How to Bridge the Gap Between Classroom and Clinical Practice? The Application of the Synchronous Teaching Model and Simulation Teaching in the Practical Education of the Health Assessment Course

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Article

How to Bridge the Gap Between Classroom and Clinical Practice? The Application of Synchronous Teaching Model and Simulation Teaching in Practical Teaching of Health Assessment Course

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Abstract: Background/Objectives: Health assessment is a required course in nursing undergraduate education, its task is not merely to train students to take a health history and conduct physical examinations but to cultivate clinical thinking and the ability to formulate a plan of holistic care. Without systematic study of clinical nursing professional courses and a lack of clinical practice experience, it could be challenging for them to understand and master health assessment knowledge and skills solely through class teaching and peer practice in the laboratory. This study aimed to evaluate the effect of the synchronous teaching model of lab teaching and clinical practice, simulation teaching in the practical teaching of the Health Assessment Course. **Methods:** The health assessment practice teaching utilized a synchronous teaching model that incorporated lab teaching, clinical practice, and simulation teaching. 71 senior baccalaureate nursing students participated in this study. Bedside consultation, Objective Structured Clinical Examination (OSCE), and self-designed questionnaires were used to evaluate the teaching effect. **Results:** The examination score for health history collection was 19.17±0.96, and the score for the OSCE exam was 91.22±5.24. There were 80.28% of the students believed that health history collection by using standardized patients (SP) could be helpful to improve their critical thinking ability, 91.55% of undergraduates thought that the synchronous teaching mode of lab teaching and clinical practice increased the level of challenge, 85.92% of students believed that case discussion is conducive to the comprehensive application of multidisciplinary knowledge and 85.92% of undergraduates reported that the OSCE exam could effectively examine their clinical thinking ability. **Conclusion:** The synchronous teaching model of lab teaching and clinical practice and simulation teaching increase the difficulty, depth, and challenge of health assessment practice teaching, and realize the deep integration of health assessment knowledge, skills, and clinical thinking.

Keywords: synchronous teaching model; simulation teaching; health assessment; practical teaching; nursing education

1. Introduction

The Health Assessment Course serves as a bridge between basic and clinical nursing courses. It aims to cultivate students' ability for health history taking and physical examination to lay the foundation for formulating a plan of holistic care. [1,2,3] Practical teaching is an important part of the curriculum for the Health Assessment Course. Scientific and reasonable practical teaching design can not only effectively cultivate students' ability to collect health history and physical examination but also promote their clinical thinking ability. In Western countries, clinical practice is synchronized with theoretical teaching; students are exposed to clinical practice from the beginning of the program, which greatly narrows the gap between classroom teaching and clinical practice. [4] In contrast,

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clinical practice is not typically introduced until the final year of the nursing program in most undergraduate nursing colleges and universities in China. The practical teaching of the Health Assessment Course is mainly completed in the laboratory, where students practice with their peers. However, this approach lacks experience in bedside consultation, physical examination for real patients, and clinical case analysis. This approach is not conducive to cultivating students' clinical thinking ability. [3] Additionally, the traditional lab teaching of the Health Assessment Course focuses on skill training, lacking comprehensive experiments. The assessment results for peer practice are often normal, leading to students' inability to identify abnormal signs and their clinical significance, which hinders the organic integration of health assessment knowledge, skills, and clinical thinking ability. [5] Therefore, it is indispensable for nursing curriculum reform in China to incorporate more clinical practice into nursing courses.

In recent years, the American Association of Colleges of Nursing (AACN) updated the essentials for Professional Nursing Education to focus on competency-based learning. According to the new essentials, all nursing students should have proficient assessment skills to become competent entry-level nurses. [6] As a result, faculty must redesign practice teaching to focus on students' health assessment knowledge, skills, and clinical thinking for future practice.

The synchronous teaching model refers to the simultaneous implementation of classroom teaching and clinical practice. Nursing students receive relevant theoretical knowledge and practical skills before providing medical care for patients under the guidance of the teacher. According to the results of Luo et al. [8] and Zhang et al. [9], synchronous teaching could effectively stimulate students' learning interest, deepen their understanding and mastery of theoretical knowledge and practical skills, and improve their communication, critical thinking, analytic and problem-solving abilities in regards to patient care. Furthermore, Gong et al. [10] also confirmed that the synchronous teaching model was a valid instructional approach for fostering deep learning in students.

Simulation-based nursing education is an increasingly popular pedagogical approach that provides students with opportunities to practice their clinical and decision-making skills through various real-life situational experiences. [11]Simulation teaching helps students to be better prepared in situations where they have to assess the patient's clinical condition, and it is an effective teaching methodology for students to acquire the necessary competencies for their professional future.[12] Several researchers [13,16] have shown that simulation scenarios could enhance students' acquisition, understanding, and application of knowledge. Additionally, they also could improve students' self-confidence in handling clinical problems and promote critical thinking.

In Health Assessment Courses, although several studies have documented the effectiveness of synchronous teaching models and simulation teaching respectively, few studies have explored the use of both two methods simultaneously. Therefore, under the guidance of the gold course perspective, we introduced a synchronous teaching model and simulation teaching in health assessment practical teaching to bridge the gap between classroom and clinical practice. The purpose of this study was to evaluate the effect of the synchronous teaching model and simulated teaching in Health Assessment Course practical teaching.

2. Methods

2.1. Participants

The study was started from September 2021 to February 2022, a total of 37 nursing undergraduates from a university in Wuhan were selected for this study using a convenient sampling method. The sample included 10 male students and 27 female students, aged from 18 to 20 years (19.13 ± 0.67). Based on the principles of group homogeneity and individual heterogeneity, the students were divided into 5 groups, each consisting of 6-8 students. During the first semester of their second academic year, they received a comprehensive Health Assessment Course which lasted for a total of 112 hours. The course comprised 16 hours of theoretical teaching, 32 hours of lab teaching,

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and 64 hours of clinical practice. Before this course, the students had already completed the courses of Anatomy, Pathophysiology, and Fundamentals of Nursing.

2.2 Practical Teaching Design of Health Assessment Course

2.2.1. Constructing the Synchronous Teaching Model of Lab Teaching and Clinical Practice.

Under the guidance of experiential learning theory, we constructed the synchronous teaching model of lab teaching and clinical practice, which provided students with an opportunity to learn by doing. Students will enter the laboratory directly after completing health assessment theoretical knowledge every Tuesday, and carry out simulation exercises of health assessment skills under the guidance of the course instructor. At the end of the lab teaching, the instructor will assess students' skills, provide grades and offer feedback. Students will enter the clinical practice in the week after passing the assessment. Students enter the clinical department of the affiliated hospital every Friday morning to collect health history and conduct physical examinations on real patients, half a day a week, totaling 16 weeks and 64 class hours. The teachers of the course personally participate in clinical practice teaching, and each teacher teaches 6~8 students. Based on the weekly objectives of the lab teaching, teachers pre-select the internship department and patients for the students. Once students begin their clinical department rotations, they will practice under the guidance of the teacher, systematically gather the patient's health history, and identify any abnormal symptoms and signs. Half an hour before the end of the internship, the teacher organized the students to discuss clinical cases, help students analyze the shortcomings in the process of health history collection and physical examination, and guide students to analyze the relationship between abnormal assessment results and specific diseases.

2.2.2. Reforming Lab Teaching Methods

We introduced innovative teaching methods and standardized patients, role-play, simulation and case discussion to our Heath Assessment Course. We subsequently adjusted our teaching hours and increased the proportion of practical teaching. We arranged our teaching according to the proportion of theoretical teaching, lab teaching, and clinical practice; 1:2:4 respectively. The lab teaching period was increased to 32 hours while the clinical practice period was extended to 64 hours. By integrating lab teaching situations with clinical applications, we conducted comprehensive experiments at the end of the semester to increase the difficulty of simulating cases and promote the organic integration of students' health assessment knowledge, skills, and clinical thinking ability. Based on previous years' teaching experiences, the course's instructors, of course, optimized the course content and teaching methods by selecting the corresponding lab teaching method following the teaching objectives, content, and student's knowledge level. See Table 1 below for details.

Table 1. Design of lab teaching methods for the Health Assessment Course.

Contents	**lab teaching methods**				
	SP	**Role play**	**Local simulator**	**Case analysis**	**HFS**
Health history taking	√				
Assessment of General Status		√		√	
Nutrition assessment		√		√	
Psychological assessment		√		√	
Assessment of Head, Face, and Neck			√	√	
Thorax and lungs assessment			√	√	
Breast assessment			√	√	
Assessment of Abdomen			√	√	
Musculoskeletal assessment		√		√	
Neurological Assessment				√	√

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Comprehensive experiment	√	√	√

*SP=standardized patients, HFS=high-fidelity simulation.

2.2.3. Evaluation of Practical Teaching

Three self-designed questionnaires including 23 items and an open-ended question were used to evaluate the teaching effectiveness of synchronous teaching models, lab teaching methods, and the OSCE exam. Students were asked to rate the items with agree, neutral, or disagree. The Cronbach's alpha coefficients of the three questionnaires are 0.92, 0.89, and 0.94 respectively. As part of our effort to enhance the practicality of the course, we implemented bedside consultations and OSCE in the course exam, which aimed to provide students with hands-on experience in health assessment and clinical thinking. The health history collection at the bedside accounts for 40%, and the OS*CE exam* accounts for 60%. The mid-term examination was a comprehensive health history collection, which was completed by students on real patients in the clinical department. In the final examination, the OSCE exam was introduced for the assessment of health assessment skills and clinical thinking abilities. To comprehensively evaluate students' mastery of core competencies, we established a multi-station assessment, covering medical history collection, case analysis, general condition assessment, specialized physical examination, and case writing".

2.3. Statistical Analysis

Statistical Package for Social Sciences software (SPSS) (version 23.0, IBM Corp., Armonk, NY, USA) was used to analyze the data. Categorical variables were described in numbers and percentages and continuing variables were described by means and standard deviation. The results of open-ended questions were expressed in words. For each type of CAM treatment, frequencies and proportions were used to evaluate the responses. The significance level was set at to be 0.05 (two-tailed).

2.4. Ethics Considerations

This study was approved by the medical ethics committee of the University (WHU-2022-HL-002). Prior to the research, the purpose of the study was explained to all students, and written informed consent was obtained. During the data collection process, no identifying information such as student ID and name that would reveal their identities was requested from the students.

3. Results

3.1. The Score of Health History Collection and the OSCE Exam

All of the students passed the course examination, meeting the goal of the course redesign. The score of health history collection is 19.17±0.96. The total score and each station's score on the OSCE exam are shown in Table 2.

Table 2. The score of the OSCE exam.

Station	Health history collection	Case analysis	General situation assessment	Specialized physical examination	Medical record writing	Total score
Full score	20	20	20	25	15	100
Actual score	19.17±0.96	18.25±1.51	16.48±2.63	22.88±2.66	14.44±1.22	91.22±5.24

3.2. Student Evaluation of Synchronous Teaching Models, Lab Teaching Methods, and the OSCE Exam. For Details, see Table 3, Table 4, and Table 5.

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Table 3. Students' evaluation of synchronous teaching model (n, %).

Items	Agree	Neutral	Disagree
Increased interest in learning Health Assessment Course	60（84.51）	10（14.08）	1（1.41）
Promote the integration of theoretical knowledge and clinical diseases	63（88.73）	7（9.86）	1（1.41）
Improve students' communication ability	60（84.51）	10（14.08）	1（1.41）
Help students to know the clinical significance of abnormal signs	60（84.51）	11（15.49）	0（0.00）
Cultivating Students' clinical thinking ability	61（85.92）	9（12.68）	1（1.41）
Promotes the comprehensive application of multidisciplinary knowledge	61（85.92）	9（12.68）	1（1.41）
Increased the difficulty and challenge of the Health Assessment Course	65（91.55）	6（8.45）	0（0.00）
Case writing after clinical practice helps to promote self-reflection	67（94.37）	4（5.63）	0（0.00）

Table 4. Students' evaluation of the lab teaching methods (n, %).

Items	Agree	Neutral	Disagree
Simulation teaching increases the interest in practicing health assessment skills	63（88.73）	7（9.86）	1（1.41）
Simulation exercises avoid the embarrassment of peer checking	65（91.55）	5（7.04）	1（1.41）
Simulation teaching can vividly simulate abnormal clinical signs (heart sounds, breath sounds, etc)	53（74.65）	16（22.54）	2（2.81）
Be able to practice repeatedly on the human patient simulator	62（87.32）	7（9.86）	2（2.82）

Table 4. cont

Items	Agree	Neutral	Disagree
Simulated teaching enhances the confidence of physical examination on real patients	51（71.83）	17（23.94）	3（4.23）
Taking history from SP can obtain feedback timely	58（81.69）	9（12.68）	4（5.63）
Taking history from SP can improve critical thinking ability	57（80.28）	13（18.31）	1（1.41）
Taking history from SP can improve communication skills	62（87.32）	9（12.68）	0（0.00）
Promoting the comprehensive application of multidisciplinary knowledge by case discussion	66（92.96）	4（5.63）	1（1.41）
Case discussion helps to clarify the relationship between abnormal signs and specific diseases	63（88.73）	7（9.86）	1（1.41）

Table 5. Students' evaluation of the OSCE exam (n, %).

Items	Agree	Neutral	Disagree
Evaluate the students' health assessment skills scientifically and objectively	57（80.28）	13（18.31）	1（1.41）
Pay attention to the examination of students' clinical comprehensive ability	68（95.77）	2（2.82）	1（1.41）
Test students' clinical thinking ability effectively	65（91.55）	5（7.04）	1（1.41）

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Examining students' ability to comprehensively apply knowledge to solve practical clinical problems	62（87.32）	8（11.27）	1（1.41）
The situation of the OSCE exam is closer to clinical reality	54（76.05）	16（22.54）	1（1.41）

There were 63 students who participated in answering open-ended questions. Of these, 55 students reported that the practical teaching of the Health Assessment Course after reform presented numerous advantages, including “providing students with repeated practice opportunities, enhancing their confidence in operating on real patients, and facilitating accurate judgment of patients' abnormal signs”; “compensating for the infrequent clinical encounters with typical disease signs, such as abnormal heart and breath sounds, through simulation”; “strengthening health assessment skills and communication abilities through physical examinations on real patients”; “synchronous lab teaching and clinical practice reinforcing theoretical understanding and timely consolidation of operational skills”; and “allowing students to acquire knowledge unavailable in classroom settings, thereby deepening and expanding their understanding.” However, eight students identified shortcomings: “insufficient knowledge making it difficult to analyze clinical cases and apply theory to specific situations”; “simulation scenarios lacking the flexibility and variability of real clinical environments, resulting in significant differences between simulated and actual patient operations”; and “challenges in identifying abnormal heart and breath sounds in real patients similar to those heard during simulation.”

4. Discussion

This study aimed to examine the effects of the synchronous teaching model incorporating lab teaching, clinical practice, and simulation teaching in practical Health Assessment Courses. The results showed significant improvements in students’ health assessment knowledge, skills, and clinical thinking abilities.

The synchronous teaching model provides students with the opportunity to learn by doing and do by learning, effectively cultivating their clinical practice ability, critical thinking and interpersonal communication ability. [9,17] By integrating lab teaching and clinical practice, teachers created real-life applications for health assessment knowledge and skills. [8] Through the process of taking health history and conducting physical examinations on real patients, students not only mastered inquiry techniques and physical examination methods but also enhanced their interpersonal communication ability and critical thinking. The findings revealed that 84.51% of students believed the synchronous teaching model was conducive to improving communication ability, and 85.92% of students believed it facilitated the cultivation of clinical thinking ability. Students' scores for health history collection averaged 19.17 ± 0.96, indicating a high level of mastery in inquiry skills through training with SP. At the end of the clinical practice, students engaged in discussions of clinical cases, guided by the teacher to analyze the causes of abnormal signs in patients, facilitating their understanding of the clinical significance of these signs. This integration of theoretical knowledge and clinical practice was rated positively by 88.73% of students.

Nursing education aims to integrate theoretical knowledge into real environment practice and foster students' problem-solving skills, contributing to their future nursing roles. [18]Simulation teaching provided an effective solution for bridging the gap between the learning environment and clinical practice. Depending on the level of simulation, it could be categorized as low-fidelity simulation (case analysis and role-play), moderate-fidelity simulation (local simulator, etc.), or high-fidelity simulation. The SP was also utilized for interactive skill practice. [19]Faculties designed teaching methods according to the lab teaching content, and introduced SP, role-play, case analysis, local simulator, and high-fidelity simulation into lab teaching, realizing the organic integration of simulation teaching and the curriculum. SP teaching was used to collect the health history. Through training and examination, SP could accurately express specific symptoms of the disease and the psychological response to illness. As students took a health history through SP, they could quickly

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enter the role of a nurse, realistically conduct inquiry training, and adjust the inquiry strategy promptly through interaction and feedback, thereby improving students' interpersonal communication ability, critical thinking, and humanistic caring ability. [12] Among the students, 81.69% thought that taking health history through SP could provide timely patient feedback, and 80.28% thought it is helpful to improve critical thinking ability.

Local simulators, such as Resusci Anne and Harvey, can realistically simulate various abnormal heart sounds and breath sounds, contributing to the practice opportunities for students and increasing their confidence in real patient physical examinations. [20]According to this survey, 87.32% of the students found the simulation teaching helpful for repeated practices, and 87.32% of the students thought that the local simulator (Resusci Anne, Harvey, etc.) could realistically simulate abnormal signs and enhance their confidence in the physical examination of real patients.

Lab teaching has been reformed to prioritize both simple and complex skill training, as well as single and comprehensive training and focused on improving students' knowledge, skills, and clinical thinking abilities. The first half of the semester comprised single-skill simulation training, and in the second half, a more comprehensive high-fidelity simulation was introduced. This allowed for complex case studies and comprehensive analysis of students' health assessment knowledge and skills, which could be used to solve clinical problems. There were 92.96% of students who believed that high-fidelity simulation should improve their ability to apply their multidisciplinary knowledge comprehensively.

The final exam introduced the OSCE exam and established a multi-station assessment for health history collection, case analysis, general condition assessment, specialized physical examination, and case writing. This comprehensive assessment aimed to examine students' health assessment knowledge, skills in evaluating patients, interpersonal communication skills, clinical thinking skills, ability to analyze and solve clinical practical problems, and case writing ability. Health history collection was performed with SP, and students need to effectively communicate with patients to ensure a comprehensive and accurate collection. Case analysis required students to use critical thinking to carry out logical reasoning based on the collected health history data, and analyze the patients' diseases and possible abnormal signs. General condition assessment and specialized physical examination require students to closely combine case analysis, speculate on possible abnormal signs of patients, and then carry out targeted physical examination to comprehensively examine students' health assessment knowledge, skills, and clinical thinking ability. The inclusion of these components has greatly increased the difficulty of the exam. The results showed that 95.77% of the students believed that the OSCE exam focused on students' comprehensive ability, and 91.55% believed that the OSCE exam effectively tested students' clinical thinking ability.

5. Limitations of this study

Due to the limitations of this study, it is necessary to acknowledge the following three factors. Firstly, because of the descriptive design and the small sample size in this study, it is recommended that future studies evaluate the learning outcomes of students using a randomized controlled trial design with a larger sample. Additionally, as this study only recruited students from one nursing school, the results cannot be extended to the entire population. Lastly, as there was no longitudinal follow-up of students' learning outcomes, the predictive effect of the synchronous teaching model and simulation teaching remains uncertain.

6. Conclusions

To our knowledge, this is the first study in China to explore the effectiveness of synchronous teaching and simulation teaching in practical Health Assessment courses. The results showed that this program significantly improved nursing students' knowledge, skills, and clinical thinking in health assessment, which could provide a validated paradigm for other nursing schools to practice. The reliability and validity of this study could be enhanced by conducting future studies with a

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larger sample size and objective evaluation tools. Additionally, longitudinal studies on health assessment performance changes in subsequent clinical nursing courses and transference to clinical performance are suggested.

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Informed Consent Statement: Informed consent was obtained from all participants included in the study. Written informed consent has been obtained from the subjects to publish this paper.

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