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Application of Case-Based Teaching Combined with Graduate Teaching Assistants in Fundamental Nursing Skills Practicum

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Abstract

Objective: To explore the effect of case-based teaching combined with graduate teaching assistants in Fundamental Nursing Skills Practicum. Methods: A quasi-experimental design was adopted, with 37 undergraduate nursing students from the class of 2022 assigned to the intervention group and 39 from the class of 2021 assigned to the control group. The control group received traditional experimental teaching, while the intervention group underwent case-based teaching combined with graduate teaching assistants. Results: After the teaching reform, the intervention group demonstrated significantly higher scores than the control group in midterm and final individual operational assessment score, final comprehensive assessments, and critical thinking ability ($P < 0.05$). Over 72.34% of the students in the intervention group held a positive attitude toward the teaching reform. Conclusions: Case-based teaching combined with graduate teaching assistants in Fundamental Nursing Skills Practicum can effectively improve the nursing undergraduates' operational skills, critical thinking ability, teamwork, and overall competence, thereby providing a valuable reference for practical courses conducted in large-class settings in other disciplines.

Keywords

Fundamental Nursing, Case-Based Teaching, Graduate Teaching Assistant, Critical Thinking

1. Introduction

Fundamental Nursing Skills Practice is a core professional course offered to second-year nursing students, serving as a bridge between nursing theory and clinical

practice. Its teaching quality directly impacts students' subsequent performance in specialized clinical rotations and patient safety. Traditional experimental teaching primarily follows the "teacher demonstration followed by student group practice" model, which has three main limitations: 1) Fragmented skill training often occurs in isolation from clinical contexts, making it difficult for students to develop holistic clinical thinking. 2) The faculty-to-student ratio of 1:10 - 15 limits individualized feedback and guidance. 3) The assessment system overemphasizes procedural accuracy while neglecting core competencies such as critical thinking and clinical decision-making. Case-based teaching, which simulates authentic clinical scenarios, has been proven effective in enhancing student engagement and critical thinking skills, and is widely adopted in medical education [1]-[5]. Concurrently, the graduate teaching assistant system has been implemented globally in universities. Graduate teaching assistants, acting as both "instructors" and "learners", not only facilitate student learning but also serve as a communication bridge between faculty and students [6]-[9]. However, existing research has yet to systematically explore the synergistic effects of combining graduate teaching assistants with case-based teaching in fundamental nursing skills practice. Given the advantages of the two approaches, this study examines whether integrating them could more effectively achieve the teaching objectives of fundamental nursing skills practice. The results are presented below.

2. Participants and Methods

2.1. Participants

Using convenience sampling method, nursing undergraduates (class of 2022) were assigned to the intervention group ($n = 37$), while those from the 2021 cohort were assigned to the control group ($n = 39$). No statistically significant differences were observed between the two groups in terms of gender, age, grade point average (GPA), and critical thinking ability scores ($P > 0.05$).

2.2. Methods

2.2.1. Teaching Methods

Both groups used the same core textbook: the 7th edition of Fundamental Nursing edited by Li Xiaohan. The experimental teaching consisted of 64 credit hours, with the same instructors and identical total teaching hours for both groups. To minimize potential bias, the instructors were not involved in any of the experimental assessments, questionnaire surveys, or data analysis.

1) Control Group

The traditional teaching method was employed, where instructors first explained and demonstrated the operational procedures and key points. Students were then divided into groups of 10 - 15, with each group practicing under the guidance of one instructor. After every 30 credit hours of single-skill operation teaching, a 2-credit-hour case-based comprehensive teaching session was conducted, integrating three previously learned operational skills into one case sce-

nario.

2) Intervention Group

Case-based teaching was jointly implemented by instructors and Master of Nursing Specialist (MNS) students.

a) Teaching Philosophy

Guided by the outcome-based education framework, the teaching focused on student development, integrating knowledge, skills, and values into case-based learning to develop students' operational competence, clinical thinking, teamwork, and communication skills.

b) Teaching Preparation

i) GTA Recruitment and Training: During the first academic year, the MNS students from the class of 2022 received training about undergraduate fundamental nursing skills instruction through both the Advanced Nursing Practice curriculum and extracurricular programs, subsequently establishing one-to-one mentoring relationships with intervention group students.

ii) Case Database Development: The course instructors and MNS students collaboratively developed 80 teaching and assessment cases. Each case includes a scenario description, nursing problems identification, operational tasks, and 1~2 challenging situations. The developed cases were reviewed and then uploaded to the online platform.

iii) Restructuring of the teaching program： The original 64-credit-hour practical training was restructured into case-based learning workshops. Following every 6 credit hours of single-skill case instruction, a 2-credit-hour comprehensive case-based teaching session was conducted.

c) Teaching Process

i) Pre-class phase: instructors assigned MNS students according to the teaching schedule, ensuring a 1:3 supervisor-to-student ratio during sessions. One week before each class, faculty and postgraduate students worked together to conduct standardized patient training,

ii) In-class phase: the instructor systematically explained the operational procedures and key points based on the case, then conducted a demonstration. During the subsequent group practice session, MNS students took on a mentoring role, introducing challenging scenarios to guide nursing undergraduates' hands-on practice. Students were required to analyze these simulated situations and make clinical decisions accordingly.

iii) Post-class phase: the nursing undergraduates uploaded reflective reports to the online platform, where both the instructor and MNS students provided online guidance.

2.2.2. Evaluation Methods

1) Midterm and final practical examination scores: Clinical instructors not involved in the course teaching conducted the assessments, with identical grading criteria applied to both the intervention and control groups.

2) Critical thinking ability: The Critical Thinking Disposition Inventory-Chi-

nese Version (CTDI-CV), translated and revised by Peng MC [10], was used to assess critical thinking one week before and after the intervention. It comprises seven dimensions: truth-seeking, open-mindedness, analyticity, systematicity, critical thinking self-confidence, inquisitiveness, and cognitive maturity. Each dimension contains 10 items (70 items total), scored on a 6-point Likert scale. Scores for each dimension range from 10 to 60, with a maximum total score of 420. Higher scores indicate stronger critical thinking disposition. The scale demonstrated good reliability (Cronbach's $\alpha = 0.90$) and validity (CVI = 0.89).

3) Intervention group's evaluation of the teaching reform: A self-designed "Teaching Reform Evaluation Questionnaire" was utilized for the survey. The initial draft of the questionnaire was developed based on literature review and team discussions, followed by evaluation by six experts with associate senior titles or higher and over 10 years of experience in nursing education or clinical practice. A pilot survey was then conducted, and the questionnaire was further revised based on identified limitations along with additional expert consultation. The final version consisted of 15 items. The scale-level content validity index was 0.91, and the item-level content validity indices ranged from 0.84 to 0.98. After the course, the questionnaire was distributed to students in the intervention group, with 37 questionnaires collected and 37 valid responses.

2.2.3. Data Analysis

The data were analyzed using independent samples t-tests in SPSS 26.0, with the significance level set at $\alpha = 0.05$.

3. Results

3.1. Nursing Undergraduates' Midterm and Final Individual Practical Assessment Scores

The intervention group showed significantly higher scores in both midterm (86.84 ± 3.35) and final (90.32 ± 2.78) individual practical assessments compared to the control group ($P < 0.05$). Notably, a statistically significant improvement was observed between midterm and final practical assessment scores within the intervention group ($P < 0.05$), whereas no significant difference was detected in the control group ($P > 0.05$). See Table 1 in detail.

Table 1. Comparison of midterm and final individual practical assessment scores between the two groups ($\overline{x} \pm s$, score).

group	n	midterm individual practical assessment scores	final individual practical assessment scores	t	P
control group	39	83.85 ± 4.57	85.08 ± 4.11	−1.250	0.215
intervention group	37	86.84 ± 3.35	90.32 ± 2.78	−4.876	0.000
t		3.240	6.546		
P		0.002	0.000		

3.2. Nursing Undergraduates' Final Comprehensive Assessment Scores

The intervention group achieved significantly higher scores on the final comprehensive assessment (86.86 ± 3.35) compared to the control group ($P < 0.05$). See Table 2 in detail.

Table 2. Comparison of final comprehensive assessment scores between the two groups ($\overline{x} \pm s$, score).

Group	n	Final comprehensive assessment scores
Control group	39	82.90 ± 4.44
Intervention group	37	86.86 ± 3.35
t		3.763
P		0.000

3.3. Nursing Undergraduates' Critical Thinking Ability

The intervention group demonstrated significantly higher critical thinking scores (283.73 ± 20.91) compared to the control group upon course completion ($P < 0.05$). See Table 3 in detail.

Table 3. Comparison of post-course critical thinking scores between the two groups ($\overline{x} \pm s$, score).

Group	n	Critical thinking scores
Control group	39	260.54 ± 20.31
Intervention group	37	283.73 ± 20.91
t		4.904
P		0.000

3.4. Intervention Group Students' Evaluation of the Teaching Reform

The percentage of students expressing positive evaluations ranged from 72.34% to 97.30% across the 15 items, with six items obtaining approval rates exceeding 80%. See Table 4 in detail.

Table 4. Intervention group students' evaluation ($n = 37$).

Items	Yes n (%)	Uncertainty n (%)	No n (%)
Increasing proactive communication with the MNS students	36 (97.30)	1 (2.70)	0 (0)
Learning deficiencies can be promptly identified and addressed with immediate feedback	35 (94.59)	2 (5.41)	0 (0)
Enhancing clinical immersion and stimulated learning motivation	34 (91.89)	3(8.11)	0(0)
Improving teamwork competency	34 (91.89)	2 (5.41)	1 (2.7)
Enhancing communication and coordination skills	33 (89.19)	2 (5.41)	2 (5.41)
Enhancing complex problem-solving skills	31 (83.78)	3 (8.11)	3 (8.11)

4. Discussions

4.1. Case-Based Teaching Combined with Postgraduate Teaching Assistants Improved the Operational Skills

The results of this study demonstrated that the intervention group achieved significantly higher midterm and final individual assessment scores compared to the control group ($P < 0.05$), which is consistent with the findings of Song YL [2]. The improvement in students' operational skills may be attributed to the following three factors: 1) Case-based teaching employed realistic clinical scenarios, making learning content more vivid and concrete, thereby increasing students' interest and participation. 2) The involvement of postgraduate teaching assistants effectively optimized the instructor-to-student ratio, ensuring each student received more timely and personalized guidance. 3) The similarities in age and experience between postgraduate assistants and undergraduate students fostered an effective near-peer learning atmosphere [8] [9]. This equitable interaction persisted throughout the pre-class, in-class, and post-class phases, continuously reinforcing instructional effectiveness.

4.2. Case-Based Teaching with Postgraduate Teaching Assistants Enhanced Critical Thinking Ability

The post-intervention results demonstrated significantly greater improvement in critical thinking skills in the intervention group compared to the control group, consistent with findings reported by Huai PP [3]. The enhancement of critical thinking abilities may be explained through following mechanisms: 1) Both individual skill training and comprehensive training adopted case-based teaching, incorporating challenging scenarios such as changes in patient condition, incorrect medical orders, and nurse-patient communication conflicts within the cases，which created a "cognitive conflict" learning environment, effectively activating students' metacognitive monitoring abilities, prompting them to continually adjust and optimize their thinking strategies. 2) Postgraduates served as "more capable peers" demonstrating and guiding thinking processes based on their advanced training and clinical experience. Undergraduate students actively observed and emulated these processes, mirroring the "cognitive exposure" mechanism.

4.3. Case-Based Teaching with Postgraduate Teaching Assistants Improved Comprehensive Competencies

As shown in Table 2, the intervention group achieved significantly higher comprehensive assessment scores than the control group. Questionnaire results indicated that over 80% of students perceived improvements in teamwork, communication and coordination, complex problem-solving abilities and so on. These outcomes may be attributed to the following implementations: 1) The course team expanded the comprehensive training from 4 to 16 class hours, providing students with enhanced opportunities for integrated skills practice, which may have contributed to the improved outcomes. 2) Triad-based scenario management requir-

ing coordinated responses to emergent patient conditions (e.g., acute deterioration, medication errors), which necessitated precise role delegation and real-time interdisciplinary collaboration. 3) Iterative simulation cycles that progressively refined both cognitive skills (clinical decision-making under pressure) and behavioral competencies (conflict resolution, task synchronization). This aligned with Bandura's social learning theory, where repeated, scaffolded practice in high-fidelity environments facilitated competency internalization.

4.4. Limitations

The main limitation of this study lies in its use of a quasi-experimental design with non-randomized grouping. Although no statistically significant differences were found in gender, age, academic performance, and critical thinking skills between the two groups before the course, potential unmeasured confounding factors may still exist, such as teaching experience, instructional environment, students' learning motivation and so on.

5. Summary

The application of case-based teaching combined with postgraduate teaching assistants in fundamental nursing skills education has demonstrated significant improvements in students' operational competencies, critical thinking abilities, and comprehensive qualities. This approach was proved to be a feasible and effective teaching method, which could serve as a valuable reference for other practice-based courses conducted in large-class settings. Future studies will incorporate qualitative research to explore both students' and teaching assistants' subjective experiences in depth, with the aim of optimizing instructional implementation details.

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Conflicts of Interest

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

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