

Application of the BOPPPS Teaching Model Based on the Chaoxing Learning Platform in Ideological and Political Education in Infectious Disease Nursing

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Abstract

Objective: To explore the application effect of integrating the BOPPPS teaching model based on the Chaoxing learning platform in ideological and political education in Infectious Disease Nursing. **Methods:** A quasi-experimental design was adopted. 36 undergraduate nursing students from the class of 2021 were assigned to the intervention group and underwent teaching reforms implementing the “Chaoxing Learning Platform + BOPPPS model”, while the control group consisted of 40 students from the class of 2021 who received conventional instruction. **Results:** Students in the intervention group achieved a significantly higher course score (90.15 ± 5.67) compared with the control group (82.62 ± 4.82), with a statistically significant difference ($t = -6.256$, $P < 0.001$). Meanwhile, the critical thinking ability score of the intervention group was higher than that of the control group, and the difference between the two groups was statistically significant ($P < 0.001$). The agreement rates for each item of the teaching reform evaluation in the intervention group ranged from 88.89% to 100.00%. **Conclusions:** The BOPPPS teaching model based on the Chaoxing Learning Platform demonstrates better effectiveness when applied to ideological and political education in Infectious Disease Nursing and can be promoted and implemented in practical teaching.

Keywords

Infectious Disease Nursing, BOPPPS Teaching Model, Ideological and Political Education, Chaoxing Learning Platform

1. Introduction

Infectious Disease Nursing not only undertakes the responsibility of imparting professional knowledge of infectious disease nursing and cultivating clinical practice skills, but also plays an important role in fostering professional ethics, social responsibility, and humanistic care among nursing professionals. Therefore, integrating ideological and political education throughout the entire teaching process is of great significance for cultivating new-era nursing professionals with both moral integrity and professional competence [1]. The Chaoxing Platform can provide strong support for the comprehensive integration of ideological and political education into the course and the evaluation of teaching effectiveness through functions such as resource delivery, classroom interaction, online assessment, and learning data analysis. The BOPPPS teaching model focuses on the achievement of teaching objectives and emphasizes student engagement and teaching evaluation through six stages [2]: bridge-in, objective, pre-assessment, participatory learning, post-assessment, and summary, thereby providing a systematic framework for integrating ideological and political education with professional instruction. In this study, the Chaoxing platform and the BOPPPS teaching model were combined and applied to the practice of ideological and political education in Infectious Disease Nursing, and the research findings are reported as follows.

2. Participants and Methods

2.1. Participants

Two undergraduate nursing classes enrolled in September 2021 were selected for the study and assigned to the intervention group ($n = 36$) and the control group ($n = 40$). All students were admitted through the national unified college entrance examination. The intervention group comprised 7 male and 29 female students, whereas the control group comprised 9 male and 31 female students. No statistically significant differences were observed between the two groups in terms of gender, age, grade point average (GPA), or critical thinking ability scores ($P > 0.05$), indicating comparability between the groups for subsequent experimental and comparative analyses.

2.2. Methods

The control group received conventional instruction, in which teachers delivered lectures, students attended classes, regular group-based practice was conducted, and professional instructors provided centralized question answering and guidance. The intervention group received a teaching intervention based on the “Chaoxing + BOPPPS” teaching model. The two groups were identical in terms of class hours, teaching progress, textbook, teachers and test paper.

2.2.1. Development of Ideological and Political Education in Infectious Disease Nursing

The learning needs analysis indicated that the teaching of Infectious Disease Nurs-

ing still has certain limitations in terms of student agency [3], feedback throughout the learning process, and value formation. Nevertheless, Infectious Disease Nursing has distinct educational advantages in implementing ideological and political education. Its content encompasses multiple value dimensions, including life and health, disease prevention and control, professional responsibility, teamwork, humanistic care, and public health security. However, in conventional teaching models, ideological and political elements are often presented as supplementary content after knowledge instruction or as extensions of case-based teaching. They are insufficiently integrated with professional knowledge, clinical contexts, and students' learning processes, potentially leading to a relative separation between professional instruction and ideological and political education. Therefore, it is necessary to further optimize the teaching model, and transform ideological and political education from an additional component of knowledge instruction into a whole-process educational approach integrated throughout pre-class, in-class, and post-class learning.

2.2.2. Optimizing the Structure of the Teaching Team

The teaching team for this course consists of four university faculty members (including one professor, one associate professor, and two lecturers) and one clinical instructor from a hospital (a senior nurse practitioner). All members of the team hold a master's degree or higher and have 10 or more years of experience in teaching or clinical practice.

2.2.3. Ideological and Political Education Teaching Design Based on the "Chaoxing + BOPPPS" Model

Under the BOPPPS model, the instructional design for Infectious Disease Nursing was developed based on educational and teaching theories, students' cognitive patterns, and psychological developmental characteristics, while also incorporating the professional training program, course standards, professional competency requirements, and learning needs analysis [4]. Accordingly, three teaching objectives were established for Infectious Disease Nursing: cognitive objectives (professional education), affective objectives (ideological and political education), and skills objectives (vocational education).

The establishment of affective objectives serves as the starting point for implementing ideological and political education throughout the course. In instructional design, the cultivation of students' ideological and political qualities should be regarded as a primary educational objective and integrated with professional and vocational education objectives. At the same time, we must fully explore and distill the cultural elements and value paradigms inherent in the professional course content to ensure that the course possesses both political depth and ideological strength, as well as humanistic warmth, thereby achieving an educational effect where ideological and political values are instilled subtly and imperceptibly¹.

¹http://www.moe.gov.cn/srcsite/A08/s7056/202006/t20200603_462437.html

Based on the characteristics of Infectious Disease Nursing, the alignment between its teaching objectives and ideological and political education objectives was analyzed to identify the core elements of course-based ideological and political education, including medical ethics and professional commitment, social responsibility and patriotism, ethical awareness and the rule of law, as well as traditional culture and humanistic literacy.

Chaoxing integrates mobile teaching, mobile reading, mobile learning, and mobile social interaction into one platform and is a free application containing various teaching-related micro-applications that has been widely used in the context of “Internet + Education”. Currently, Chaoxing has developed into a specialized mobile learning platform designed for mobile terminals such as tablets and smartphones. Users can establish course spaces on the Chaoxing platform and develop online teaching resources, including videos, case studies, ideological and political education resource libraries, and interactive quizzes. Chaoxing provides an online teaching platform for the implementation of the BOPPPS model and runs throughout all stages of its application. Meanwhile, the BOPPPS model can enhance the human-centered elements of Chaoxing [5], and the complementary advantages of both approaches jointly construct a blended teaching model based on “Chaoxing + BOPPPS”.

2.2.4. Teaching Methods

B (Bridge-in): Students’ existing knowledge was assessed through relevant cases, current affairs and hot topics, as well as questioning activities, which were used to introduce the new lesson. The ideological and political elements embedded in the course were further explored and refined to stimulate students’ learning interest and clarify the course content.

O (Objective): This stage aimed to clearly inform students of the three learning objectives of the lesson: cognitive objectives (professional education), affective objectives (ideological and political education), and skills objectives (vocational education). Students were guided to become familiar with the teaching objectives and key and difficult points of the lesson, thereby establishing a clear learning direction.

P (Pre-assessment): Pre-assessment serves as a prerequisite for implementing effective course-based ideological and political education activities and can accurately identify students’ ideological and political literacy before learning new knowledge, thereby helping teachers adjust educational strategies. Through the Chaoxing platform, questionnaires were distributed in advance, with response scores and completion time preset, and answer explanations were provided to reflect students’ preparation status before class.

P (Participatory Learning): This is the core component of the BOPPPS model, aiming to promote knowledge comprehension and skill development through students’ active participation and collaborative inquiry. Guided by a student-centered educational philosophy, teachers can use functions of the Chaoxing platform, such as random student selection, topic discussions, and quick-response activities, to

enhance students' attention and assess learning outcomes. For PPT content on which students frequently clicked the "unclear" option via mobile devices, teachers should adjust the teaching process in a timely manner. Different approaches can be adopted for participatory group learning according to various types of knowledge points, including case analysis, student mini-lectures, group presentations, and role-playing activities. Teachers can raise questions to guide students in in-depth analysis, organize group presentations, identify appropriate entry points, and naturally integrate ideological and political education into the course. Through diverse teaching methods, such as group discussions and practical activities, students' enthusiasm for classroom participation can be stimulated, thereby achieving the dual objectives of professional knowledge acquisition and ideological education.

P (Post-assessment): This stage aims to determine whether students have achieved the expected learning objectives of the lesson and can be conducted through online tests on Chaoxing, student skill demonstrations, presentations, and other methods.

S (Summary): Teachers use the random student selection function of Chaoxing to invite students to summarize the content of the lesson and provide supplementary explanations when necessary. After class, students are required to complete online assignments assigned by teachers on Chaoxing, such as mind maps, micro-videos, and publicity brochures on infectious disease prevention and protection, to guide students in transforming theoretical knowledge into practical actions. Through the regulation of emotional cognition, students can realize the transformation of beliefs through practice. This stage plays an important role in linking previous and subsequent teaching processes, enabling the entire teaching process to form a complete closed loop, thereby consolidating the achievements of ideological and political education in this chapter and ultimately achieving the educational goal of "fostering virtue through education".

2.3. Evaluation Methods

2.3.1. Student's Stage Test Average Score and Final Exam Results

Based on the three-dimensional educational objectives of "cognition, affect, and skills", a diversified, multidimensional, and whole-process course assessment and evaluation system was established on the Chaoxing platform. Relying on the Chaoxing platform, the system dynamically recorded students' learning processes and comprehensively evaluated their learning engagement, knowledge acquisition, practical competence, and ideological and political literacy. The formative assessment comprised five dimensions: pre-class self-directed learning, in-class interactive participation, post-class extended learning, practical competence development, and performance in ideological and political education integrated into the curriculum, with a maximum score of 100 points. The summative assessment consisted of a theoretical knowledge assessment, with a maximum score of 100 points. The total course score for students in the intervention group was calculated as follows: $\text{total score} = (\text{formative assessment score} + \text{summative assessment score})/2$. For the control group, the formative assessment comprised class attendance, class-

room performance, in-class tests, assignment completion, laboratory reports, and skills training, whereas the summative assessment consisted of the final theoretical examination. Both groups completed the same final theoretical examination under identical examination conditions and scoring criteria, ensuring comparability of their theoretical examination scores.

2.3.2. Critical Thinking Ability

The Simplified Critical Thinking Scale [6] was used to assess critical thinking. It comprises six dimensions: truth-seeking (4 items, score range 4 - 24), analytical ability (3 items, score range 3 - 18), systematic ability (4 items, score range 4 - 24), self-confidence (7 items, score range 7 - 42), curiosity (5 items, score range 5 - 30), and maturity (8 items, score range 8 - 48). A Likert 6-level scoring method was adopted, and the total score was 31 - 186 points. The scale demonstrated good reliability (Cronbach's $\alpha = 0.865$). Higher scores indicate stronger critical thinking dispositions.

2.3.3. Evaluation of Course Teaching Reform

After completion of the course, students in the intervention group were evaluated using a self-designed questionnaire on course teaching reform. The questionnaire covered multiple aspects, including instructional content design, development of teaching resources, implementation of the teaching process, learning engagement experience, integration of ideological and political education into the course, and evaluation of teaching effectiveness. Each evaluation item was rated using a 3-point Likert scale, with response options of "agree", "uncertain", and "disagree".

2.4. Data Analysis

The data were analyzed using independent samples t-tests in SPSS 21.0, with the significance level set at $\alpha = 0.05$. The measurement data, such as students' test scores, critical thinking ability and autonomous learning ability, were expressed by ($\bar{x} \pm s$), and the counting data were expressed as %.

3. Results

3.1. Nursing Undergraduates' Final Exam Scores and Total Assessment Scores

The final exam score and total assessment score of the intervention group were significantly higher than those of the control group ($P < 0.001$). See **Table 1** in detail.

Table 1. Comparison of final exam score and total assessment score between two groups ($\bar{x} \pm s$, score).

Group	<i>n</i>	Final exam score	Total assessment score
Control group	40	79.46 $\pm$ 3.84	82.62 $\pm$ 4.82
Intervention group	36	88.51 $\pm$ 4.63	90.15 $\pm$ 5.67
<i>t</i>	-	-9.308	-6.256
<i>P</i>	-	<0.001	<0.001

3.2. Nursing Undergraduates' Critical Thinking Ability

The scores of the critical thinking of the intervention group were significantly higher than those of the control group ($P < 0.001$). See **Table 2** in detail.

Table 2. The scores of the critical thinking ability between two groups ($\bar{x} \pm s$, score).

Group	<i>n</i>	Truth-seeking	Analytical ability	Systematic ability	Self-confidence	Curiosity	Maturity
Control group	40	18.40 ± 2.27	14.98 ± 1.24	17.33 ± 2.19	32.15 ± 2.86	22.85 ± 2.50	41.75 ± 3.51
Intervention group	36	21.53 ± 2.13	16.72 ± 1.33	20.25 ± 2.18	36.22 ± 3.41	25.92 ± 3.57	44.69 ± 3.55
<i>t</i>	-	-6.179	-5.902	-5.816	-5.656	-4.377	-3.626
<i>P</i>	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

3.3. Intervention Group Students' Evaluation of the Teaching Reform

The agreement rates for each item of the teaching reform evaluation in the intervention group ranged from 88.89% to 100.00%. See **Table 3** in detail.

Table 3. Intervention group students' evaluation ($n = 36$).

Items	Agreement <i>n</i> (%)	Uncertainty <i>n</i> (%)	Disagreement <i>n</i> (%)
Practicality and advancement of teaching content	32 (88.89)	4 (11.11)	0 (0.00)
Richness and applicability of teaching resources	36 (100.00)	0 (0.00)	0 (0.00)
Enlightening and interactive teaching process	32 (88.89)	3 (8.33)	1 (2.78)
Improvement of learning interest and autonomous learning ability	33 (91.67)	3 (8.33)	0 (0.00)
Effective integration of ideological and political education into the course	36 (100.00)	0 (0.00)	0 (0.00)
Promotion of comprehensive ability development	33 (91.67)	3 (8.33)	0 (0.00)

4. Discussions

4.1. The BOPPPS Teaching Model Based on the Chaoxing Learning Platform Improved Students' Mastery of Knowledge and Skills

Table 1 shows that the final exam score and total assessment score of the intervention group are higher than those of the control group, and the differences are statistically significant, which is consistent with the studies [7]-[9]. In the evaluation of the course teaching reform, 88.89% of nursing students in the intervention group considered the teaching process to be enlightening and interactive, while 91.67% of nursing students agreed that the teaching approach enhanced their learning interest and autonomous learning ability, and 91.67% agreed that it promoted

the development of their comprehensive competencies.

The possible reason is that the BOPPPS teaching model is goal-oriented and divides the teaching process into several stages, including bridge-in, objective, participatory learning, and summary, emphasizing students' central role in the classroom. Through the Chaoxing Learning Platform, teachers can release instructional videos, learning materials, and pre-class quizzes in advance to guide students in self-directed preparation, enabling them to develop a preliminary understanding before classroom learning. During classroom instruction, typical cases, problem-based discussions, and in-class quizzes are integrated to facilitate students' in-depth understanding of disease transmission characteristics, clinical manifestations, nursing interventions, and prevention and control knowledge. After class, further consolidation of knowledge is achieved through extended assignments and online interactions. This teaching model enhances students' learning engagement through a continuous learning process before, during, and after class, thereby facilitating knowledge internalization and transfer.

Furthermore, Infectious Disease Nursing not only requires students to acquire theoretical knowledge related to diseases but also demands practical skills in epidemic prevention and control, patient care, and health education. The BOPPPS teaching model based on the Chaoxing Learning Platform integrates abstract theoretical knowledge with clinical nursing practice through teaching activities such as case scenario simulation, virtual training, and nursing plan design, which helps cultivate students' abilities to analyze problems and solve practical nursing problems, thereby promoting the coordinated development of knowledge and skills. Improved critical thinking skills enable students to identify key information, analyze problems systematically, and make rational judgments, which may help them better understand examination questions and provide accurate and logically structured answers.

4.2. The BOPPPS Teaching Model Based on the Chaoxing Learning Platform Improved Students' Comprehensive Competencies

The education of nursing professionals focuses not only on professional knowledge and clinical skills but also emphasizes the development of comprehensive competencies, including clinical reasoning, communication and collaboration, professional competence, and social responsibility. **Table 3** shows that students in the intervention group give relatively positive evaluations of the teaching reform, indicating that the BOPPPS teaching model based on the Chaoxing Learning Platform has a positive effect on fostering students' comprehensive competencies. It is consistent with the studies [10] [11].

In traditional teaching, students primarily acquire knowledge through passive learning, with relatively limited opportunities for classroom interaction and independent inquiry, which may hinder the development of their comprehensive competencies. In contrast, the BOPPPS teaching model emphasizes a student-centered approach and encourages students to think actively, communicate and collaborate,

and articulate their views through participatory learning activities such as problem-based learning, case analysis, group collaboration, and classroom presentations. In Infectious Disease Nursing, teachers incorporate infectious disease prevention and control cases, public health emergencies, and clinical nursing scenarios to guide students in analytical discussions, enabling them to gradually develop clinical reasoning and nursing decision-making skills through solving practical problems.

Meanwhile, the Chaoxing Learning Platform overcomes the temporal and spatial limitations of traditional classroom teaching by providing students with a platform for continuous learning and interactive communication. Students can repeatedly review instructional resources according to their individual learning needs, participate in online discussions, and complete extension tasks, thereby enhancing their self-directed learning abilities and awareness of lifelong learning.

In addition, integrating ideological and political education throughout the teaching process, through content such as infectious disease prevention and control cases, healthcare professionals' contributions during epidemic response, and public health responsibilities, helps students recognize the value of the nursing profession, strengthen their professional identity, social responsibility, and awareness of humanistic care, and achieve the organic integration of professional education and value formation.

4.3. Limitations

This study has several limitations. First, the intervention and control groups each consisted of one intact class. Consequently, the effect of the teaching intervention may be confounded by class-specific characteristics, such as classroom dynamics, peer interactions, and other unmeasured contextual factors, making it difficult to distinguish the intervention effect from the class effect. Second, students were analyzed as individual observations, and the statistical analyses did not account for potential within-class dependence. Students within the same class may share learning environments and experiences, meaning that their outcomes may not be fully independent. With only one class in each group, the effects of class-level clustering cannot be reliably estimated or adjusted for statistically. Therefore, the findings should be interpreted with caution, and the observed differences cannot be attributed exclusively to the teaching intervention. Future studies should include multiple classes in each group, use multilevel models or other methods that account for clustering to improve the robustness and generalizability of the findings.

5. Summary

The BOPPPS teaching model based on the Chaoxing Learning Platform provides a structured approach to optimizing the teaching process, enhancing student engagement, and integrating ideological and political education into Infectious Disease Nursing. The findings suggest that this approach may contribute to improved learning outcomes and the development of students' comprehensive competencies.

However, given the limitations of the class-level study design, these findings should be interpreted cautiously, and further research involving multiple classes is needed to validate the effectiveness of this teaching model. Future efforts will focus on enriching the teaching case base, deepening the integration of ideological and political education, and leveraging digital teaching tools to support the development of nursing professionals with strong professional competence, social responsibility, and commitment to the nursing profession.

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Author Contributions

Xie Fei and Zhou Hong contributed to the conception and design of the study. Xie Fei and Sun Rui were responsible for the implementation of the teaching intervention and data collection. Qi Xiaowei conducted the statistical analysis and interpreted the results. XieFei drafted the manuscript. Xie Fei and Fei Yang critically revised the manuscript for important intellectual content. All authors reviewed and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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