared to those in the first grade. Compared to the prior inclination toward overly harsh vocal expressions when performing familiar pieces, students at this stage demonstrate a greater tendency to adopt more aesthetically pleasing modes of expression. These include dynamic contrasts of strength and weakness, smooth phrasing, and coherent melodic lines. Through refined and comfortable musical articulation, they can achieve a more profound and beautiful musical experience. The New Art Curriculum Standards stipulate that

second-grade primary school students should sing with a natural voice, infusing their performances with rich ^[1].

However, students at this stage have not been exposed to systematic and basic vocal training. Due to their developmental stage, they tend to have insufficient breath during singing, which affects their performance of songs and the expression of emotions. For instance, they need to take a breath in the middle when facing long and coherent sentences, cannot reach high notes, and their voices are scattered and weak when handling weak notes, and they shout when handling strong notes.

It is important that proper breath management techniques be utilized when discussing the pathway to healthy, sustainable singing ^[2]. Therefore, the researcher believes that in the music classroom teaching of the second grade, in addition to closely adhering to the requirements and goals of the new curriculum standards, it is also necessary to integrate the teaching of singing and breathing into the classroom in combination with the curriculum standards.

2. A concise exploration of breathing techniques in singing and their application in classroom instruction

The production of sound arises from the vibration of the vocal folds during exhalation. This vibration induces resonant oscillations throughout the vocal apparatus, which collectively form the sound generated by the human voice—a unique “instrument” in its own right ^[3]. Therefore, in music singing performances, breathing is extremely important. The author will respectively explain the significance of breathing in singing through the “inhalation” and “exhalation” of breathing, and closely follow the point in the new curriculum standards that “second-grade students learn music while enjoying themselves”, transforming professional learning into interesting learning.

2.1. The role of inhalation and its integration into the new curriculum standards teaching

During the inhalation stage, the students inhale air into their bodies and exhale it to vibrate the vocal cords. Therefore, whether the amount of inhalation is large or small directly affects students’ singing state. The ways of inhaling are generally divided into three types: nasal inhalation, oral inhalation, and inhalation through both the mouth and nose. Nasal inhalation makes it easier to obtain a large amount of breath, but the inhalation speed is relatively slow. It is suitable for use when sentences are connected for a long time. Mouth inhalation can obtain breath within a short period of time, but it may cause insufficient breath volume when dealing with long sentences. Inhaling through the mouth and nose combines the above two advantages and can obtain a considerable amount of breath in a relatively short time, but it requires a high level of proficiency. Before the training of inhalation, second-grade students do not pay much attention to their inhalation state, do not care about the amount of air they need to inhale into the work, and due to their physiological age, the amount of air they inhale each time is relatively small, resulting in insufficient energy supply when exhaling and causing certain singing problems. Therefore, through systematic inhalation training, the problem of breath volume in singing can be fundamentally changed. In accordance with the requirements of the new curriculum standards and in combination with the characteristics of the second grade stage, the author has set up the following methods to train students’ inhalation ability.

2.1.1. Smell smell fragrance

Prepare flowers with a certain light fragrance or create a virtual situation filled with floral scents, guiding

students to take a deep breath through their noses. While feeling the fragrance of the flowers, they can also experience the state of their bodies when taking a deep breath. During the training, ask the students where they will be expanded after taking a deep breath, and then guide them to focus their inhalation on the abdomen, feeling the expansion of the waist and abdomen after inhalation.

2.1.2. Big big surprised

Create a scenario where a startling event is unfolding in the classroom. When the teacher utters suggestive words such as “wow”, the student reacts with shock by opening his mouth wide, taking a deep breath, and freezing momentarily. The student remains unable to exhale or take another breath until the teacher provides further instructions.

This training can enhance students’ ability to inhale through the mouth. As there is a certain breath-holding process involved, students still need to increase their breath volume to a certain extent when inhaling through the mouth, thereby obtaining exercise.

The above two methods are carried out through situational modes. Besides enriching the classroom’s interest, attracting students’ curiosity, and making them more focused, they can also strengthen students’ inhalation ability and exercise, and improve the inhalation ability of students at this stage in singing.

2.2. The role of exhalation and its integration into the teaching of the new curriculum standards

During the singing process, the activity of exhaling directly affects the vibration of the vocal cords to produce sound. The density and intensity of the breath during exhalation will directly affect the vibration of the vocal cords. Most students in the second grade or singers who have never received music singing training are in a passive process of breathing when performing because they have never paid attention to the activity of exhaling. During this process, the closure of the vocal cords and sound production are more reliant on the contraction of laryngeal muscle groups. Prolonged maintenance of this state may readily result in excessive fatigue of the throat or vocal cords, potentially leading to pathological conditions. Furthermore, the sound generated through excessive reliance on laryngeal muscle tension tends to be dry and hoarse, lacking resonance, which makes it challenging to achieve musical aesthetics.

The scientific method of exhalation is an essential component in musical singing. It involves the coordinated functioning of bodily mechanisms such as the abdomen and diaphragm, which expel the inhaled air from the body, thereby causing the vocal cords to vibrate and produce sound during exhalation. The state of exhalation not only influences the quality of the sound produced during vocal cord vibration but also plays a crucial role in shaping articulation during singing, the strength of notes and phrases, as well as the expression of emotions.

A good way of exhaling can not only reduce vocal cord damage and improve the bad habit of students in this grade who like to shout while singing, but also encourage them to process music in a more diverse form, making the music have a contrast between strong and weak and smooth lines.

Therefore, this study contends that in the training of music singing, incorporating exhalation training can foster students’ awareness of active breathing during singing, mitigate vocal cord damage caused by singing to some extent, and enhance the aesthetic appeal of musical works. In line with the requirements of the new curriculum standards and considering the characteristics of the second-grade stage, the author has devised the

following methods to cultivate students' exhalation abilities.

2.2.1. Naughty puppy

The teacher plays instruments or plays music with leaps. In the music, students imitate the panting sound of a puppy and make “hah, hah” sounds. In this exercise, the teacher needs to guide the students to exhale by forcefully bouncing their abdomens, and always pay attention to whether the students' conditions meet the requirements and whether their bodies are relaxed.

This exercise can enhance students' diaphragmatic jumping ability, allowing them to actively release their breath without resistance. It enables students to experience the functional state of their bodily mechanisms during exhalation and fosters the development of good breathing habits.

2.2.2. Exhalation challenge

The teacher plays an instrument or plays two or three melodies. The time depends on the specific situation. Before the music starts, students take a deep breath and emit a soft and even “sizzle” sound when the music begins, stopping along with the music. Each melody allows students to take a short break.

When practicing, students should stand upright with their hands on their hips, feel the tension between their abdomen and diaphragm, and deliberately control the exhalation to be soft and even. Teachers need to constantly remind and correct students to prevent them from emptying their breath all at once or exhaling unevenly, which would render the practice ineffective. The duration of exhalation is relatively long. Therefore, when inhaling, remind students to use deep inhalation to accumulate breath.

This exercise mainly trains and strengthens students' ability to exhale evenly and control the amount of exhalation, so that they can independently and freely control their breath during singing and better complete the work.

In singing, both inhalation and exhalation are crucial steps. They complement each other and neither can be dispensed with. Therefore, it is very important to incorporate the training of singing and breathing into classroom training.

3. A concise analysis of the application of breathing techniques in singing: A case study of “The Sea”

The vocal work “The Sea” (excerpted from Lesson 9, Flower City Edition Music Textbook for Grade 2, China) is a lyrical composition in F major with a 3/4 meter. Its tessitura spans a ninth interval (c^1-d^2), structured in two-bar subphrases and four-bar phrases. Characterized by a moderato tempo and cantabile style, this piece serves as an exemplary pedagogical material for vocal training. This chapter conducts a case study of this work to systematically analyze the application of respiratory techniques in art song performance.

As shown in **Figure 1**, although this sentence is divided into two small lines and can take a break in the middle, to sing out the major lines of the sentence and the smoothness of the music, this sentence should be sung in one go. For this reason, the training “Smell Smell Fragrance” set up in the courses mentioned above enables students to inhale sufficient breath volume before singing the sentence to support them in completing the singing of the sentence. The melodic development of this musical phrase progresses from low to high and then descends back to low. When performed vocally, the sound is sustained and seamless, evoking the ebb and flow of ocean waves. Additionally, this phrase serves as the opening of the composition. When instructing

students in their performance, it is important to emphasize that the volume should remain moderate, and the breath support must be steady to achieve a richer and more expansive musical expression.

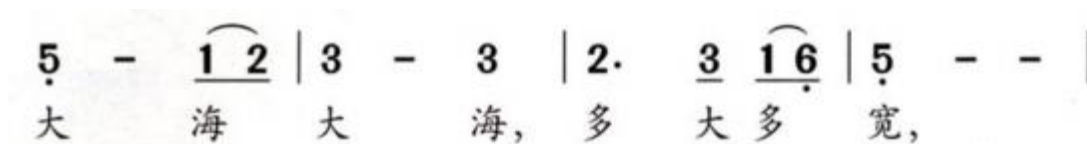


Figure 1. Bars 1–4 of “The Sea” (F major, 3/4 time) from Lesson 9 of the Flower City Edition Music Textbook for Grade 2

As illustrated in **Figure 2**, the first occurrence of the highest pitch d2 in this work appears in this measure, and it notably occurs on a weak beat. When singing, the teacher should emphasize to the students that the physical strength utilized during singing originates from the core muscles of the waist and abdomen, rather than exerting pressure on the throat. As students inhale, their waist and abdominal areas should expand, focusing on engaging these core muscles. This approach facilitates a transition from relying on throat tension to utilizing the strength of the waist and abdomen during singing. Consequently, this technique not only minimizes potential damage to the vocal cords but also enhances the aesthetic quality of the music and improves singing efficiency.

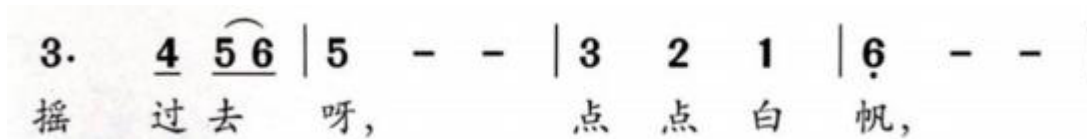


Figure 2. Bars 9–12 of “The Sea” (F major, 3/4 time) from Lesson 9 of the Flower City Edition Music Textbook for Grade 2

As shown in **Figure 3**, this phrase represents the climax of the piece, featuring the three highest notes (d²) while constituting a complete four-bar musical phrase. Given its extended length and moderate technical difficulty, it poses a challenge for second-year students. Prior to vocal execution, instructors should guide students to adopt diaphragmatic breathing techniques, ensuring adequate respiratory support for sustained phonation.

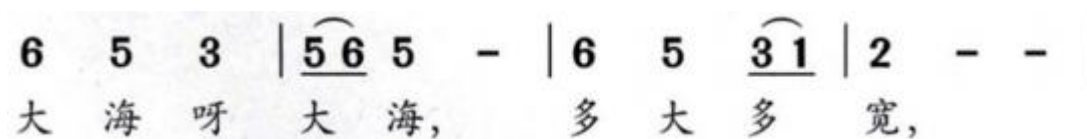


Figure 3. Bars 17–20 of “The Sea” (F major, 3/4 time) from Lesson 9 of the Flower City Edition Music Textbook for Grade 2

In conclusion, the systematic integration of respiratory techniques in vocal pedagogy, particularly through contextualizing breath management within the performance of *The Sea*, achieves multidimensional pedagogical efficacy. This approach not only resolves technical challenges inherent in the work (e.g., extended phrase sustainment across nine-degree tessitura) but also enhances emotional articulation through dynamic breath modulation, which simultaneously cultivates students’ vocal competency, aesthetic discernment, and holistic musicianship.

4. Conclusion

Second-grade students are lively in behavior and active in thinking, and they are very willing to express what they have learned and can do. In singing, they are also prone to a series of minor singing problems, which prevent them from better expressing the emotions of the music through singing or from completely singing musical works that are relatively difficult for second-grade students.

The breathing state forms used by second-grade students in singing studied in this article are vivid and interesting, which makes it convenient for students to understand and use. It is integrated and analyzed with the musical work “The Sea”, combining the simple method with singing into one, so that the work can be better expressed.

Overall, for second-grade students in music classes, apart from learning to sing the melodies of music, they still need to master certain singing techniques and incorporate these techniques into their singing, laying a more solid foundation for subsequent learning and singing.

Disclosure statement

The author declares no conflict of interest.

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Exploration of the Digital Transformation Path of College English Teaching from the Perspective of Blended Teaching

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Abstract: In contemporary society, digitalization has become a prominent feature of the times. Specifically in the field of higher education, digital construction has become a crucial strategic issue related to the quality of development. Therefore, this article mainly conducts relevant analysis and research on the digital transformation of college English teaching from the perspective of blended teaching, for reference only.

Keywords: Blended teaching; College English; Digital transformation

Online publication: June 5, 2025

1. Introduction

The Ministry of Education clearly pointed out in the annual education work conference that it is necessary to focus on promoting the teaching digitalization strategy and deepen reform to inject new momentum into education development. The education of college English majors undertakes the important responsibility of cultivating foreign language talents who meet the requirements of the times. It is necessary to transform and upgrade in the digital direction to better adapt to the requirements of higher education reform in the new era.

2. The construction significance of the digital transformation of college English teaching

2.1. Improving teaching content

From the perspective of blended teaching, the digital transformation of college English can greatly improve the training effect of English talents. For example, with the help of artificial intelligence technology, English talents can exercise their writing ability, and continuously improve their English expression skills such as essay writing and letter writing. At the same time, with the help of digital tools, a large amount of English teaching resources

can be introduced, broadening students' horizons ^[1].

2.2. Enriching teaching forms

Digital technologies such as artificial intelligence, AR, and VR, when applied in various industries, often turn the impossible into possible. The same is true in college English teaching. For example, the application of VR technology allows students to directly converse with foreign friends in class or switch to different English application scenarios while in the classroom. This meets students' learning needs and hobbies and improves the fluency and accuracy of their oral expressions.

2.3. Implementing the blended teaching model

The blended teaching model usually refers to the online-offline teaching model. The realization of this model requires advanced teaching technology support, such as a stable network environment, a fully functional teaching platform, and convenient teaching equipment, to ensure the smooth progress of online teaching. Therefore, the digital transformation of college English teaching plays an important role in promoting the blended teaching model ^[2].

3. The Forms of the digital transformation of college English teaching

3.1. The transformation of teaching design

In the teaching design stage, teachers need to consider many issues, such as students' learning situations, digital technologies and equipment, the requirements of English-related positions, teaching objectives, and teaching progress. At the same time, influenced by the dual factors of the online-offline blended model and digital transformation, teachers must also reorganize and integrate teaching content, organically combining digital resources with traditional teaching content to meet the learning needs and styles of different students ^[3]. Since college students come from all over the country, there are significant differences in their social experiences, knowledge reserves, and ways of dealing with people. Coupled with the diversity of college English-related majors, teachers need to base on the main body of students and use digital technology to carry out hierarchical and personalized education in the teaching design process to ensure that students can achieve results in their studies. In the process of design transformation, teachers can transform with market demands, school-enterprise cooperation, and digital technology as guidance, to achieve the digital, three-dimensional, and information-based development of college English.

3.2. The transformation of teaching methods

If English teachers want to implement the online-offline blended model in the classroom and promote the digital transformation of English classrooms, they must break through traditional teaching methods and try to innovate and apply novel teaching methods ^[4]. The transformation of teaching methods can have a positive impact on students' knowledge structure, cognitive structure, emotional structure, personality characteristics, and ability tendencies. The transformation of teaching methods from the traditional face-to-face teaching and blackboard-writing model to a model centered on digital technologies such as smart classrooms, cloud classrooms, and virtual training can not only stimulate the interest and enthusiasm of young talents in learning English, improve their learning experience and feelings, but also enable the college English discipline to keep up with the times and achieve healthy and sustainable development.

3.3. The transformation of evaluation methods

The college English evaluation system usually includes formative assessment, attendance, summative exams, and classroom performance. Although these evaluation methods seem complete, they actually have some disadvantages. For example, formative assessment may easily ignore the improvement of students' actual learning abilities; attendance assessment cannot comprehensively and truly reflect students' learning attitudes and participation. Therefore, teachers need to comprehensively transform the evaluation methods of college English. On the basis of the above-mentioned evaluation forms, digital technology should be introduced. The application of digital technology can conduct a full-process and all-around teaching evaluation of students. It can not only help students understand their advantages and disadvantages in learning and develop the good habit of self-reflection, but also provide more accurate teaching feedback for teachers, realizing "promoting learning, teaching, and improvement through evaluation"^[5].

4. The effective paths for the digital transformation of college English teaching from the perspective of blended teaching

4.1. Changing the concept of talent cultivation

With the implementation of relevant documents such as the "Education Informatization 2.0 Action Plan", the "Guidelines for the Construction of Ideological and Political Education in Higher Education Courses", and the "National Standards for the Teaching Quality of Undergraduate Majors in General Colleges and Universities", higher education has entered a new era. In addition to completing their basic teaching tasks, college English teachers should also pay attention to the cultivation of students' ideological and moral qualities, character traits, and cultural literacy. Only in this way can students not only master English language skills but also have good comprehensive qualities, establish correct outlooks on life, values, and career, and become socialist builders and successors with a sense of national and family responsibility, an international perspective, and an innovative spirit. These documents also explain and emphasize students' "information technology capabilities", which have become one of the necessary factors for the digital transformation of college English. At the same time, from the perspective of blended teaching, the cultivation of "versatile" and "multi-skilled" English talents also requires the support of digital technology. Therefore, in order to better meet the needs of cultivating English talents in the new era, college English teachers must change their concepts of talent cultivation, actively innovate blended teaching methods, and continuously improve the training plan for English majors. When changing concepts and designing plans, teachers must base on an international perspective and national conditions, combine the actual situation and characteristics of their institutions, and adhere to following the laws and connotations of foreign language disciplines. Only in this way can the transformation from traditional English classrooms to digital English classrooms be accelerated, and more language talents needed for national construction and social development can be cultivated^[6].

4.2. Building a digital learning platform

College English usually includes four categories: Business English, Management English, Science and Engineering English, and Humanities English. With the development of digital technology in China, teachers are applying more and more teaching methods in teaching. In order to better achieve the overall and synchronous development of young talents, the blended teaching model has emerged. This model breaks the limitations of time and space, inherits the advantages of traditional English teaching, and integrates digital

technology, greatly improving the learning efficiency of young talents and providing strong support for their personal and professional development ^[7].

The digital platform, as an important carrier of the blended teaching model and the digital transformation of the college English discipline, its construction is not only related to the development of students' English literacy and professional qualities, but also to the success of the reform of college English teaching and its digital transformation. An excellent digital platform can not only provide strong support for students to learn English knowledge, understand foreign cultures, and develop their personalities, but also provide teachers with sufficient teaching materials and resources, enabling them to "give full play to their abilities" in English classrooms and "cook delicious meals with colorful ingredients." It effectively improves the teaching environment and atmosphere of English classrooms, making it possible for college English teaching to reach a new height and promoting the continuous progress of the educational cause.

In the process of building a digital platform, colleges and universities can determine the construction method according to their financial resources. If a college or university has strong financial resources, it can build a digital teaching platform with school-based attributes, fully integrating the school's teaching characteristics and faculty advantages to create a unique learning environment ^[8]. If a college or university has relatively limited financial resources, it can choose to cooperate with other colleges and universities or educational institutions to develop a digital platform, or directly access other excellent digital teaching platforms, such as the "Open Cloud Academy APP" of the National Open University and the "Rain Classroom" of Tsinghua University. These methods can also make up for the deficiencies of the school and promote the digital development of college English teaching ^[9].

However, since digital technology is still in development, teachers and students often encounter problems such as a lack of multi-dimensional human-machine interaction, one-way resource output, and insufficient aggregation of digital English resources when actually using digital platforms. With the continuous deepening of the application of digital technology in the education system, some digital platforms have begun to overcome these problems. By connecting intelligent learning systems and assessment technologies, they have greatly improved the effect of human-machine interaction, made two-way resource output smoother, and significantly enhanced the aggregation of digital English resources ^[10].

4.3. Building a modern teaching team

In most colleges and universities, the English discipline exists in the form of a public basic compulsory course, so there are a large number of students taking English courses ^[11]. In order to better meet the English learning needs of students with different abilities and foundations, teachers must try to transform the English discipline from a "large-scale standardized teaching" model to a "large-scale personalized teaching" model. Under the dual background of blended teaching and digital transformation, college English teachers must always pay attention to the cutting-edge digital technologies and research results in the English field, explore the connection between college English and digital technologies, reshape the concept of intelligent teaching, actively learn various "digital + teaching" cases, draw experience and inspiration from them, and continuously improve their digital teaching capabilities. In terms of the digital training of college English teachers, colleges and universities should do the following.

Establish a digital growth file for English teachers. The file needs to record in detail the progress and achievements of teachers in digital teaching, and organize teachers' previous teaching habits, teaching quality,

and teaching evaluation results into data and upload them to the electronic file for later tracking.

Establish a special training platform. With the help of digital technology, on the one hand, it can improve the efficiency and quality of English teaching and enhance students' English literacy. On the other hand, it can also improve teachers' digital literacy and strengthen their digital teaching capabilities^[12]. In the English teacher training management platform, teachers can access a large number of digital English teaching resources, such as online courses and teaching cases. At the same time, the platform can also develop special training plans for English teachers according to their personal digital foundations and abilities, and push personalized training content and tasks to help teachers improve their digital teaching capabilities more efficiently.

Strengthen teachers' application ability of digital devices. In order to better achieve the digital transformation of college English, colleges and universities should not only pay attention to teachers' digital theoretical literacy but also focus on training teachers' application ability of digital technologies. Colleges and universities can regularly organize teachers to participate in training courses on the use of digital devices and invite digital technicians to the school for on-site guidance, so as to help teachers master the operation methods of various digital devices and continuously improve their application ability of digital devices.

Establish a community of college English teachers. The establishment of the community can connect English teachers from different regions and colleges and universities, enabling them to learn from each other, inspire each other, and discuss the problems and solutions in digital teaching, thereby promoting the overall improvement of the digital teaching level of college English teachers^[13].

4.4. The practical application of digital technology

Digital technology is not a single technology but a general term for a variety of modern technologies. In teaching, commonly used digital technologies include artificial intelligence technology, VR technology, etc. Take the application of artificial intelligence technology in college English as an example. When training students' English pronunciation, college English teachers can use artificial intelligence software to help students master and practice their oral English skills. After students have strong oral English skills under the guidance of artificial intelligence software, they can be organized to conduct offline oral conversations, or foreign friends and international students can be invited to communicate with students in oral English. Through this online-offline combination method, not only can students' oral English training scenarios be enriched, but also their flexibility and response ability in oral expression can be improved. Take the application of VR technology in college English as an example. In the context of blended teaching, teachers can use VR technology to construct virtual language environments, such as simulating real-life scenarios in English-speaking countries, like academic seminars, business negotiations, or daily conversations. When students interact with AI virtual characters in real-time through head-mounted devices, the speech recognition module in the system will automatically correct students' pronunciation and grammar errors and record the interaction data for teachers to analyze. After class, students can review the high-frequency vocabulary and expressions in the scenarios through mobile VR micro-courses and complete situational assignments (such as dubbing in virtual scene reproduction) on the online platform. On the teacher's side, according to the personalized learning reports generated by the platform, teachers can use offline time to focus on training students' common weak points^[14]. For example, through the design of group collaboration tasks, students can complete project-based learning (such as virtual cross-border enterprise cooperation projects) in VR social games. This closed-loop blended model of "virtual immersion + online reinforcement + offline deepening" not only breaks through the limitations of physical space on language

practice but also achieves precise teaching through data-driven methods, ultimately forming a deep-learning cycle of “self-experience-feedback correction-collaborative internalization.”

In addition, teachers can also use artificial intelligence technology to deeply analyze students’ English abilities and interests, point out their strengths and weaknesses in the English field, and then provide them with targeted guidance and help ^[15].

5. Conclusion

All in all, the digital transformation of college English is an inevitable trend of educational change. In this transformation process, college English teaching shows four remarkable characteristics: teaching resources are in an open and shared state, teaching models show a diversified development trend, teaching tools have achieved intelligent upgrades, and the teaching environment breaks through the limitations of physical space. College English teachers must actively adapt to these changing trends, update teaching concepts in a timely manner, systematically master cutting-edge digital technologies, and innovate digital teaching methods to finally give full play to the real role of digital technology in college English teaching.

Disclosure statement

The author declares no conflict of interest.

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Interdisciplinary Education: Research on Collaborative Teaching of Traditional Chinese Medicine and Western Medicine

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Abstract: This study explores the integration of traditional Chinese medicine (TCM) and Western medicine in medical education, focusing on the First Affiliated Hospital of Guizhou University of Traditional Chinese Medicine. The research highlights the growing need for interdisciplinary approaches in addressing the complexities of modern healthcare. It examines the benefits and challenges of combining TCM's holistic and preventive approach with the technological advancements of Western medicine. A mixed-methods design was employed, involving 150 medical students across various levels of training, who participated in a 12-week program with lectures, clinical rotations, case discussions, and workshops. The study found significant improvements in students' knowledge, attitudes, and clinical confidence, particularly in integrating both medical systems. Despite challenges, such as cultural differences, skepticism from Western-trained students, and faculty coordination, the program demonstrated the potential of interdisciplinary education to foster patient-centered care and enhance critical thinking. The study suggests the need for clearer curriculum structures, standardized assessments, and enhanced faculty collaboration to optimize the effectiveness of such programs.

Keywords: Interdisciplinary education; Traditional Chinese medicine; Western medicine; Medical curriculum; Patient-centered care

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1. Introduction

1.1. Background and context of medical education

Medical education, in its traditional form, has been largely divided into two primary systems: Traditional Chinese medicine (TCM) and Western medicine. These two medical paradigms represent distinct approaches

to diagnosing, treating, and preventing diseases. While both systems have proven effective in various contexts, they differ significantly in their underlying philosophies, diagnostic methods, and therapeutic strategies. Western medicine, with its roots in science and technology, focuses on evidence-based practices, often employing cutting-edge diagnostic tools and treatment regimens. On the other hand, TCM, with a history spanning over two millennia, is rooted in a holistic view of health, emphasizing balance, harmony, and the interaction between the body, mind, and environment ^[1].

Given the complexity of modern healthcare and the increasing demand for patient-centered care, there has been a growing recognition of the potential benefits of integrating TCM and Western medicine. This integration is not just limited to treatment practices but also extends to the educational environment. The need for a more holistic approach to medical education, one that appreciates and incorporates the strengths of both TCM and Western medicine, has become more evident in recent years. Medical educators and institutions are increasingly exploring ways to bridge the gap between these two medical systems, aiming to equip future healthcare providers with a comprehensive skill set that spans both traditions.

1.2. The importance of integrating TCM and Western medicine in medical education

The integration of TCM and Western medicine into a cohesive curriculum can provide medical students with a more comprehensive understanding of health, disease, and patient care. Western medicine, with its focus on empirical evidence, excels in acute care, surgical interventions, and scientific advancements in the treatment of diseases. However, it often faces limitations when addressing chronic conditions, managing pain, and considering the psychosocial aspects of health. In contrast, TCM emphasizes prevention, lifestyle adjustments, and the use of natural remedies to restore balance within the body. It is particularly effective in managing chronic conditions, promoting wellness, and enhancing quality of life ^[2].

Integrating both systems into medical education allows students to gain insights into complementary and alternative therapeutic options, giving them a broader toolkit to treat diverse patient populations. This interdisciplinary education fosters a more holistic view of healthcare, one that is better suited to meet the multifaceted needs of modern patients. For instance, patients suffering from chronic pain may benefit from a combination of Western pharmacological interventions and TCM therapies such as acupuncture or herbal medicine. By understanding and practicing both medical paradigms, healthcare providers can offer more personalized treatment options, leading to improved patient outcomes ^[3].

1.3. Current challenges in medical education: The need for interdisciplinary approaches

Despite the clear benefits of integrating TCM and Western medicine, several challenges remain in effectively implementing interdisciplinary education. One major obstacle is the traditional compartmentalization of medical education into distinct fields. In many educational settings, TCM and Western medicine are taught as separate disciplines, with minimal interaction between the two. This siloed approach limits students' exposure to alternative medical practices and restricts their ability to make informed, integrative decisions when treating patients.

The integration of TCM into Western medical curricula has often been met with resistance from both educators and students. Some faculty members from Western medicine may be skeptical about the scientific validity of TCM, while students may find it difficult to balance the different paradigms and apply them simultaneously in clinical settings. Moreover, the absence of standardized teaching frameworks, assessment

methods, and faculty collaboration complicates the development of effective interdisciplinary teaching models.

Furthermore, cultural differences play a significant role in the challenge of integrating TCM and Western medicine. In some regions, particularly in the West, TCM is still viewed with skepticism due to its non-empirical, holistic nature. Overcoming this skepticism requires a robust educational framework that addresses the scientific foundations of TCM while respecting its cultural and historical significance. The challenge lies in creating a curriculum that is evidence-based, respects the unique aspects of both medical systems, and prepares students to work with diverse patient populations who may seek care from either or both traditions ^[3-4].

1.4. The role of interdisciplinary education in shaping future healthcare providers

Interdisciplinary education, particularly in the context of integrating TCM and Western medicine, plays a pivotal role in shaping well-rounded healthcare providers. The incorporation of TCM into Western medical education helps students develop critical thinking skills and fosters an appreciation for diverse medical traditions. By engaging with both systems, students are more likely to approach patient care with an open mind, considering a wide range of treatment options that extend beyond conventional Western practices.

Interdisciplinary medical education also enhances communication skills, which are essential for effective patient care. When healthcare providers are trained in both TCM and Western medicine, they are better equipped to communicate with patients who may have a preference for one system over the other. This understanding allows providers to engage in meaningful discussions with patients, fostering trust and improving patient satisfaction. Moreover, interdisciplinary education encourages collaborative learning among students from different medical disciplines, promoting teamwork and mutual respect.

As the healthcare landscape continues to evolve, there is an increasing need for healthcare providers who are capable of thinking critically, collaborating across disciplines, and providing holistic care. Interdisciplinary education is key to addressing this need, as it enables future doctors, nurses, and other healthcare professionals to incorporate the strengths of both TCM and Western medicine into their practice ^[5-7].

1.5. Research objectives and scope of the study

The primary objective of this study is to explore the impact of interdisciplinary education that combines TCM and Western medicine in the training of medical students. This study aims to investigate the benefits, challenges, and outcomes of such an educational approach, with a particular focus on the development of clinical skills, decision-making, and patient care. The study will examine the experiences of medical students and faculty members involved in interdisciplinary teaching programs at the First Affiliated Hospital of Guizhou University of Traditional Chinese Medicine.

Through this research, we aim to identify the key factors that contribute to the success of interdisciplinary medical education and propose strategies for overcoming the challenges associated with curriculum integration, faculty collaboration, and assessment standards. The findings of this study will provide valuable insights for medical educators seeking to implement or improve interdisciplinary teaching programs that integrate TCM and Western medicine.

2. Literature review

2.1. Historical context of traditional Chinese medicine and Western medicine

Traditional Chinese medicine (TCM) has a history spanning over two millennia, deeply rooted in the cultural

and philosophical traditions of China. It is based on the principles of balance, harmony, and the interconnection between the human body and the natural environment. TCM practices are built upon foundational concepts such as Yin and Yang, the Five Elements, and Qi (vital energy). These principles guide the diagnosis and treatment of illness, emphasizing the importance of maintaining balance and prevention over merely addressing symptoms. Treatments in TCM include herbal medicine, acupuncture, dietary therapy, and Qi Gong, each focusing on restoring harmony within the body.

In contrast, Western medicine, also referred to as biomedicine, emerged through a scientific approach to health and disease. It is based on the understanding of human biology, pathophysiology, and the use of empirical evidence. Western medicine is grounded in the principles of anatomy, physiology, and pharmacology, and its treatments largely revolve around technological advancements, surgical procedures, and pharmacological interventions. The advent of the scientific method and clinical trials has led to evidence-based practices that dominate healthcare systems worldwide.

While these two medical traditions have developed separately, there has been growing recognition of the value in integrating their respective strengths. The coexistence of both systems in contemporary medical education has created opportunities to blend the holistic approach of TCM with the technological advancements of Western medicine, offering a more comprehensive approach to patient care^[8-10].

2.2. Benefits of interdisciplinary education

Interdisciplinary education has gained significant attention in recent years, particularly in the context of healthcare. It refers to the integration of knowledge, skills, and perspectives from different disciplines to provide a more holistic and collaborative approach to problem-solving and decision-making. In the case of TCM and Western medicine, interdisciplinary education offers several notable benefits, both for medical students and healthcare providers.

One of the primary advantages of an interdisciplinary approach is the development of critical thinking and problem-solving skills. By being exposed to two different medical paradigms, students are encouraged to think creatively and consider a broader range of treatment options. This not only enriches their clinical decision-making but also enhances their ability to treat patients more holistically. For example, a patient suffering from chronic pain may benefit from Western pharmacological treatments alongside TCM therapies such as acupuncture, which could help alleviate pain and improve the patient's overall well-being.

Furthermore, interdisciplinary education fosters cultural competence and empathy. TCM has a deep cultural and philosophical foundation that emphasizes the connection between mind, body, and spirit. By learning about TCM, students gain insights into different cultural approaches to health, which helps them better understand and respect the diverse beliefs and preferences of patients. This cultural awareness is particularly important in today's increasingly globalized healthcare environment, where patients often come from varied cultural backgrounds and may prefer alternative or complementary treatments.

Additionally, interdisciplinary education promotes collaboration and teamwork. In the clinical setting, healthcare providers often work in multidisciplinary teams, and the ability to collaborate effectively with professionals from different fields is crucial for providing high-quality patient care. By integrating TCM and Western medicine into educational curricula, students are trained to approach healthcare as a team effort, recognizing the value of each discipline and working together to meet the needs of patients^[8-12].

2.3. Challenges of integrating TCM and Western medicine

Despite the potential benefits of integrating TCM and Western medicine, several challenges hinder the successful implementation of interdisciplinary education. One of the most significant barriers is the lack of standardized frameworks for curriculum development. TCM and Western medicine are typically taught as separate disciplines, with distinct educational pathways, teaching methods, and assessment criteria. As a result, finding common ground and creating a cohesive, interdisciplinary curriculum can be difficult.

In addition, there is often a lack of collaboration between TCM and Western medicine faculty members. Educators from different medical traditions may have differing views on teaching methodologies and clinical practices, which can lead to resistance when attempting to design an integrated curriculum. Some instructors from Western medicine may be skeptical about the scientific validity of TCM, while TCM instructors may feel that Western medicine overlooks the holistic aspects of healthcare. This lack of consensus can create tensions and complicate the development of interdisciplinary programs.

Another challenge is the time and resources required to implement interdisciplinary education effectively. Incorporating both TCM and Western medicine into medical curricula requires significant investment in faculty training, curriculum development, and assessment tools. Furthermore, the integration of two complex medical systems demands additional time in the classroom and clinical settings, which may be difficult to accommodate within the constraints of existing medical programs.

Furthermore, students may face difficulties in balancing the theoretical and practical aspects of both systems. TCM and Western medicine have different approaches to diagnosis and treatment, which can be overwhelming for students who must learn and apply both systems simultaneously. The lack of a unified approach to teaching and assessment may also result in confusion and cognitive overload for students, making it challenging for them to apply both paradigms in clinical settings effectively.

2.4. Existing models of TCM and Western medicine collaboration

Although integrating TCM and Western medicine into a single educational framework presents challenges, several institutions have successfully developed collaborative models. These models provide valuable insights into how interdisciplinary education can be implemented effectively.

One example is the integration of TCM into the curricula of medical schools in China, where both systems are taught side by side. In some institutions, students begin their education with a strong foundation in Western medicine, followed by the introduction of TCM concepts later in their training. This approach allows students to appreciate the strengths of both medical systems without overwhelming them early in their studies. In these institutions, clinical rotations often involve exposure to both Western medical practices and TCM therapies, allowing students to experience the complementary nature of the two systems firsthand.

Internationally, several medical schools have also explored the integration of TCM into Western medical curricula. For instance, the University of Maryland School of Medicine has developed a program in which medical students receive training in acupuncture and TCM as part of their overall medical education. This program aims to introduce students to alternative treatments and broaden their therapeutic options, particularly in the management of chronic conditions.

Similarly, the University of Sydney in Australia has introduced complementary medicine into its medical curriculum, which includes elements of both Western medicine and TCM. This program seeks to provide students with a well-rounded education, incorporating both evidence-based practices and holistic approaches to

patient care. In these models, faculty members from both disciplines collaborate to develop a comprehensive curriculum that addresses the needs of students and prepares them for diverse patient populations.

Despite these successful models, the integration of TCM and Western medicine remains a work in progress. Further research is needed to assess the effectiveness of these programs, identify best practices, and develop standardized frameworks for integrating both medical systems into educational curricula ^[13–16].

2.5 Conclusion of the literature review

The literature review highlights the rich history and distinct principles of TCM and Western medicine, and it emphasizes the benefits and challenges of integrating these two systems in medical education. Interdisciplinary education that combines TCM and Western medicine has the potential to broaden students' understanding of healthcare, enhance their clinical decision-making, and improve patient outcomes. However, challenges related to curriculum integration, faculty collaboration, and student adaptation must be addressed to ensure the successful implementation of such programs.

Existing models of TCM and Western medicine collaboration demonstrate the viability of interdisciplinary education but also highlight the need for further research and development. As the demand for more comprehensive and patient-centered care continues to grow, the integration of TCM and Western medicine in medical education will play an increasingly important role in preparing healthcare providers for the complexities of modern healthcare.

3. Methodology

3.1. Study design

This study utilized a mixed-methods approach to investigate the effectiveness of interdisciplinary education that integrates traditional Chinese medicine (TCM) and Western medicine in the medical curricula at the First Affiliated Hospital of Guizhou University of Traditional Chinese Medicine. The mixed-methods design was chosen because it allows for both quantitative data to measure the outcomes of the educational intervention and qualitative data to explore the perceptions and experiences of participants involved in the program.

The research design consists of two main components:

Quantitative component: A survey-based approach to assess students' knowledge, attitudes, and clinical skills before and after participating in the interdisciplinary educational program.

Qualitative component: In-depth interviews with faculty members and medical students to gather insights into the challenges and benefits of integrating TCM and Western medicine in the educational setting.

The mixed-methods approach enables a comprehensive analysis of the impact of interdisciplinary teaching, providing both measurable outcomes and a deeper understanding of the factors influencing the success of such an educational program.

3.2. Participants

This study involved 150 medical students from the First Affiliated Hospital of Guizhou University of Traditional Chinese Medicine: 50 undergraduate interns, 50 master's students, and 50 regulation training residents.

Interns were final-year undergraduates with basic TCM and Western medicine training but limited clinical integration experience.

Master's students had deeper TCM knowledge but limited exposure to Western medicine.

Residents were trained in Western medicine and sought TCM integration.

Inclusion criteria: Active enrollment, willingness to participate, and completion of basic TCM and Western medicine coursework.

Exclusion criteria: Prior advanced interdisciplinary training or dual formal qualifications.

3.3. Interdisciplinary Educational Program

A 12-week program combined TCM and Western medicine through lectures, clinical rotations, case discussions, and practical workshops. Lectures introduced diagnostic and treatment principles from both systems. Rotations allowed students to apply integrated knowledge in clinical settings. Case discussions promoted critical thinking and cross-disciplinary decision-making. Workshops offered hands-on training in techniques from both medical traditions.

3.4. Data collection

Data were collected via surveys and interviews at three stages: before, during, and after the program.

Surveys measured knowledge, attitudes, and clinical competence. Weekly feedback guided program improvements. Interviews with 30 students and faculty explored experiences and challenges.

3.5. Data analysis

Quantitative: Paired *t*-tests and correlation analysis assessed changes and group differences.

Qualitative: Thematic analysis using NVivo identified key themes in faculty and student interviews.

3.6. Ethical considerations

IRB approval was obtained. All participants gave informed consent. Data confidentiality was strictly maintained, and participation had no impact on academic evaluation.

3.7. Limitations

The single-institution scope and sample size limit generalizability. Self-reported data may include biases. Future research should expand to larger, multi-site studies.

4. Results

4.1. Overview of data collection

Data were collected in three phases—before, during, and after the interdisciplinary education program—from 150 medical students (50 undergraduate interns, 50 master's students, 50 regulation training students) and 20 faculty members. Quantitative surveys assessed changes in knowledge, attitudes, and clinical skills, while qualitative interviews captured experiential feedback.

4.2. Pre-program survey results

Students showed stronger baseline knowledge of Western medicine (avg. 82%) than TCM (avg. 62%), with master's students scoring higher in TCM. Attitudes toward integration were generally positive, though Western-focused students were more skeptical. Confidence in clinical skills varied: master's students felt more confident

applying TCM (mean: 4.1) than interns (3.2) or regulation students (2.8).

4.3. During-program feedback

Lectures received high ratings (88% helpful/very helpful), particularly for integrated case studies. Clinical rotations were valuable for 70% of students but posed challenges in reconciling differing approaches. Interdisciplinary case discussions boosted critical thinking (85% positive). Practical workshops were well-received (90%), though some skepticism about TCM remained among Western medicine students.

4.4. Post-program survey results

Post-program surveys showed increased knowledge (Western: 88%, TCM: 76%), especially among regulation students. Positive attitudes toward integration rose to 92%, with more students open to using both systems. Confidence improved across all groups, and 80% reported better clinical decision-making and communication with diverse patients.

4.5. Faculty feedback

Faculty noted both benefits and challenges in collaboration. Differences in pedagogy and philosophy occasionally caused tension, but interdisciplinary teaching deepened mutual understanding. Concerns were raised about assessing integrative competencies and the need for faculty development. Overall, faculty supported the program's value in enhancing students' critical thinking and holistic care capacity.

4.6. Student feedback

Interviews with 30 students highlighted broadened perspectives and appreciation for holistic care. Challenges included reconciling TCM with Western scientific frameworks and a desire for clearer guidance during clinical integration.

4.7. Summary of results

The program significantly improved students' understanding, attitudes, and confidence in integrating TCM and Western medicine. Both students and faculty affirmed the program's role in fostering patient-centered, interdisciplinary medical education, despite some implementation challenges.

5. Discussion

5.1 Key findings and their implications

This study demonstrates that integrating Traditional Chinese Medicine (TCM) and Western medicine into medical education significantly enhances students' knowledge, attitudes, and clinical skills. Students showed improved understanding and increased confidence in applying both systems, supporting a holistic approach to healthcare.

A key finding is the shift in attitudes, especially among students trained in Western medicine, who initially expressed skepticism about TCM. After completing the program, most recognized its complementary role, suggesting that interdisciplinary education fosters greater openness to diverse medical perspectives.

Clinical rotations played a vital role in helping students apply both systems in practice. Through hands-on experiences, students saw how integrating TCM and Western medicine can enhance clinical decision-making

and patient care.

5.2 Integration of TCM and Western medicine: Benefits and challenges

Combining TCM and Western medicine broadens students' clinical reasoning by exposing them to a wider range of treatment strategies. For example, integrating pharmacological and traditional therapies like acupuncture can better address chronic conditions.

The program also promoted cultural competence. Understanding TCM helped students appreciate patient diversity and tailor care accordingly, a crucial skill in multicultural healthcare settings.

However, challenges remain. A major issue is the absence of standardized interdisciplinary curricula. Differences in teaching methods and philosophies complicate curriculum design. TCM emphasizes individualized, holistic care, while Western medicine focuses on evidence-based, standardized practices, requiring careful coordination between faculties.

Faculty collaboration is another barrier. Although educators value the integrated model, differing medical paradigms can create tension. Cross-training and joint professional development are needed to improve teaching cohesion.

5.3. Faculty and student perspectives

Faculty generally supported the program, noting improvements in students' clinical and critical thinking skills. However, they acknowledged challenges in unifying teaching approaches across disciplines and stressed the need for structured training in interdisciplinary methods.

Students welcomed the dual-system education and felt it prepared them for comprehensive care. Yet, some—particularly from Western backgrounds—struggled to reconcile different diagnostic models. A gradual curriculum introducing foundational knowledge before advanced integration may be more effective.

Students also found the program intellectually demanding. Many suggested additional support during clinical training would help manage the complexity of learning and applying two distinct medical systems.

5.4. Opportunities for curriculum and teaching improvements

While successful overall, the program would benefit from a clearer progression. Rather than combining both systems from the start, a stepwise structure—beginning with core principles and advancing to integration—may aid student learning.

Standardized assessments are also needed to evaluate students' ability to apply both medical systems in practice. Faculty collaboration should be enhanced through joint workshops and development programs to address differences in teaching styles and promote interdisciplinary cohesion.

Disclosure statement

The authors declare no conflict of interest.

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The Educational Value, Implementation Principles, and Integration Pathways of Traditional Puzzle Games in Early Childhood Education

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Abstract: With the continuous development of modern educational concepts, the value of traditional puzzle games in preschool education has gained increasing recognition. This paper explores the significance, principles, and practical implementation approaches of integrating traditional puzzle games into early childhood education by analyzing their crucial role in children's physical and mental development, intellectual cultivation, and cultural heritage preservation. The study reveals that traditional puzzle games not only stimulate children's learning interest and enhance their hands-on abilities and social development but also help them understand local culture and strengthen cultural identity. However, challenges such as insufficient resources and limited teacher awareness persist in practical applications. Therefore, this paper proposes strategies such as resource integration, innovative game adaptation, and home-kindergarten collaboration to promote the effective incorporation of traditional puzzle games into preschool education.

Keywords: Traditional puzzle games; Preschool education; Value; Principle; Path

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1. Introduction

The Guidelines for Improving Education on Chinese Excellent Traditional Culture issued by the Ministry of Education explicitly emphasizes the integration of outstanding Chinese folk culture into curricula and educational systems^[1]. As a vital component of China's traditional cultural heritage, folk traditional puzzle games carry profound educational value and cultural significance. These games, serving as vessels of cultural wisdom, not only embody sophisticated logical thinking and problem-solving strategies but also captivate learners with their unique charm^[2].

Forged through centuries of historical accumulation and folk ingenuity, these games transcend mere entertainment, fostering multifaceted development in children. With rapid societal advancement, early

childhood education has progressively shifted from knowledge-based instruction to holistic development, emphasizing the cultivation of comprehensive competencies in young learners. However, the application of traditional puzzle games in kindergartens faces significant challenges, including the proliferation of modern technology and constraints on educational resources.

This study aims to explore the educational value, implementation principles, and practical pathways for incorporating traditional puzzle games into kindergarten education, thereby providing actionable insights for early childhood educators.

2. The value of traditional puzzle games in kindergarten education

2.1. Promote the healthy physical and mental development of children

Traditional puzzle games typically feature simplicity and fun, making them appealing to young children who can actively participate. For example, “Tangram” pieces, when assembled into different shapes, not only enhance children’s manual skills but also improve their spatial cognition. Additionally, puzzle games can boost physical coordination and flexibility in children, such as “Hopscotch” and “Kicking Shuttlecock.” In terms of physical development, traditional folk puzzle games promote the coordinated development of both large and small muscle groups in children. For instance, “Hopscotch” helps develop balance and lower limb strength; “Flower Rope Toss” trains fine motor skills and hand-eye coordination. Mathematical literacy is crucial for lifelong development. Integrating mathematical activities with traditional board games can effectively promote the growth of children’s mathematical abilities ^[3]. These physical activities are not only conducive to the healthy development of children’s physical health, but also promote the development of the brain’s nervous system, laying a foundation for subsequent learning.

2.2. Cultivate children’s sociality and cooperation consciousness

In terms of social and emotional development, traditional folk puzzle games provide young children with rich social opportunities and emotional experiences. These traditional puzzles often require multiple people to work together, which not only helps improve the physical fitness of young children but also fosters their sense of cooperation and social interaction skills. Many games like “Hot Potato”, “Hopscotch”, and “Eagle Catching Chicks” require teamwork, allowing children to learn social skills such as following rules, taking turns, and working in groups during play. At the same time, the experience of success in these games can boost children’s confidence, while facing failure can cultivate their resilience. Through interactions with peers, children learn to share, understand rules, and develop a spirit of teamwork. These social and emotional skills are crucial for their future school adaptation and the establishment of interpersonal relationships.

2.3. Stimulate children’s creativity and imagination

Traditional folk puzzle games, with their open gameplay and rich cultural connotations, provide a unique space for the development of children’s creativity and imagination. These games often lack fixed answers, instead encouraging children to explore freely and express themselves in diverse ways within the framework of rules. For example, the “Tangram” game stimulates creative thinking through the infinite combinations of geometric shapes; children can piece together animals, buildings, and various other images, continuously breaking conventional thinking patterns. The “Story Chain” game, on the other hand, promotes language interaction, allowing children to freely imagine within a set plot, constructing stories that are boundless and

imaginative. Traditional puzzle games typically have an open nature, permitting children to explore and create independently. For instance, games like “Flower Twisting” and “Nine Linked Rings” encourage children to try different solutions, thereby stimulating their creativity and imagination.

2.4. Inherit local culture and enhance cultural identity

The combination of folk games and early childhood education can not only let children experience the happiness of games, but also guide children to inherit the excellent traditional Chinese culture ^[4]. Traditional puzzle games carry rich regional cultural connotations, such as “jump rope” and “hopscotch”, which reflect the folk culture of southern China. These games embody the historical memory, values, and aesthetic tastes of the Chinese nation, subtly passing on traditional culture to the next generation through play. Children not only gain knowledge and skills from these games but also experience the charm of traditional culture, fostering a sense of cultural identity and national pride.

3. The principle of integrating traditional puzzle games into kindergarten education

3.1. The principle of age-appropriateness

The principle of age-appropriateness requires selecting appropriate games based on the developmental characteristics and needs of children at different age stages. For example, children aged 3–4 are suitable for simple rule games with low action requirements, such as “finger rhymes” and “clapping songs”, while children aged 5–6 can try more complex games that require strategic thinking, like “Go enlightenment” and “nine-link rings.” The difficulty of the game should be slightly higher than the child’s current level to create an appropriate challenge, but not too difficult to avoid causing frustration. Traditional puzzle games should be adjusted according to the age characteristics of the children. For instance, younger children in the small class are suited for simple, highly combinable games, such as “Tangram”; middle-class children can attempt slightly more complex puzzle games; and older children can participate in logical reasoning games.

3.2. The principle of interest guidance

Teachers should fully consider the interests and needs of young children, integrating elements they enjoy into games. For example, in the “Eagle Catching Chicks” game, adding role-playing where children play as eagles or chicks can boost their participation enthusiasm. On one hand, different types of traditional games should be selected, including language-based, action-based, and strategy-based games, to meet the diverse developmental needs of children; on the other hand, traditional games can be appropriately adapted and innovated according to modern educational concepts and the characteristics of young children, making them more aligned with contemporary children’s interests and learning needs.

3.3. Principle of hierarchy

When integrating traditional folk puzzle games into kindergarten education, it is essential to follow the principle of hierarchy. This means designing the difficulty, rules, and interaction methods of the games scientifically based on children’s age characteristics, cognitive levels, and developmental needs, creating a progressive development gradient to maximize the educational value of the games. The core of the hierarchy principle lies in gradual progression, which must align with the children’s zone of proximal development while ensuring the fun and challenge of the games. Teachers should flexibly adjust the game difficulty according to individual

differences among children, avoiding a one-size-fits-all approach. At the same time, the content and form of the games can be progressively deepened as children's abilities improve, such as transitioning from simple "Tangram puzzles" to more complex "Nine Linked Rings puzzles", thereby achieving a spiral upward development in cognitive skills and social-emotional growth. For example, in the "Flower Rope Tossing" game, teachers can first teach the basic gameplay and then guide children to try more intricate patterns.

3.4. The principle of cultural inheritance

The principle of cultural inheritance emphasizes the integration and explanation of traditional culture during the game process. Teachers should not only teach the rules of the game but also introduce its historical origins, cultural significance, and related folk knowledge. When selecting and designing educational games, it is important to explore their cultural connotations and incorporate them into teaching activities. For example, when playing "Guess the Lantern Riddle", one can explain the traditional culture of the Lantern Festival; when playing "Tossing the Arrow", ancient etiquette can be introduced; and in "Hopscotch", local patterns and stories can be added to allow children to experience the charm of culture while having fun. Through these methods, children can feel the allure of traditional culture through games and enhance their cultural identity.

4. The path of integrating traditional puzzle games into kindergarten education

4.1. Course integration and rich game content

Curriculum integration is the most direct approach, allowing folk games to be organically incorporated into the five major areas of kindergarten education. In the health domain, games like "jump rope" and "throwing sandbags" can be introduced to develop children's motor skills; in the language domain, games such as "riddles" and "story chain" can be used to foster language abilities; in the science domain, activities like "Tangram" and "Huaron Path" can enhance spatial cognition and logical thinking; in the social domain, role-playing and traditional festival games can deepen cultural understanding; in the arts domain, folk song and dance games and craft activities can cultivate aesthetic appreciation. Teachers can adapt and innovate traditional educational games based on children's interests and needs. For example, adding musical elements to the "hopscotch" game can make it more engaging.

4.2. Cooperate and participate in game activities together

The Guidelines for Kindergarten Education (Trial) points out that kindergartens should cooperate closely with families and communities, make comprehensive use of various educational resources, and jointly create good conditions for children's development ^[5]. Home-community collaboration can expand the space and resources for game implementation. Kindergartens can introduce the value and play methods of traditional games to parents through parent meetings and workshops, encouraging families to engage in parent-child traditional game activities. Organizing events such as "Traditional Game Day" and "Parent-Child Garden Parties" can enhance interaction between home and kindergarten. Collaborating with community cultural centers, museums, and other institutions to conduct traditional game experience activities is also beneficial. Utilizing the resources of elderly residents in the community, inviting them to play with children in the kindergarten can facilitate intergenerational cultural inheritance. Teachers can invite parents to participate in the design and implementation of educational games, such as organizing parent-child activities like "Nine Linked Rings", to strengthen cooperation between families and kindergartens. Parents can provide materials for traditional

educational games at home and encourage children to explore independently.

4.3. Create a suitable game environment

The creation of an environment is a crucial support for the development of traditional educational games. Kindergartens should design suitable game areas based on the characteristics of these games. They should establish dedicated traditional cultural game zones, equipped with various traditional game materials and tools, such as Go, Chinese chess, nine-linked rings, and diabolo. Walls can be decorated with pictures and descriptions related to traditional games to create a rich cultural atmosphere. Outdoor spaces can be planned for traditional game areas, like hopscotch grids and arrow-throwing fields. At the same time, modern multimedia technology can be used to create virtual game environments, allowing children to experience digital traditional games through interactive screens. Teachers should use verbal guidance and emotional encouragement to create a relaxed and enjoyable game atmosphere, stimulating children's enthusiasm for participation.

4.4. Teacher professional development and training

Teacher professional development is key to the effective implementation of traditional educational games. Kindergartens should organize teachers to learn about the cultural background and educational value of traditional educational games, enhancing their understanding of these games. Through regular training, teachers' game design skills and teaching techniques can be improved. The content of specialized training on traditional educational games should include learning the rules of traditional educational games, analyzing their educational value, and discussing teaching strategies. Encourage teachers to conduct action research, exploring ways to integrate traditional educational games with modern educational concepts. Establish teacher learning communities to share experiences in traditional game teaching and innovative practices. At the same time, invite folk artists and intangible cultural heritage bearers to provide guidance at kindergartens, improving teachers' cultural literacy and game guidance abilities.

5. Conclusion

Traditional folk puzzle games, as cultural treasures of the Chinese nation, possess unique educational value and cultural significance. Integrating them into modern early childhood education systems not only promotes the comprehensive development of young children but also effectively carries forward excellent traditional culture. The educational value analysis, integration principles, and implementation paths proposed in this article provide a systematic theoretical framework and practical guidance for early childhood educators. However, it is important to note that the integration of traditional games should not be a simple revival or direct replication; instead, it should involve creative transformation and innovative development based on respect for tradition, making them more suitable for the learning characteristics and needs of contemporary young children. Future research can further explore the educational applications of distinctive traditional games from different regions and innovative models of integrating modern technology with traditional games, offering more possibilities for the living inheritance of traditional culture.

Disclosure statement

The authors declare no conflict of interest.

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Exploration of the “Problem-Oriented” Teaching Model in Ideological and Political Theory Courses in Universities

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Abstract: Ideological and political courses are key courses for colleges and universities to implement the fundamental task of cultivating morality and educating people. The “problem-oriented” teaching model is a teaching model that takes problems as the core and students as the main body in teaching. It is conducive to improving the effectiveness of ideological and political teaching, increasing students’ learning interest, and promoting the growth of ideological and political teachers. It is a major topic worthy of in-depth thinking.

Keywords: Higher education teaching, Ideological and political theory courses, Problem-oriented teaching model

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1. Theoretical connotation of the problem-oriented teaching model

Problems are the voice of the times, and the fundamental task of theory lies in addressing and guiding the resolution of these challenges. The “problem-oriented” teaching model has garnered significant attention in recent reforms of ideological and political education courses in higher education institutions. By skillfully employing “problems” as a pedagogical tool, this model enhances the humanistic values and practical applicability of education, effectively revitalizing traditional classroom instruction and fostering students’ holistic development. Prioritizing this problem-oriented pedagogical approach to strengthen the efficacy of ideological and political education holds substantial implications for advancing curriculum reform.

1.1. The concept of “problem”

At the core of the “problem-oriented” teaching model lies the notion of “problem”. As Mao Zedong stated: “What is a problem? A problem is the contradiction inherent in things. Wherever an unresolved contradiction exists, there is a problem”^[1]. Thus, “problems” stem from contradictions—the emergence of a contradiction signifies the emergence of a problem. From the perspective of problem logic, “There is no knowledge without problems,

but without knowledge, there are no problems either”^[2]. This emphasizes that problems arise from the “unknown” within the “known.” Synthesizing the above perspectives on the definition of “problem”, a “problem” can be understood as a cognitive challenge that emerges in a given context, where existing knowledge or conditions serve as the foundation, yet further inquiry is required to resolve contradictions or achieve specific objectives. Resolving such a challenge may yield new insights. In other words, problems serve as bridges between existing and emerging knowledge.

Based on the definition, the formation of a complete “problem” needs to have three key points. First, the necessary conditions for the generation, namely the specific situation and knowledge base. The specific situation determines the possibility of the problem and determines direction of the problem. Knowledge is the premise of the problem, and the problem is based on knowledge. When the existing knowledge collides and conflicts with the situation, cognition is challenged, doubts arise, and problems arise. Second, the answer to the problem is exploratory. The real process of solving the problem is not achieved overnight or at a glance, but the result is obtained after careful reasoning and repeated deliberation. Third, there are requirements for the answer; that is, the solution or answer to the problem is not boundless, but must be limited and in line with the nature of the problem. Marxist theory posits that truth is relative, and any truth is only a correct understanding of a certain aspect and level of an objective object. Different situations and knowledge backgrounds of each problem should correspond to different answers and solutions.

1.2. The “problem-oriented” teaching model

From the analysis of the definition of “problem”, it can be known that “problem” can be used as a bridging point for new and old knowledge and play a role in inspiring students. Embedding “problems” in pedagogical practice facilitates effective knowledge transfer. In the classroom, there are two main ways for students to generate “problems”: one is that teachers, based on students’ existing knowledge background, take the initiative to ask questions and require students to give accurate answers in order to achieve certain teaching goals. The second is that students generate certain challenging problems in the process of learning or practice due to gaps or limitations in their prior knowledge. Such problems can be generated by teachers or by students’ active exploration, but there are certain difficulties in trying to solve them. At this time, guiding them to actively explore the problems is conducive to stimulating students’ interest in learning and cultivating their thinking ability. Therefore, taking “problems” such as the second approach as the core of the classroom, designing certain situations according to the teaching content, and raising several specific questions to guide students to actively think, explore and ask questions, and finally achieving the effect of students mastering knowledge and improving their learning ability is the “problem-oriented” teaching mode. “Problem-oriented” means taking problems as the leading direction of the classroom.

Similarly, to achieve complete “problem-oriented” teaching, three conditions are also required. The first is the setting of problems. This is the core of “problem-oriented” teaching. As the focus of the classroom, teaching problems contain the knowledge points that students should master and contain specific ways of thinking. In terms of problem setting, we must focus on integrating disciplinary characteristics and realistic conditions. When people raise, study, and discuss relevant issues, they usually do so from a certain disciplinary background. The directions and paths of the questions raised and their answers in different disciplinary backgrounds are different. Well-designed pedagogical scenarios aligned with learning objectives enhance student engagement and facilitate immediate cognitive immersion. A teaching situation with a certain degree of reality can deepen

students' understanding of the problems and the knowledge points under the problems.

The setting of questions must also take into account the students' situation, including their knowledge base, thinking ability, and comprehensive quality, to ensure that the questions set are understandable, interesting, and able to be solved by students, and should not be rigid and obscure, making students feel powerless; nor should they be too simple, making students have no desire to explore. Secondly, in solving problems, the solutions cannot be separated from the core teaching content; at the same time, they should be open-ended, not limited to "one question and one answer", but should try to seek multiple solutions and accommodate multiple viewpoints. Finally, in the process of students solving problems, teachers should play a leading role, control the direction of the problem, and do a good job of guiding and summarizing students' thinking.

2. Analysis of the current situation of ideological and political courses in colleges and universities

Since the new era, the development of the social economy has put forward higher requirements for people's ideology. As an important frontier of national ideology, ideological and political courses play an irreplaceable role. In the new historical stage, with the deepening of the emphasis on ideological and political courses, the teaching methods of ideological and political courses have been continuously innovated, and significant progress has been made in curriculum development. At the same time, there are also some problems in ideological and political courses that need to be solved urgently.

2.1. Insufficient effectiveness of teaching content

Traditional ideological and political education is mainly based on the "inculcation" teaching method. In the special category of ideological and political education, "inculcation" means that a correct and advanced ideological system cannot be spontaneously generated in the mind, and can only be consciously formed through learning, education, and practice. In traditional inculcation classrooms, teachers often continuously output theoretical knowledge on the podium, and students' ideas cannot be expressed, and teaching is one-way and single. The reform of ideological and political courses has changed this situation to a certain extent, and has emphasized the subjectivity of students in the classroom. "In order to change the cramming method, teachers adopt thematic, heuristic, interactive, case-based, research-based, on-site teaching, and passionate teaching methods in the classroom to stimulate students' in-depth thinking" [3]. New media teaching platforms such as "RainClassroom" are also used in teaching to increase the interaction rate between teachers and students in the classroom and enhance students' sense of participation. In terms of teaching content, ideological and political courses in the new era have added theoretical knowledge related to the sinicization and modernization of Marxism, reflecting the quality of Marxist theory that keeps pace with the times, and are more helpful for students to connect with reality and deepen their understanding and thinking of reality.

However, the reform's innovation in teaching methods and content still has the problem of low effectiveness. The new learning method has increased students' interest in learning, but it is still difficult to break away from the essence of "reasoning." The classroom's foothold ultimately remains on outputting theories, rather than arming the brain with theories and guiding practice. The teaching content is still not friendly enough. The lecture materials used by teachers are derived from social practice, but the connection with students' learning and life is still not close enough, and the explanation is not thorough enough. It has not yet made the lofty theories grounded and the high-cold theories warm, which has reduced students' sense of gain and satisfaction in ideological and political courses.

2.2. Evaluation focuses on theory and neglects practice

The reform of ideological and political courses attaches great importance to the practicality of ideological and political courses. Therefore, most college ideological and political courses have added practical links to teaching, including social surveys, visits and inspections, and other routine activities, which eventually form practical investigation reports and include them in the final examination of the subject to a certain proportion. The form of practical investigation reports can detect the level of students' practical skills and cultivate students' ability to discover problems and use theories to solve problems. However, the attitude of most college ideological and political course evaluations towards investigation reports is perfunctory, and they only regard it as a form of classroom practice, without paying attention to its quality and practical significance; this indirectly leads to students' lack of attention and rejection of practice, and they regard investigation reports as a tool to obtain credits, and complete the practical process by copying, plagiarizing and hastily finishing. Under such circumstances, the practicality of ideological and political courses is greatly reduced.

2.3. Students' sense of identity needs to be improved

In recent years, the importance of ideological and political education has gradually gained popularity, and most college students have a positive attitude towards the opening of ideological and political courses. However, the credits of ideological and political courses in colleges and universities are high, but they are mostly in the form of public courses, with a large number of students, few learning tasks, and relatively easy. This has led students to form a stereotype that ideological and political courses are "formalistic and simple to learn", and they are not serious in ideological and political courses, resulting in the phenomenon of "high head-down rate, low head-up rate, and low attendance rate" in ideological and political classes. In addition, contemporary youth are in an era of "multiple, changing, and disgusting", with various social thoughts intertwined and the social environment constantly changing. Students "have the characteristics of pursuing equality and freedom in the market economy and the Internet era, and are naturally rebellious and critical of ideological indoctrination", and the rigidly output ideological and political views are difficult to resonate with their own thoughts and views, so it is naturally difficult to maintain a sense of identity with ideological and political courses ^[4].

2.4. The quality of the teaching staff needs to be improved

The key to running ideological and political theory courses well lies in teachers, and the key lies in giving full play to the enthusiasm, initiative, and creativity of teachers. The talent team of ideological and political teachers in colleges and universities in the new era is huge, but it still needs to be continuously optimized in many aspects. Some ideological and political teachers are not strong in politics when teaching, but political guidance is the basic function of ideological and political courses. Deliberately weakening or even avoiding "politics" does not meet the basic requirements of ideological and political courses. Some teachers are not sentimental and only regard ideological and political courses as "work tasks", and teach in a rigid way without warmth. Some teachers are not new in thinking, and have only updated their teaching methods in form, but their teaching skills and content are still "old-fashioned", and they do not pay attention to students' classroom experience. Some ideological and political teachers have a narrow vision, talk in general terms when teaching, cannot dig deep into knowledge theories, and cannot make a logically rigorous and in-depth analysis of students' problems. In addition, in some schools, there are still shortcomings in the selection and training of teachers, the team structure needs to be optimized, and the overall quality needs to be improved.

3. The value and significance of the “problem-oriented” teaching model of ideological and political courses in colleges and universities

The teaching content of ideological and political courses in colleges and universities involves a lot of complexity, and teaching has its own particularity. The teaching content of ideological and political courses must keep up with the times. Only by constantly preparing lessons and constantly updating them can better teaching results be achieved. The “problem-oriented” teaching model has the advantages of creating problem situations and exploring real problems according to the characteristics of the times, which coincides with the disciplinary characteristics of “constantly updating” ideological and political courses, and is consistent.

3.1. “Problem-oriented” teaching helps to improve teaching effectiveness

Theoretical knowledge of ideological and political courses must “enter the mind” to effectively realize its function, that is, to achieve the “internalization” of ideological and political education. The process of students thinking and solving problems in “problem-oriented” teaching is actually the process of internalization. In ideological and political courses, when students think about problems and express their own ideas, their understanding of the problems deepens; at this time, the teacher introduces the correct world outlook and methodology, and students will experience a process of self-reflection, compare and reflect on the advantages and disadvantages of their own concepts in their minds, and consciously enter the knowledge structure and thinking system guided by the teacher to achieve knowledge internalization. The continuous internalization of ideological and political theoretical knowledge will also influence students’ world outlook, outlook on life, and values, achieve ideological internalization, and further enhance the effectiveness of ideological and political courses.

3.2. “Problem-oriented” teaching helps promote learning and application

Marxism believes that practice is the purpose and motivation of cognition. From cognition to practice, it is necessary to go through certain intermediary links, including determining the purpose of practice, forming practical concepts, and formulating practical plans. Ideological and political courses in colleges and universities are courses with “educational” significance in which educators exert systematic influence on the educated according to social or class requirements, transforming certain social thoughts and morals into individual thoughts, consciousness, and moral qualities. Its purpose is to let students integrate the knowledge they have gained in class into their own words and deeds and implement them in practice. Traditional ideological and political courses focus on solidifying students’ “cognition”, with theoretical learning and credit examinations as teaching purposes, ignoring the guidance of students to achieve the leap from cognition to practice. In ideological and political classrooms, from the perspective of “problem-oriented”, problems originate from the objective world. Students ask “why” and “how to do” in a free and open classroom atmosphere, constantly gain correct understanding from basic facts, establish scientific ideals and beliefs, and thus consciously devote themselves to practice and shoulder the responsibility of realizing the great rejuvenation of the Chinese nation.

3.3. “Problem-oriented” teaching helps stimulate students’ interest in learning

In order to make good use of classroom teaching as the main channel, ideological and political education theory courses should be strengthened in the process of improvement, improve the affinity and pertinence of ideological and political education, and meet students’ growth and development needs and expectations. This means that “people” must be put first in the process of ideological and political teaching. Integrating the

“problem-oriented” teaching model into the ideological and political classroom, starting from the problems that students are confused about and concerned about, and guiding students to use scientific ideas and methods in the process of solving their own problems, it conforms to the laws of education and teaching, and can better meet students’ learning and development needs. “Adhere to problem-oriented, solve key and difficult problems, clarify ideological confusion as the basic yardstick, and connect with social hot spots and focus issues as an important starting point”^[5]. At the same time, the open ideological and political classroom under the “problem-oriented” approach can allow students to express their own views, and teachers will also explore problems with students at the same time, which is more in line with students’ expectations for learning ideological and political courses.

3.4. “Problem-oriented” teaching helps promote teacher growth

Under the “problem-oriented” teaching mode, teachers need to control the entire class and have a strong sense of dominance, which puts higher demands on teachers’ teaching ability. First, “problem-oriented” promotes the improvement of student participation, which can also indirectly stimulate teachers’ enthusiasm for teaching, enhance their teaching enthusiasm, and enhance their teaching sentiments. Second, teachers need to make sufficient teaching preparations before teaching, understand students’ concerns, interests, and confusions, which can narrow the distance between teachers and students, broaden teachers’ teaching horizons, and truly make ideological and political courses in-depth, thorough, and lively. Third, the widespread use of the “problem-oriented” teaching model in ideological and political courses can better analyze students’ situations, grasp the current situation, strengthen theoretical research, and is conducive to the construction of the ideological and political course teaching team in colleges and universities.

Disclosure statement

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Research on the Interactive Relationship between Campus Cultural Ecology Construction and Students' Comprehensive Quality Development in the Dual-Cycle Drive

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Abstract: This study explores the interactive relationship between campus cultural ecology and the comprehensive quality development of students from the perspective of “dual circulation drive.” Currently, there is a disconnection between campus cultural construction and student quality development, such as the monotonous form of cultural activities and the incomplete evaluation system, which urgently needs to be improved through the dual circulation mechanism. The article clarifies the core concepts of “dual circulation drive”, campus cultural ecology, and the comprehensive quality development of students, and constructs a theoretical framework based on ecosystem theory, collaborative education theory, and comprehensive development theory. Through the analysis of the current situation, it is found that there are problems such as unbalanced cultural supply, disconnection in evaluation, and the absence of interaction mechanisms. The article then constructs an interaction mechanism from both the internal circulation (spiritual, material, institutional, and behavioral culture) and the external circulation (mutual empowerment between culture and quality) perspectives.

Keywords: Dual circulation drive; Campus cultural ecology; Comprehensive quality development of students; Interaction mechanism; Collaborative education

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1. Introduction

In the context of the new era, the core task of education is to implement moral education and cultivate well-rounded socialist builders and successors. In recent years, the state has issued a series of educational policies, such as “all-round education” and “integration of five educations”, emphasizing the importance of campus cultural ecology construction. The “Outline for the Construction of an Education Power (2024–2035)” clearly states the need to strengthen ideological and political education in schools in the new era, promote the

normalization and institutionalization of ideal and belief education, and deepen patriotism, collectivism, and socialism education. These policies have pointed out the direction for campus cultural construction, requiring schools to promote an all-around and all-process education system to enhance the comprehensive quality of students. However, there is still a disconnection between campus cultural construction and the comprehensive quality development of students. On the one hand, the problem of formalism in cultural activities is prominent. Some schools overly focus on the investment in material culture while neglecting the cultivation of spiritual culture, resulting in cultural activities lacking depth and substance and failing to have a substantive impact on students' thoughts and behaviors. On the other hand, the correlation between the student comprehensive quality evaluation system and campus cultural practice is low, and the interaction between cultural activities and comprehensive quality development is insufficient. Moreover, there is a lack of effective interaction mechanisms between campus cultural ecology and the comprehensive quality development of students. The influence of culture on quality is relatively one-sided, lacking the feedback of students on culture, making it difficult to form a mutually empowering situation. These problems seriously affect the realization of educational goals. Therefore, this study proposes the perspective of "dual circulation drive" to explore the mutually empowering relationship between campus cultural ecology and the comprehensive quality development of students, aiming to optimize the internal and external circulation of campus cultural ecology, establish a long-term mechanism for collaborative education, promote the positive interaction between campus cultural ecology construction and the comprehensive quality development of students, and provide theoretical and practical support for solving the current predicament.

2. Research background and significance

2.1. Policy background

Since the 18th National Congress of the Communist Party of China, China's education has entered a new stage of development. The Chairman of the CCP has proposed that we adhere to the socialist orientation in running schools, fully implement the Party's education policy in the new era, make moral education the fundamental task, promote quality education, advance educational equity, and cultivate well-rounded builders and successors of socialism who excel in morality, intelligence, physical fitness, aesthetics, and labor ^[1]. This policy provides a clear direction for the construction of campus cultural ecology. Campus culture, as an important component of school education, is not only the environment for students' learning and life but also an important carrier for cultivating students' comprehensive qualities. By building a good campus cultural ecology, it can provide students with rich learning resources and development opportunities, and promote the all-round development of students in terms of morality, intelligence, physical fitness, aesthetics, and labor.

2.2. Practical demands

At present, while China's campus culture construction has achieved certain results, it also faces many challenges. On the one hand, the campus culture construction in some schools is formalistic and superficial, and cultural activities lack depth and connotation, making it difficult to have a substantive impact on students' thoughts and behaviors. On the other hand, there is a lack of effective connection between the student comprehensive quality evaluation system and campus cultural practice, resulting in insufficient interaction between cultural activities and the development of students' comprehensive qualities. In addition, some schools

focus more on material investment and less on spiritual cultivation in campus culture construction, leading to serious homogenization of cultural activities and a lack of innovation and targeting ^[2]. These problems seriously affect the effectiveness of campus cultural ecology construction and also restrict the all-around development of students' comprehensive qualities.

2.3. Innovative value

This study proposes the “double circulation drive” perspective, aiming to solve the current disconnection between campus culture construction and the development of students' comprehensive qualities by establishing a two-way empowerment relationship between campus cultural ecology and students' comprehensive quality development. This perspective not only enriches the theoretical connotation of campus cultural ecology construction but also provides new ideas and methods for school education practice. Through the construction of the “double circulation drive” mechanism, a positive interaction between campus cultural ecology and students' comprehensive quality development can be achieved, promoting the overall quality improvement of school education.

3. Core concepts and theoretical framework

3.1. Definition of core concepts: Dual-loop drive

3.1.1. Internal loop

The internal loop refers to the coordinated interaction among various elements within the campus cultural ecosystem (spiritual culture, material culture, institutional culture, and behavioral culture). Spiritual culture is the core, material culture is the carrier, institutional culture is the guarantee, and behavioral culture is the external manifestation. These four elements interact with each other to form an organic whole, jointly promoting the healthy development of the campus cultural ecosystem.

3.1.2. External loop

The external loop refers to the interactive empowerment relationship between the campus cultural ecosystem and the comprehensive quality development of students in terms of morality. Virtue is the prerequisite, wisdom is the core, physical well-being is the guarantee, beauty is the ideal, and labor is the means ^[3]. The campus cultural ecosystem provides resources and an environment for the comprehensive quality development of students, while the improvement of students' comprehensive quality in turn nourishes the campus cultural ecosystem, promoting its continuous innovation and development.

3.1.3. Campus cultural ecosystem

The campus cultural ecosystem is a complex system with systematicity, dynamics, and sustainability, encompassing multiple levels such as spiritual culture, material culture, institutional culture, and behavioral culture. These elements are interrelated and interact with each other, forming an organic whole.

3.1.4. Comprehensive quality development of students

The comprehensive quality development of students refers to the all-round development of students in terms of morality, intelligence, physical fitness, aesthetics, and labor, “Aims to pursue educational quality and fairness, focusing on the all-round development of every student”, emphasizing the comprehensive improvement of

students in knowledge, skills, emotions, attitudes, and values ^[4]. Through the construction of the campus cultural ecosystem, rich learning resources and development opportunities can be provided for students, promoting their comprehensive quality development.

3.2. Theoretical basis

3.2.1. Ecosystem theory

Ecosystem theory emphasizes the hierarchy and interactivity of systems. The campus cultural ecosystem is a multi-level system where various elements interact with each other to form an organic whole. At the same time, there is a close interactive relationship between the campus cultural ecosystem and the comprehensive quality development of students. Through ecosystem theory, the intrinsic connection between the campus cultural ecosystem and the comprehensive quality development of students can be better understood, providing theoretical support for the construction of the “dual-loop drive” mechanism.

3.2.2. Collaborative education theory

Collaborative education theory emphasizes the linkage mechanism among multiple stakeholders (schools, families, and society). In the “dual-loop drive”, “the school, family, and social education systems are independent yet interdependent subsystems. Strengthening the connections among these subsystems is the key to achieving collaborative education” ^[5]. Through collaborative education theory, the roles of all parties can be better leveraged to form an educational synergy, achieving a positive interaction between the campus cultural ecosystem and the comprehensive quality development of students.

3.2.3. Theory of holistic human development

The theory of holistic human development emphasizes the full development of all aspects of human abilities. The campus cultural ecosystem provides students with rich learning resources and development opportunities. Through cultural immersion and practical activities, it can promote the all-around development of students in terms of morality, intelligence, physical fitness, aesthetics, and labor. Through the theory of holistic human development, the intrinsic logic between the campus cultural ecosystem and the comprehensive quality development of students can be better understood, providing a theoretical basis for the construction of the “dual-loop drive” mechanism.

4. Analysis of the current interactive situation between the campus cultural ecosystem and students’ comprehensive quality development

4.1. Interactive achievements

In recent years, China has achieved certain results in the construction of the campus cultural ecosystem and the comprehensive quality development of students. Through projects such as the “Red Culture Corridor”, red culture has been integrated into campus cultural construction. Through cultural exhibitions, theme activities, and other forms, students are subtly influenced by ideological and political education, enhancing their ideological and political quality. According to the report on the effectiveness of campus cultural construction released by the Ministry of Education, the proportion of students participating in cultural activities has been increasing year by year, and the results of comprehensive quality assessment have also improved. These achievements indicate that there is a certain interactive relationship between the campus cultural ecosystem and the comprehensive quality

development of students. Through effective cultural construction and practical activities, the comprehensive quality of students can be enhanced.

4.2. Existing problems

In the interactive process between the campus cultural ecosystem and the comprehensive quality development of students, there are still some problems. First, there is an imbalance in cultural supply. In the current campus cultural construction, there is a phenomenon of emphasizing material construction over spiritual cultivation. Cultural activities are highly homogeneous and lack innovation and specificity. Second, there is a disconnection in quality evaluation. “The comprehensive quality evaluation system has a low correlation with campus cultural practice and cannot accurately reflect students’ performance and gains in cultural activities” [6]. Finally, there is a lack of interaction mechanisms. There is a “single cycle” operation phenomenon between the campus cultural ecosystem and the comprehensive quality development of students. The influence of culture on quality is relatively obvious, but the feedback effect of quality on culture has not been fully exerted, and there is a lack of effective interaction mechanisms.

4.3. Cause analysis

The emergence of these problems is mainly due to the following reasons. First, there is insufficient top-level design. The interaction between campus cultural ecosystem construction and the comprehensive quality development of students lacks systematic planning and design, and lacks clear goals and indicator systems. Second, resource integration is inefficient. Campus cultural resources are scattered, and there is a lack of coordination and cooperation among departments, resulting in low resource utilization. Third, the awareness of participation by the main bodies is weak. Schools, families, and society have insufficient awareness of participation in campus cultural ecosystem construction and the comprehensive quality development of students, and lack effective communication and cooperation mechanisms, resulting in the failure to fully exert the roles of all parties.

5. Construction of a double-cycle driven interaction mechanism

5.1. Internal cycle mechanism: Self-optimization of campus cultural ecosystem

5.1.1. Spiritual culture leadership

“Spiritual culture is the core and soul of campus culture and the foundation of campus cultural ecosystem construction” [7]. By integrating the core socialist values into the school’s motto and school spirit, the school can promote patriotism, collectivism, and socialism, guiding students to establish correct worldviews, outlooks on life, and values. At the same time, it is important to emphasize the inheritance and innovation of school history culture, exploring the school’s historical and cultural heritage through forms such as school history exhibitions and lectures, allowing students to understand the school’s development process and enhance their sense of belonging and identity. Additionally, the construction of spiritual culture should focus on connotative development, organizing activities such as theme class meetings, speech contests, and reading sharing sessions to allow students to experience the power of culture through participation.

5.1.2. Material culture empowerment

Material culture, namely carrier culture, is the most basic external symbol and material carrier of university

campus culture. By building smart classrooms, cultural experience centers, and other immersive educational spaces, the school provides students with a good learning and living environment. At the same time, it is important to pay attention to the beautification and optimization of the campus environment, creating a rich cultural atmosphere through campus landscape design and cultural wall construction. Additionally, the school should increase material investment in campus cultural construction, improve cultural facilities, and provide strong material support for the conduct of campus cultural activities. The school can also combine its own characteristics to create recognizable cultural spaces, such as establishing “intangible cultural heritage inheritance studios” and inviting intangible cultural heritage inheritors to the campus, allowing students to closely contact and learn traditional skills and enrich the cultural connotation of the campus.

5.1.3. Institutional culture guarantee

Institutional culture is an important guarantee for campus cultural ecosystem construction, providing norms and incentive mechanisms for the inheritance and development of campus culture. By establishing a “culture-quality” linked assessment system, the school can incorporate club activities and cultural practices into the credit system, encouraging students to actively participate in cultural activities. At the same time, it is important to improve the management system for campus cultural activities, strengthening the organization and management of cultural activities to ensure their quality and effectiveness. Additionally, the school can establish a cultural resource allocation mechanism to optimize resource allocation and improve resource utilization efficiency.

5.1.4. Behavioral culture incentive

Behavioral culture is the external manifestation of the campus cultural ecosystem and the behavioral habits and lifestyles formed by teachers and students in campus life. Through a variety of cultural activities, the school can guide students to experience the power of culture in practice and cultivate good behavioral habits. For example, through the “one school, one brand” characteristic, cultural activities such as intangible cultural heritage inheritance and science and technology innovation competitions, the school can cultivate students’ innovative spirit and practical ability ^[8]. In addition, schools can guide students to develop good etiquette habits and moral qualities through behavioral norms education.

5.2. The external circulation mechanism: Bidirectional empowerment of cultural ecology and quality development

5.2.1. Cultural infiltration into quality

The campus cultural ecology provides rich resources and a favorable environment for the comprehensive quality development of students. Through cultural immersion, students’ ideological and moral sentiments, innovative abilities, and practical abilities can be cultivated. Integrating labor education into campus farming culture practices enables students to experience life through labor, fostering their labor concepts and skills. The conduct of cultural activities enriches students’ spiritual world, enhances their aesthetic abilities, and humanistic qualities. Incorporating ideological and political education into cultural activities promotes the normalization and institutionalization of ideal and belief education, enhancing students’ sense of social responsibility and mission.

5.2.2. Quality feedback to culture

“Student associations are important carriers for campus cultural construction in colleges and universities,

and also important ways to cultivate the comprehensive qualities of college students”^[9]. Through student activities, students’ horizons can be broadened, and their humanistic qualities can be enhanced. This not only improves students’ comprehensive qualities but also enriches campus culture. The improvement of students’ comprehensive qualities, in turn, nourishes the campus cultural ecology, promoting its continuous innovation and development. Students can be encouraged to participate in campus cultural construction and design, allowing them to lead the development of campus cultural and creative products. Through students’ participation and creation, new vitality and creativity can be injected into the campus cultural ecology.

5.2.3. Synergistic support system

The linkage of home, school, and society is an important guarantee for the construction of campus cultural ecology and the comprehensive quality development of students. Schools should actively communicate and cooperate with families and society to jointly create a favorable growth environment for students. Families should pay attention to family, family education, and family traditions, cultivating students’ good behavior habits and moral qualities. Society should provide support and guarantees for the construction of campus cultural ecology, offering students rich learning resources and development opportunities. Schools can build digital platforms and cultural resource sharing databases to achieve digital management and sharing of campus cultural resources. The government should introduce relevant policies to provide support and guarantees for the construction of campus cultural ecology and the comprehensive quality development of students.

6. Conclusion

Against the background of a new era of education, constructing a “dual circulation drive” mechanism is of great significance for the interactive relationship between campus cultural ecology and the comprehensive quality development of students. Through the “internal circulation” of self-optimization, the campus cultural ecology achieves coordinated development in the four aspects of spiritual, material, institutional, and behavioral culture, providing students with rich cultural nourishment and growth space. At the same time, the “external circulation” mechanism realizes the positive interaction between campus culture and student development through the infiltration of culture into quality, the feedback of quality to culture, and the collaborative support of home, school, and society. This bidirectional empowerment not only contributes to the all-around improvement of students’ comprehensive qualities but also injects new vitality into the sustainable development of campus culture. In the future, schools should further deepen the “dual circulation” mechanism, explore more innovative practical paths, promote high-quality education development, and lay a solid foundation for cultivating all-around socialist builders and successors.

Disclosure statement

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