Education Reform and Development, 2026, Volume 8, Issue 3
https://ojs.bbwpublisher.com/index.php/ERD
Online ISSN: 2652-5372
Print ISSN: 2652-5364

Application of Scenario Simulation Teaching + SPOC + TBL Model Based on the ADDIE Model in the Teaching of Professional Master's Degree Students

Ning Zhang[1,4], Yajun Ma[2,4], Rong Zhai[3,4], Youhong Zhao[2,4], Ying She[2,4], Zhao Lin[2,4]*

[1]Department of Critical Care Medicine, The Affiliated Jiangning Hospital of Nanjing Medical University, Nanjing 211000, Jiangsu, China
[2]Department of Science and Education, The Affiliated Jiangning Hospital of Nanjing Medical University, Nanjing 211000, Jiangsu, China
[3]Department of Cardiothoracic Surgery, The Affiliated Jiangning Hospital of Nanjing Medical University, Nanjing 211000, Jiangsu, China
[4]Clinical Medical College, Kangda College of Nanjing Medical University, Lianyungang 222000, Jiangsu, China

***Corresponding author:** *Zhao Lin, lzjnyy2025@sina.com*

Abstract: *Objective:* This study aims to construct an integrated teaching model combining scenario-based simulation teaching, Small Private Online Courses (SPOC), and Team-Based Learning (TBL) based on the ADDIE Instructional System Design Model, evaluate its application in clinical teaching for professional master's students, and provide practical evidence for the reform and optimization of clinical teaching models for professional master's students. *Methods:* A total of 32 professional master's students enrolled from January 2024 to December 2024 were selected for this study. They were divided into two groups based on different teaching models: the control group (16 students) received traditional teaching methods, while the observation group (16 students) adopted the scenario-based simulation teaching + SPOC + TBL model based on the ADDIE model. Both groups underwent 8 weeks of continuous teaching. Assessment scores, comprehensive abilities, and teaching satisfaction were statistically compared between the two groups. *Results:* The observation group achieved higher assessment scores (professional theoretical knowledge and clinical practical skills) than the control group. After teaching, the observation group scored higher in clinical thinking, problem analysis, and problem-solving abilities compared to the control group. Additionally, the observation group reported higher teaching satisfaction scores than the control group, with all differences being statistically significant ($P < 0.05$). *Conclusion:* The integrated teaching model combining scenario-based simulation teaching, SPOC, and TBL based on the ADDIE model significantly improves assessment scores, effectively cultivates comprehensive abilities in clinical thinking, problem analysis, and problem-solving, and enhances teaching satisfaction among professional master's students in clinical teaching.

Keywords: ADDIE model; Scenario-based simulation teaching; SPOC; TBL; Professional master's students; Clinical teaching

Online publication: April 10, 2026

1. Introduction

The core of cultivating professional master's students lies in enhancing their clinical competency, which requires them to possess both a solid theoretical foundation in their field and proficient clinical practice skills, as well as good clinical thinking and problem-solving abilities. This represents a crucial link in the medical talent cultivation system, bridging university education with clinical practice. Currently, clinical teaching for professional master's students in China primarily relies on traditional teaching methods, which lack targeted instruction tailored to individual student differences and struggle to meet the demand for versatile medical professionals in clinical settings [1]. With the advancement of medical education reform and information technology, novel teaching methods such as the ADDIE Instructional System Design Model, scenario-based simulation teaching, Small Private Online Courses (SPOC), and Team-Based Learning (TBL) are gradually being applied in the field of medical education. The ADDIE model, centered around analysis, design, development, implementation, and evaluation, provides a systematic and scientific design approach for constructing curricula. Scenario-based simulation teaching can recreate clinical diagnosis and treatment scenarios, enhancing students' practical operational and emergency response capabilities. SPOC enables flexible hybrid teaching combining online and offline methods, breaking through spatial and temporal constraints. TBL focuses on cultivating students' teamwork and independent inquiry abilities. Integrating multiple teaching methods has emerged as an important direction for addressing the challenges of traditional clinical teaching and improving the quality of education for professional master's students [2]. This study aims to explore the application effects of a teaching model combining scenario-based simulation teaching, SPOC, and TBL based on the ADDIE model in the education of professional master's students, as described below.

2. Materials and methods

2.1. General information

Thirty-two professional master's degree students enrolled at our hospital from January 2024 to December 2024 were selected as the research subjects. They were divided into a control group and an observation group using the principles of gender, grade, and major matching, with 16 students in each group. The male-to-female ratio in the control group was 9:7, with ages ranging from 22 to 28 years old and an average age of (24.63 ± 1.25) years old; the male-to-female ratio in the observation group was 8:8, with ages ranging from 23 to 27 years old and an average age of (24.58 ± 1.19) years old. By comparing the above general information between the two groups, $P > 0.05$, indicating comparability.

Inclusion criteria: Full-time professional master's degree students enrolled at our hospital from January 2024 to December 2024; having completed basic medical courses and entered the clinical skills training stage at the time of enrollment; being able to fully participate in the teaching training, assessments, and questionnaires of this study with good cooperation; having no prior special training experience related to clinical skills training and having homogeneous learning foundations. Exclusion criteria: Those with severe physical or mental illnesses before enrollment who were unable to participate normally in teaching activities; those who had received clinical skills training related to similar scenario simulations or the SPOC+TBL model before enrollment.

2.2. Methods

The control group was taught using the traditional teaching model: a traditional model combining offline classroom lectures and operational demonstrations was adopted, with one theoretical and clinical skills operation

class held each week for 8 consecutive weeks. Theoretical teaching mainly involved one-way lectures by teachers using PPT presentations and blackboard writing, explaining the theoretical knowledge, operational procedures, and precautions of core skills such as cardiopulmonary resuscitation and puncture techniques; skills teaching involved teachers demonstrating the entire operation process, with students observing and then practicing in groups afterward, while teachers provided simple guidance during rounds without standardized evaluations or interactive discussions. There were no unified learning tasks after class, and students were only required to review independently. At the end of the course, theoretical written exams and on-site operational assessments were used as the basis for final evaluations.

The observation group was taught using the scenario simulation teaching + SPOC + TBL model based on the ADDIE model: Using the ADDIE model as a framework, a blended online and offline teaching approach integrating scenario simulation, SPOC, and TBL models was adopted, with one online and offline class held each week for 8 consecutive weeks, implemented in five stages: (1) Analysis stage: Conduct surveys from organizational, task, and personnel dimensions, clarify core teaching tasks based on job competency requirements, understand students' learning foundations and needs through interviews/questionnaires, and determine teaching content and model ratios in combination with teaching resources. (2) Design stage: Focus on cultivating clinical skills and comprehensive abilities, design scenario simulation scripts and TBL discussion cases adapted from real clinical cases; divide students into 4 TBL groups of 4 students each and determine the teaching process of SPOC online preview + offline TBL discussion + scenario simulation practical operations. (3) Development stage: Build a dedicated SPOC teaching platform and upload theoretical courseware, operational demonstration videos, after-class thinking questions, and other resources; design TBL team discussion materials and assessment criteria; set up a simulation training room, clarify role assignments (attending physician/assistant/patient/family member) and operational requirements for scenario simulations; and establish an evaluation system combining process-based and final assessments. (4) Implementation stage: Online, students complete pre-class preview and clock-in via SPOC, and those who do not complete it are not allowed to participate in offline sessions; offline, first conduct TBL team discussions to analyze clinical cases and organize diagnostic and treatment mentality, with teachers providing evaluations and answering questions; then conduct scenario simulation practical operations, where students complete skill operations and handle unexpected problems in a simulated clinical setting; finally, conduct team self-summaries and targeted evaluations and feedback from teachers based on practical operation videos. (5) Evaluation stage: Formative evaluations include SPOC learning completion rates, TBL discussion performance, and scenario simulation practical operation scores after each weekly class; summative evaluations are consistent with those of the control group, while a teaching satisfaction questionnaire developed by our hospital is also conducted to achieve closed-loop management of teaching evaluations. Both groups received 8 weeks of continuous teaching.

2.3. Observation indicators

(1) Assessment scores, including clinical practical ability assessment scores and professional theory assessment scores, with both assessments having a full score of 100 points.

(2) Comprehensive abilities, assessed using a self-made evaluation questionnaire from three aspects: clinical thinking ability, problem analysis ability, and problem-solving ability, with each aspect having a full score of 100 points. Higher scores indicate stronger abilities.

(3) Teaching satisfaction, assessed using a self-made satisfaction scale developed by our hospital, with a full score of 100 points. Among them, a score below 50 indicates dissatisfaction; a score of 50 or above but

below 80 indicates satisfaction; and a score of 80 or above indicates high satisfaction.

2.4. Statistical methods

Various indicators in this study were tested using SPSS 26.0. Case (%) represents count data, and a χ^2 test was performed; mean ± standard deviation (SD) represents measurement data, and a t-test was performed. A data result with $P < 0.05$ calculated using statistical software indicates a statistically significant difference.

3. Results

3.1. Assessment scores

Table 1. The assessment scores (professional theoretical knowledge, clinical practical ability) of the observation group were higher than those of the control group, $P < 0.05$.

Table 1. Assessment scores (mean ± SD, points)

Group	Number of Cases	Professional Theoretical Knowledge	Clinical Practical Ability
Control Group	16	81.06 ± 3.52	82.36 ± 2.37
Observation Group	16	86.24 ± 3.17	87.96 ± 2.53
t value		4.374	6.462
P value		< 0.001	< 0.001

3.2. Comprehensive abilities

Table 2 shows that after teaching, the observation group scored higher than the control group in clinical thinking ability, problem analysis ability, and problem-solving ability, with $P < 0.05$.

Table 2. Teaching effectiveness (mean ± SD, scores)

Group	Number of Cases	Clinical Thinking Ability	Problem Analysis Ability	Problem-Solving Ability
Control Group	16	79.35 ± 3.73	78.56 ± 3.65	77.96 ± 3.86
Observation Group	16	87.59 ± 3.26	89.05 ± 2.67	88.64 ± 3.21
t value		6.508	9.278	8.509
P value		< 0.001	< 0.001	< 0.001

3.3. Teaching satisfaction

Table 3 shows that after teaching, the teaching satisfaction score of the observation group was higher than that of the control group, with $P < 0.05$.

Table 3. Teaching satisfaction (mean ± SD, points)

Group	Number of Cases	Teaching Satisfaction Score
Control Group	16	72.49 ± 4.62
Observation Group	16	89.07 ± 3.18
χ^2 value		11.825
P value		< 0.001

4. Discussion

Clinical teaching for professional master's degree students in medicine serves as a crucial link connecting medical education in academic institutions with clinical practice. Its core objective is to cultivate students' clinical competencies, enabling them to possess both a solid foundation in professional theory, proficient clinical practical skills, and well-developed clinical thinking and problem-solving abilities. This holds significant importance for the cultivation of high-quality medical talent. The novel teaching model that integrates scenario simulation teaching, SPOC, and TBL based on the ADDIE model effectively addresses the shortcomings of traditional teaching through systematic course design, the integration of online and offline teaching, team-based autonomous inquiry, and immersive scenario-based practical operations, becoming an important pathway for enhancing the quality of clinical teaching.

The results of this study indicate that the scores of professional theoretical knowledge and clinical practical ability assessments in the observation group were significantly higher than those in the control group ($P < 0.05$). This suggests that applying the scenario simulation teaching + SPOC + TBL model based on the ADDIE model to the clinical teaching of professional master's degree students can effectively improve students' theoretical mastery and practical operational skills. The possible reasons are as follows: Traditional teaching models primarily rely on offline centralized lectures, where students accumulate knowledge solely through classroom observations and independent post-class reviews, lacking systematic pre-class preparation and targeted post-class practice. Moreover, skill operation learning mainly involves mechanical imitation, making it difficult to understand the clinical logic behind the operations, thus limiting learning outcomes. In contrast, the observation group, using the ADDIE model as a framework, accurately grasps students' learning foundations and needs during the analysis phase, making the teaching content more relevant to students' actual situations. The SPOC online platform established during the development phase provides students with theoretical courseware and operational demonstration videos that can be watched repeatedly, breaking the constraints of time and space in teaching. Students can conduct personalized pre-class preparation according to their own circumstances, thereby consolidating theoretical knowledge in advance. The offline practical operation phase in the implementation phase is not merely about imitating operations but involves scenario simulations based on real clinical settings. Students are required to independently complete operations and handle unexpected problems within the set scenarios, deeply integrating theoretical knowledge with practical operations. Meanwhile, targeted feedback from teachers based on practical operation videos enables students to precisely identify operational weaknesses and correct them promptly. This model ensures more systematic theoretical learning and standardized practical operations, contributing to improved assessment scores [3].

The results of this study also show that after teaching, the scores for clinical thinking ability, problem analysis ability, and problem-solving ability in the observation group were significantly higher than those in the control group ($P < 0.05$). This indicates that the scenario simulation teaching + SPOC + TBL model based on the ADDIE model can effectively strengthen the comprehensive clinical abilities of professional master's degree students. The possible reasons are as follows: Traditional teaching models are teacher-centered, with students in a passive state of receiving knowledge. The lack of case analysis and team discussions in the classroom makes it difficult to effectively exercise students' clinical thinking, leading to issues such as unclear thinking and one-sided decision-making when facing clinical problems. In contrast, the TBL team teaching model incorporated into the observation group conducts group discussions centered around real clinical cases. Students are required

to collaborate in teams, analyze case characteristics, and organize diagnostic and treatment approaches, achieving the collision and complementation of ideas during the discussion process and gradually constructing a systematic clinical thinking framework. Simultaneously, scenario simulation teaching recreates real clinical diagnostic and treatment settings, requiring students to complete the entire diagnostic and treatment process, from condition assessment and plan formulation to skill operations and handling of unexpected situations, as the "attending physician." This process demands that students integrate fragmented theoretical knowledge into coherent clinical decision-making logic, forcibly exercising their problem analysis and solving abilities [4]. Additionally, the evaluation phase of the ADDIE model provides timely feedback on students' learning issues through process-based evaluations, enabling teachers to offer targeted clinical thinking guidance and helping students gradually improve their clinical thinking systems, achieving steady enhancement of comprehensive abilities.

The results of this study further reveal that the teaching satisfaction score in the observation group was significantly higher than that in the control group ($P < 0.05$). This suggests that the scenario simulation teaching + SPOC + TBL model based on the ADDIE model is more recognized by professional master's degree students and offers a better teaching experience. The possible reasons are as follows: Traditional teaching models suffer from poor interactivity, leaving students lacking a sense of classroom participation and academic achievement. Moreover, the limited integration of teaching content with clinical practice can easily lead to student burnout. In contrast, the teaching model in the observation group fully embodies the educational philosophy of "student-centeredness." The SPOC online platform offers flexibility in learning, allowing students to control their learning pace independently. TBL team discussions provide students with a platform to express their views and exchange learning experiences, enhancing teaching interactivity. Scenario simulation practical operations transform students from "passive observers" to "diagnostic and treatment leaders," enabling them to gain a strong sense of academic achievement in the process of completing diagnostic and treatment tasks, effectively improving learning initiative and enthusiasm. Meanwhile, the personalized feedback and targeted guidance provided by the ADDIE model throughout the entire process make students feel the professionalism and pertinence of teaching. The diverse teaching forms, such as scenario simulations and team collaborations, also make the otherwise dull clinical skill learning more interesting, significantly enhancing students' teaching experience and thus markedly improving teaching satisfaction [5].

5. Conclusion

In conclusion, applying the scenario simulation teaching + SPOC + TBL model based on the ADDIE model to the clinical teaching of professional master's degree students can significantly improve students' assessment scores, effectively cultivate their clinical thinking ability, problem analysis ability, and problem-solving ability, and simultaneously enhance teaching satisfaction. This model holds high value for promotion and application in clinical teaching.

Funding

Education Research Project of Nanjing Medical University (Project No.: JX220GSP20230136); Special Fund Project for Health Science and Technology Development in Nanjing (Project No.: GAX24303); Education Research Project of Kangda College of Nanjing Medical University (Project No.: KD2025JYYJYB053)

Disclosure statement

The authors declare no conflict of interest.

References

[1] Zhang J, Li W, Wang Y, 2024, Exploration of the Application of Scenario-Based Teaching Combined with PBL Teaching Method in the Parallel Training of Clinical Medicine Professional Graduate Students. Continuing Medical Education, 38(12): 83–86.

[2] Wang Z, Feng C, Ma J, et al., 2025, Application of PBL Combined with CBL Teaching Method in the Training of Clinical Medicine Professional Degree Graduate Students. Inner Mongolia Medical Journal, 57(1): 92–94.

[3] Wang H, Su X, Qi H, et al., 2025, Application of the TSSP+SPOC Teaching Model in the Teaching of Clinical Medicine Professional Master's Degree Graduate Students. Continuing Medical Education, 39(6): 69–72 + 81.

[4] Zhang T, Wu Y, Li X, et al., 2025, Research on the Application of the TOREPIE Teaching Model Based on Enhancing Innovation Ability in the Cultivation of Scientific Research Thinking Among Clinical Medicine Graduate Students. China Higher Medical Education, (7): 142–144.

[5] Zhang T, Tan P, Yu Y, 2025, Application of the PBL-CBL-VR Integrated Teaching Method in the Cultivation of Clinical Thinking Among Professional Degree Graduate Students in Medical Technology and Clinical Laboratory Diagnostics. Zhejiang Medical Education, 24(6): 356–363.