

Construction and Practice of the Three-Dimensional Interesting Teaching Model for the Course of Prescriptions of Chinese Materia and Chinese Patent Medicines

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Abstract: *Objective:* Aiming at the core pain points of the higher vocational course Prescriptions of Chinese Materia Medica and Chinese Patent Medicines, including numerous formulas, abstract compatibility logic, heavy memorization burden, dull teaching forms and weak interaction in online teaching, this study constructs a three-dimensional interesting teaching system integrating “poetry, music and gamification” to improve the quality and efficiency of course education. *Methods:* A total of 168 students from four natural classes majoring in Chinese Materia Medica and Traditional Chinese Medicine Rehabilitation Technology of Grade 2024 at South China Business College were selected as research objects. A randomized controlled experimental design was adopted. The experimental group with 86 students received the “poetry-music-game” teaching model, while the control group with 82 students adopted the traditional teaching model. The teaching effects were verified by experimental comparison, questionnaire survey and data analysis. *Results:* The average final written examination score of the experimental group was (82.3 ± 6.5) , 20.1% higher than the control group's (68.5 ± 7.2) ; the accuracy rate of formula dictation reached 89.7%, an increase of 37.6% compared with the control group's 65.2%; the completion rate of pre-class preview hit 94.2%, rising by 38.0% versus the control group's 68.3%; the classroom interaction participation rate was 91.9%, 45.0% higher than the control group's 63.4%; students' teaching evaluation satisfaction reached 98.1%. All indicators of the experimental group were significantly better than those of the control group ($P < 0.05$). *Conclusion:* The three-dimensional interesting teaching system of “poetry, music and gamification” can effectively solve the teaching difficulties of Prescriptions of Chinese Materia Medica, fit the cognitive characteristics of higher vocational students, significantly boost students' learning initiative and knowledge application ability, and form a standardized and replicable teaching practice paradigm, which provides references for the teaching reform of Chinese medicine courses in higher vocational colleges.

Keywords: Prescriptions of Chinese materia medica and Chinese patent medicines; Poetry-music-gamification; Three-dimensional interesting teaching; Higher vocational education; Teaching reform

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1. Introduction

Against the background of the continuous advancement of the Healthy China Strategy and the construction of Guangdong Province as a powerful province of traditional Chinese medicine, grassroots medical and health institutions have an increasing demand for high-quality technical and skilled talents of traditional Chinese medicine. As a core course for majors of Chinese Materia Medica and Traditional Chinese Medicine Rehabilitation Technology in higher vocational colleges, Prescriptions of Chinese Materia Medica and Chinese Patent Medicines serves as a key carrier connecting basic theories of traditional Chinese medicine and clinical application of Chinese materia medica, and its teaching effect directly determines the formation of students' integrated thinking of "theory-method-formula-medicine-application" and their core vocational ability in clinical medication. This course has a total of 84 class hours, covering 239 commonly used formulas and Chinese patent medicines. Its knowledge system is complicated and highly abstract, which constitutes the main learning difficulty for students. On this basis, based on five years of stable integrated online and offline teaching practice of Prescriptions of Chinese Materia Medica and Chinese Patent Medicines at South China Business College, this study innovatively constructs a three-dimensional interesting teaching system integrating "poetry, music and gamification" (referred to as the "poetry-music-game" teaching model). It aims to resolve the above teaching pain points, improve the quality and efficiency of course education, and provide implementable and replicable practical paradigms for the teaching reform of Chinese medicine courses in higher vocational colleges ^[1].

2. Research status

At present, research on the teaching reform of Prescriptions of Chinese Materia Medica and Chinese Patent Medicines in higher vocational colleges has become a hot spot in vocational education, focusing on four major directions. First, the exploration of blended online and offline teaching. Online teaching platforms are relied on to build resource libraries and complete closed-loop teaching ^[2]. Second, the integration of theory and practice and ideological and political education in the curriculum. Teaching contents are optimized closely around grassroots post demands, and ideological and political elements such as confidence in traditional Chinese medicine culture are integrated into the whole teaching process ^[3]. Third, the application of digital teaching tools. The implementation of auxiliary learning tools such as artificial intelligence and virtual simulation training is explored ^[4]. Fourth, the matching of talent training and post demands. Vocational abilities such as the clinical application of Chinese patent medicines are strengthened ^[5].

The academic circle has carried out a large number of targeted explorations on interesting teaching. In terms of poetic teaching, traditional formula ballads remain the mainstream memory method, which assist learning by condensing formula composition and efficacy, yet they have a single form with limited effect of mechanical memorization ^[6]. In terms of musical teaching, existing studies such as Research and Reflection on Teaching by Composing Music for Formula Ballads explore combining formula ballads with music to improve learning fun and memory persistence through composing and singing, but they have a narrow application scope and lack systematic design ^[7]. Gamified teaching has been widely applied in many medical courses. Digital pathology game platforms are built to enrich the diversity and fun of teaching ^[8]. The gamified teaching design of higher vocational chemistry based on flow experience can enhance students' internal learning motivation and thus improve teaching effects ^[9]. The gamified teaching method applied in organic chemistry theoretical teaching can stimulate learning interest and initiative ^[10]. However, gamified teaching

in the field of Prescriptions of Chinese Materia Medica is mostly scattered attempts without mature teaching models. Existing research is mostly single-dimensional exploration, lacking a systematic teaching system that organically integrates poetry, music, and gamification, so it cannot comprehensively solve the core teaching pain points of Prescriptions of Chinese Materia Medica in higher vocational colleges.

3. Construction of the “poetry-music-game” three-dimensional interesting teaching system

3.1. Overall framework of the system

Centered on the cognitive characteristic that higher vocational students are dominated by visual thinking, the three-dimensional interesting teaching system of “poetry, music and gamification” targets three major problems of “difficult memorization, low interest and weak interaction”. It consists of three functionally complementary modules: poetry, music and gamification. Among them, the poetic module solves the problem of “hard to remember” by simplifying knowledge coding through rhythmic texts; the musical module solves the problem of “difficult to concentrate” by building immersive learning scenarios via auditory experience; the gamified module solves the problem of “unwilling to learn” by activating internal learning motivation through task-driven learning. The three parts are organically integrated to cover the whole process of “teaching-learning-practicing-assessment” and form an integrated online and offline teaching closed loop.

3.2. Design of core modules

3.2.1. Poetic teaching module: Build efficient memory paths

According to the knowledge graph of Prescriptions of Chinese Materia Medica, the composition, efficacy and compatibility characteristics of core formulas are compiled into poetic formula ballads. Different from traditional formula ballads, poetic formula ballads integrate modern language habits and memory encoding skills, highlight core information and delete redundant content, with each ballad controlled at 28 to 100 words for students’ easy memorization. Supporting micro-lessons of 3 to 5 minutes explaining ballads and self-test fill-in-the-blank exercises of formulas are provided simultaneously, forming an integrated memory path of “ballad-interpretation-exercise”. The micro-lessons adopt animation to display the compatibility logic and monarch-minister-assistant-guide relationship of formulas intuitively; self-test exercises are set with gradient difficulties to help students consolidate memory step by step. Through poetic processing, scattered knowledge points are systematized and rhythmicized, greatly reducing memorization difficulty.

3.2.2. Musical teaching module: Create immersive learning scenarios

Classical folk music and light rhythms matching the themes of formulas are selected as background music. Poetic formula ballads are recorded into audio resources in the forms of recitation and rap. An audio column “Immersive Formula Learning” is set on the online teaching platform, supporting variable speed playback, loop listening and imitation singing. Leveraging the rhythmic and emotion-regulating functions of music, boring memorization tasks are transformed into pleasant auditory experiences. Students can study in fragmented time anywhere, effectively extending learning duration.

3.2.3. Gamified teaching module: Activate internal learning motivation

Three types of gamified learning tasks are designed: formula breakthrough challenges, compatibility puzzles

and syndrome differentiation prescription contests. Relying on incentive mechanisms such as points, badges and ranking lists on the Chaoxing online teaching platform, a gamified learning chain of “pre-class preview breakthrough — in-class interactive quiz — after-class consolidation challenge — unit comprehensive ranking competition” is constructed.

3.3. Development of standardized teaching resources and platform construction

In accordance with the principles of standardization, modularization and reusability, the three-dimensional teaching methods are integrated into three types of core resources. First, visual resources, including 30 micro-lessons explaining formula ballads and 15 formula mind map videos. Second, auditory resources, including 30 audio recordings of chanted or rapped formula ballads. Third, interactive resources, including 20 gamified H5 modules and a database of 500 matching exercises. Each formula classification module is independently packaged into a “poetic memory package + musical audio package + gamified breakthrough card + unit test package”, supporting flexible disassembly and combination to adapt to the teaching demands of different colleges and different class hours.

4. Teaching practice and effect verification

4.1. Research objects and methods

4.1.1. Research objects

A total of 168 students from two natural classes each majoring in Chinese Materia Medica and Traditional Chinese Medicine Rehabilitation Technology of Grade 2024 at South China Business College were selected as research objects. They were divided into an experimental group and a control group by a random number table. The experimental group included 86 students (23 males, 63 females), aged 19 to 20 years old with an average age of (19.5 ± 0.6) ; the control group included 82 students (21 males, 61 females), aged 19 to 20 years old with an average age of (19.4 ± 0.7) . There was no significant difference between the two groups in gender, age, entrance scores and basic knowledge level as well as learning interest ($P > 0.05$), showing comparability. This study has passed the review of the Medical Ethics Committee of South China Business College (Ethics No.: HNLL20250312), and all research subjects gave informed consent.

4.1.2. Research methods

The control group adopted the traditional teaching model, where teachers deliver theoretical lectures in class and students finish homework after class, with a written examination at the end of the semester. The experimental group implemented the “poetry-music-game” three-dimensional interesting teaching model, with the specific implementation process as follows. Experimental comparison method, questionnaire survey method and data analysis method were adopted to verify teaching effects. Pre-tests were conducted to ensure consistent baseline levels; post-tests (knowledge assessment + skill assessment) and satisfaction surveys were carried out at the end of the semester; learning behavior data were collected via the online platform for quantitative analysis of learning input and effects. SPSS 22.0 statistical software was used for data analysis. Measurement data were expressed as mean $\pm$ standard deviation (SD) and tested by t-test; enumeration data were expressed as rates (%) and tested by chi-square test. $P < 0.05$ was regarded as a statistically significant difference.

4.2. Teaching implementation process

4.2.1. Pre-class preview stage

Teachers release musical preview audio and gamified exercises on the platform three days in advance. Students independently finish initial memorization of formula ballads and breakthrough tasks. The platform automatically records students' learning duration, breakthrough scores and error rates to generate learning data reports. Teachers adjust key teaching contents according to students' preview conditions and focus on knowledge points with high error rates to realize targeted teaching.

4.2.2. In-class teaching stage

The offline classroom adopts a teaching mode integrating problem orientation, case teaching and gamified interaction, focusing on analyzing difficult points and discussing clinical cases. First, teachers guide students to review preview content through questioning, interspersing gamified interactive activities such as formula ballad relay and compatibility puzzles to enliven the classroom atmosphere. Then, teachers explain the compatibility logic and clinical application of formulas combined with clinical cases, and guide students to apply formula knowledge to solve practical problems. Finally, a classroom summary is delivered, and after-class tasks are assigned. Online synchronous live broadcast with bullet screen Q&A and real-time ranking lists is provided to maintain students' concentration in class.

4.3. After-class consolidation stage

The platform pushes personalized review packages to students according to their learning data, providing corresponding learning resources and exercises targeting weak knowledge points. Students consolidate knowledge by singing formula ballads and participating in contests, and finish homework. Teachers grade homework in a timely manner via the platform and provide personalized feedback to help students find and make up knowledge gaps. Regular unit comprehensive ranking competitions are held to stimulate students' sense of competition and learning motivation.

4.3. Analysis of practical effects

4.3.1. Significant improvement in knowledge mastery

Post-test results at the end of the semester show that the average final written examination score of the experimental group is (82.3 ± 6.5) , 20.1% higher than the control group's (68.5 ± 7.2) ; the accuracy rate of formula dictation reaches 89.7%, an increase of 37.6% compared with the control group's 65.2%; the average scoring rate of case analysis questions on formula compatibility application is 85.2%, 35.7% higher than the control group's 62.8%; in the skill assessment of rational application of Chinese patent medicines, the average score of the experimental group is (85.6 ± 5.8) , 18.4% higher than the control group's (72.3 ± 6.7) . All indicators of the experimental group are significantly superior to those of the control group ($P < 0.05$), which indicates that the three-dimensional interesting teaching system can effectively improve students' knowledge memorization and application ability.

4.3.2. Obvious enhancement of learning initiative and participation

Data from the online teaching platform show that the pre-class preview completion rate of the experimental group is 94.2%, 37.9% higher than the control group's 68.3%; the after-class homework submission rate is 96.5%, rising by 35.5% versus the control group's 71.2%; the classroom interaction participation rate is

91.9%, an increase of 45.0% compared with the control group's 63.4%. The above differences are statistically significant ($P < 0.05$). The completion rate of gamified breakthrough tasks reaches 87.2%. Students' self-awareness and learning enthusiasm are greatly improved, realizing the transformation from "being forced to study" to "taking the initiative to learn".

4.3.3. Greatly improved learning experience and satisfaction

A self-designed Course Learning Satisfaction Questionnaire was distributed to students of both groups, with a Cronbach's α coefficient of 0.87, indicating good reliability and validity. The results show that 92.4% of students in the experimental group think the three-dimensional interesting teaching makes learning more interesting; 89.5% hold the view that formula memorization becomes easier; 87.2% feel a significant reduction in learning burden. Students' satisfaction with teaching evaluation rises from 89.3% under traditional teaching to 98.1%, with a statistically significant difference ($P < 0.05$).

5. Conclusion and prospect

The three-dimensional interesting teaching system of "poetry, music and gamification" constructed in this study effectively resolves the teaching pain points of the higher vocational course Prescriptions of Chinese Materia Medica and Chinese Patent Medicines, greatly improves teaching quality and efficiency, and forms a replicable and promotable teaching practice paradigm. This model is not only applicable to Prescriptions of Chinese Materia Medica and Chinese Patent Medicines, but also provides references for the teaching reform of other Chinese medicine courses such as Chinese Materia Medica and Basic Theory of Traditional Chinese Medicine in higher vocational colleges.

Future research will further enrich teaching resources and expand experimental sample sizes, deeply explore the optimal combination mode of the three-dimensional teaching methods. Meanwhile, multilingual translation will be expanded, artificial intelligence technology will be introduced to realize personalized learning recommendations, and virtual reality technology will be integrated into gamified teaching modules to build immersive virtual compatibility training scenarios. The "poetry-music-game" teaching model will be continuously improved to cultivate more high-quality grassroots technical and skilled talents of traditional Chinese medicine and contribute to the inheritance, innovation and international communication of traditional Chinese medicine culture.

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The authors declare no conflict of interest.

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