Scientific Research Publishing

Open Journal of Applied Sciences, 2025, 15(11), 3566-3576
https://www.scirp.org/journal/ojapps
ISSN Online: 2165-3925
ISSN Print: 2165-3917

The Effect of Dual-Cycle Teaching Model Integrating In-Class and Extracurricular Activities in Maternal and Newborn Health Nursing

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How to cite this paper: Qi, X.W., Peng, F., Zhou, H., Gong, A.P., Qin, S. and Dong, X. (2025) The Effect of Dual-Cycle Teaching Model Integrating In-Class and Extracurricular Activities in Maternal and Newborn Health Nursing. *Open Journal of Applied Sciences*, **15**, 3566-3576.
https://doi.org/10.4236/ojapps.2025.1511231

Received: October 29, 2025
Accepted: November 15, 2025
Published: November 18, 2025

Abstract

Objective: To explore the effect of dual-cycle teaching model integrating in-class and extracurricular activities in Maternal and Newborn Health Nursing. **Methods:** A quasi-experimental design was adopted. 38 undergraduate nursing students from the class of 2022 were assigned to the intervention group and underwent teaching reforms implementing the "dual-cycle teaching model integrating in-class and extracurricular activities", while the control group consisted of 41 students from the Class of 2021, received traditional teaching. **Results:** Students in the intervention group achieved a significantly higher course score (91.74 ± 6.542) compared with the control group (85.78 ± 5.470), with a statistically significant difference ($t = 4.402$, $P < 0.001$). Meanwhile, students in the intervention group showed improvement in self-directed learning competence and clinical communication competence. 94.74% of the students in the intervention group held a positive attitude toward the teaching reform. **Conclusions:** The application of the "dual-cycle teaching model integrating in-class and extracurricular activities" in maternal and newborn health nursing serves to enhance knowledge application, self-directed learning and clinical communication competencies among nursing undergraduates, thereby improving overall teaching outcomes.

Keywords

Maternal and Newborn Health Nursing, Nursing Education, Teaching Reform, Critical Thinking, Self-Directed Learning, Clinical Communication

1. Introduction

The curriculum serves as the core element of talent cultivation, with its quality

directly determining the outcomes of the educational process. In 2019, the Ministry of Education of the People's Republic of China issued the Implementation Opinions on Building First-Class Undergraduate Courses [1], providing clear direction for the development of high-quality curricula. Following the release of these opinions, academic programs across various disciplines have actively engaged in teaching reform research and practice aligned with the standards of first-class undergraduate course construction. Maternal and newborn health nursing is a core specialized course offered to junior-year nursing undergraduates. It serves as a critical bridge linking academic learning with clinical practice. However, the traditional lecture-based teaching approach often leads to passive knowledge acquisition among students, which fails to stimulate their learning interest. As a result, students lack the motivation and ability to proactively identify and solve problems. This method also falls short of achieving the goals of cultivating critical thinking, self-directed learning and effective communication competence. Student-centered is the path to contemporary undergraduate education reform [2]. Extensive research indicates that problem-based learning appears to improve nursing students' critical thinking skills [3]. Therefore, in 2024, this course established a student-centered, problem/task-based "dual-cycle teaching model integrating in-class and extracurricular activities" which comprises two iterative cycles of online classroom - extracurricular inquiry - offline classroom - extracurricular project. This model actively adopted advanced teaching methods such as inquiry-based learning, discussion-based learning, experiential learning, and project-based learning to stimulate students' enthusiasm for learning. By leveraging information technology to empower student learning, the course promotes the organic integration of knowledge transmission and the development of competencies and qualities.

The results are presented below.

2. Participants and Methods

2.1. Participants

Using convenience sampling method, 38 undergraduate nursing students in the Class of 2022 were assigned to the intervention group, while those from the Class of 2021 were assigned to the control group (n = 41). No statistically significant differences were observed between the two groups in terms of gender, age, grade point average (GPA), self-directed learning competence scores ($P > 0.05$), critical thinking ability scores ($P > 0.05$) and clinical communication competence scores ($P > 0.05$).

2.2. Methods

2.2.1. Teaching Methods

The Maternal and Newborn Health Nursing course for both groups was completed in the second semester of their third academic year, with identical total credit hours, teaching schedules, textbooks, and instructors. To minimize poten-

tial bias, the instructors were not involved in any of the experimental assessments, questionnaire surveys, or data analysis.

1) Control Group

The traditional lecture-based teaching process was employed, which typically unfolds as follows: the instructor begins by stating the learning objectives for the session. This is followed by a systematic, one-way delivery of key knowledge points from the textbook. Students primarily listen and take notes passively. The class concludes with a summary of the content and the assignment of homework, with minimal to no interactive activities throughout.

2) Intervention Group

Students in this group received "dual-cycle teaching model integrating in-class and extracurricular activities".

a) Teaching Preparation

① Optimizing the structure of the teaching team: A teaching team with a balanced structure in terms of age, professional titles, and academic qualifications was established. Part-time instructors with extensive clinical and teaching experience were incorporated into the team to strengthen the connection between theory and clinical practice and to stay updated on clinical job requirements as well as new clinical technologies and advancements. All teachers in the team were ensured to have rich experience in teaching and pedagogical research and to have received training in instructional methods such as blended online and offline teaching, inquiry-based learning, and project-based learning. A full-time course instructor was appointed as the course coordinator, responsible for the overall arrangement of teaching tasks and for organizing teaching seminars, collective lesson preparation, and other activities.

② Survey on student learning characteristics: A questionnaire was designed to investigate the learning characteristics of the nursing undergraduates enrolled in the Class of 2022. The survey covered aspects such as learning engagement, attitudes toward learning, preferred learning methods, study habits, academic readiness, and participation in learning activities. The findings revealed a generally low level of classroom participation among students. Most students did not actively engage in critical thinking, and the vast majority expressed a preference for classroom instruction that emphasizes the development of analytical skills and appropriately broadens their knowledge base. Additionally, there were notable differences in the types of learning resources preferred by students during self-directed study.

③ Updating teaching content: The course team updated the teaching content through collective lesson planning, drawing on the latest disciplinary guidelines, expert consensus, the most advanced theoretical and technological research trends, and the most recent editions of authoritative textbooks. This process aimed to improve the content's breadth, depth, cutting-edge nature, and contemporary relevance. Additionally, efforts were made to integrate research findings from the teaching team into the instructional materials.

b) Dual-Cycle Teaching Model Integrating In-Class and Extracurricular Activities

① Online classroom: Based on learning objectives and content, case scenarios and questions are designed to stimulate students' interest. To solve these problems, students utilize various online learning materials such as MOOCs, videos, literature, and PPTs released via the Yangtze River Rain Classroom to seek answers. Questions encountered during learning are resolved through online discussions and Q&A sessions. Formative assessments are employed to help students identify and address knowledge gaps, reinforcing foundational knowledge. The goals of the online classroom are twofold: first, to free up time for offline classroom activities focused on cultivating students' competencies and skills, and second, to develop students' self-directed learning abilities.

② Extracurricular inquiry: Online learning primarily facilitates knowledge transmission and cultivates lower-order thinking skills such as memory, comprehension, and application. Building on online classroom learning, comprehensive, research-oriented, and complex questions are proposed to guide students in extracurricular inquiry-based learning. Through activities such as observation, interviews, hands-on experiences, surveys, and experiments, students autonomously construct knowledge meaning by organizing, analyzing, and evaluating information, thereby shifting from passive reception to active construction and translating abstract concepts into concrete understanding. Furthermore, during inquiry-based activities, students are required to apply scientific research methods to solve problems and critically evaluate research conclusions, which helps foster critical thinking, scientific research skills, and information literacy.

③ Offline classroom: Through the previous cycle of in-class and extracurricular learning, students acquire general knowledge. The main objective of the offline classroom is to apply this general knowledge to solve specific clinical problems. In the offline classroom, case-guided teaching methods such as role-playing, group discussions, in-class presentations, and debates are used to guide students in effectively applying their knowledge to address clinical issues, while simultaneously developing their communication and teamwork skills.

④ Extracurricular projects: During the earlier learning stages, students may identify problems or shortcomings in existing viewpoints, techniques, methods, or tools. To address these issues, students can freely form project teams to collaboratively discuss and analyze solutions, ultimately presenting their ideas in the form of product concepts or proposals. This stage of learning primarily aims to cultivate students' innovative awareness and capabilities.

2.2.2. Evaluation Methods

A multidimensional course evaluation mechanism was established, integrating formative and summulative assessment, self-assessment and peer assessment, and combining the evaluation of knowledge, skills, and competencies. Increased emphasis was placed on process evaluation, adjusting the grading weight distribution: the final exam, previously accounting for 80%, and regular performance for

20%, were adjusted to each account for 50%.

1) Formative assessment: The primary purpose of formative assessment is to help students monitor their learning progress, promptly identify and address gaps, and remedy deficiencies. Therefore, the formative assessment plan is announced to students before the course begins. Leveraging a digital learning platform, assessment results are provided every two weeks. By making the assessment methods and results transparent, students are motivated, enhancing their sense of achievement gained through diligent study and the improvement of their abilities and competencies. The specific assessment plan is detailed in Table 1.

Table 1. Formative assessment plan.

Assessment Stage	*Assessor*	Assessment Content	Method	*Weight*
Online Classroom	Teacher-Assessment	Knowledge	Online Tests	20%
Extracurricular Inquiry	Self-Assessment Teacher-Assessment	Engagement in inquiry-based learning, application of research methods, information gathering, report writing	Observation, Extracurricular Inquiry Activity Rubric	10%
Offline Classroom	Self-Assessment Teacher-Assessment	Health assessment skills, communication skills, critical thinking, complex problem-solving ability	Observation, Offline Classroom Rubric	10%
Extracurricular Project	Self-Assessment Peer Assessment Teacher	Communication, teamwork, innovation capability	Observation, Extracurricular Project Rubric	10%

2) Summative assessment: The evaluation covers three dimensions: knowledge, thinking skills, and affective attitudes, accounting for 30%, 20%, and 20% of the total grade, respectively. Knowledge is assessed via a final written examination. self-directed learning competence, Critical thinking ability, and clinical communication competence were measured using scales one week after the intervention. Affective attitudes are evaluated through interview reports, learning reflections, and the observation of humanistic care awareness during practical lab assessments. Scales used in this study include:

① Self-directed learning competence: Self-directed Learning Competence Scale for Nurses was developed by professors Xiao and Li [4] in 2008. It consists of 34 items, encompassing four dimensions: self-motivation beliefs (14 items), task analysis (6 items), self-monitoring and regulation (10 items), and self-evaluation (4 items). Each item is rated using a 5-point Likert scale. Nurses self-assess their level of agreement with each statement based on their personal perceptions. For positively worded items, responses of "Completely consistent", "Consistent", "Basically consistent", "Basically inconsistent", and "Completely inconsistent" are assigned 5, 4, 3, 2, and 1 point (s), respectively. Negatively worded items are reverse-scored. The total score ranges from 34 to 170, with a higher score indicating stronger self-directed learning competence. The scale demonstrates high reliability and validity, with an overall Cronbach's α coefficient of 0.944, a split-half reliability of 0.894, and a content validity index of 0.97. In this study, the scale demonstrated high reliability, with a Cronbach's α coefficient of 0.926.

② Critical thinking ability: The Critical Thinking Disposition Inventory-Chinese Version (CTDI-CV), translated and revised by Peng MC [5], was used to assess critical thinking. 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 α = 0.90) and validity (CVI = 0.89). In this study, the scale demonstrated high reliability, with a Cronbach's α coefficient of 0.893.

③ Clinical communication competence: The Clinical Communication Competence scale of the nursing students developed by Yang Fangyu *et al.* [6] was used to assess clinical communication competence of students. It comprises 28 items across six dimensions (7 of which are reverse-scored), rated on a 4-point Likert scale. Responses range from "Never used" to "Frequently used", assigned 1 to 4 points respectively. The total score ranges from 28 to 112, with a higher score indicating stronger clinical communication competence. In this study, the scale demonstrated high reliability, with a Cronbach's α coefficient of 0.854.

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' Final Exam Scores and Total Assessment Scores

The final exam papers were compiled through intelligent test assembly from the course question bank, maintaining identical assessment scopes, difficulty level, and proportional distribution of question types. Students in the control group achieved a final exam score of (83.39 ± 5.518), while those in the intervention group obtained a score of (89.37 ± 7.430). The intervention group demonstrated a statistically significant improvement in performance compared to the control group ($t = 4.080$, $P < 0.001$). A statistically significant difference was also observed in the total assessment score (which incorporated regular performance grades) between the two groups. See Table 2 in detail.

Table 2. Comparison of final exam score and total assessment score between the two groups ($\bar{x} \pm s$, score).

group	*n*	final exam score	total assessment score
control group	41	83.39 ± 5.518	85.78 ± 5.470
intervention group	38	89.37 ± 7.430	91.74 ± 6.542
t		4.080	4.402
P		<0.001	<0.001

3.2. Nursing Undergraduates' Self-Directed Learning Competence, Critical Thinking Ability, and Clinical Communication Competence

The intervention group demonstrated significantly higher self-directed learning competence and clinical communication competence scores compared to the control group upon course completion ($P < 0.05$). See Table 3 in detail. The intervention group showed higher critical thinking ability scores (290.21 ± 52.203) than the control group (273.05 ± 43.255), although the difference was not statistically significant ($P = 0.057$).

Table 3. Comparison of post-course self-directed learning competence and clinical communication competence scores between two groups ($\overline{x} \pm s$, score).

group	*n*	self-directed learning competence	clinical communication competence
control group	41	135.83 ± 20.312	97.12 ± 9.592
intervention group	38	145.26 ± 20.427	105.26 ± 10.872
t		2.057	3.535
P		0.043	<0.001

3.3. Intervention Group Students' Evaluation of the Teaching Reform

Students provided a highly positive evaluation of the teaching reforms in this course. Specifically, 92% of students reported that the course was challenging, and over 97% indicated that the teaching methods enhanced their class participation. The overall satisfaction rate with the course reached approximately 95%. See Table 4 in detail.

Table 4. Intervention group students' evaluation ($n = 38$).

items	Yes *n* (%)	Uncertainty *n* (%)	No *n* (%)
Did you find this course challenging?	35 (92.11)	3 (7.89)	0 (0)
Did the course spark your interest in learning?	32 (84.21)	4 (10.53)	2 (5.26)
Did the teaching methods used in this course improve your class participation?	37 (97.37)	1 (2.63)	0 (0)
Did this course improve your overall competence?	34 (89.47)	2 (5.26)	2 (5.26)
Did you feel satisfied with what you learned in this course?	36 (94.74)	2 (5.26)	0 (0)

4. Discussions

4.1. Dual-Cycle Teaching Model Integrating In-Class and Extracurricular Activities Improved Knowledge Application Skills

The findings of this study demonstrate that the intervention group achieved significantly higher final examination scores and total assessment scores compared

to the control group. This indicates that the implementation of the dual-cycle teaching model integrating in-class and extracurricular activities significantly enhanced students' ability to comprehensively apply disciplinary knowledge to analyze and solve specific clinical problems. This improvement can be attributed to three key factors: 1) Curriculum-clinical alignment, the inclusion of nursing experts ensured that teaching content reflected real-world clinical demands, strengthening the relevance of theoretical instruction. 2) Structured learning progression, the sequential cycle of online foundational learning, extracurricular inquiry, and offline case-based application enabled students to progressively construct and apply knowledge, transforming abstract concepts into actionable clinical strategies. 3) Process-oriented assessment, by emphasizing formative evaluation and multidimensional metrics, the model motivated continuous self-improvement and reinforced the integration of knowledge, skills, and professional attitudes. These three aspects worked in synergy, collectively transforming students from passive knowledge recipients into proactive practitioners capable of integrating knowledge, skills, and attitudes to analyze and resolve complex clinical challenges.

4.2. Dual-Cycle Teaching Model Integrating In-Class and Extracurricular Activities Enhances Self-Directed Learning and Clinical Communication Competence

A pre-instructional analysis of student learning characteristics conducted in this study revealed that nursing students exhibited deficiencies in self-directed learning ability, critical thinking skills, and clinical communication competence—a finding consistent with previous research [7]-[9]. The study results indicate that the teaching reform significantly enhanced students' self-directed learning competence and clinical communication competence. The improvement in self-directed learning competence can be attributed to the increased out-of-class learning tasks and time allocation after the reform. In the online classroom, students were required to independently acquire foundational knowledge based on learning objectives and tasks, while assessment feedback helped them monitor their progress and adjust learning strategies accordingly. Similarly, during extracurricular inquiry and project activities, students engaged in self-directed learning of specialized or interdisciplinary knowledge to better solve problems or accomplish project tasks. The enhancement of clinical communication skills may be associated with the implementation of group discussions and nurse-patient communication role-playing simulations in the offline classroom. Furthermore, the collaborative group learning approach adopted in both extracurricular inquiry and project activities also contributed to the development of students' communication skills.

4.3. Dual-Cycle Teaching Model Integrating In-Class and Extracurricular Activities Stimulated Learning Interest and Increased Class Participation

Traditional teaching is primarily lecture-based, where students passively receive knowledge transmission. This approach results in insufficient student participa-

tion during the learning process and fails to adequately stimulate learning motivation. The lack of interactive and inquiry-based teaching activities hinders the cultivation of students' critical thinking, communication skills, scientific research mindset, and innovative spirit. The constructivist theory of learning posits that learning is a process in which students construct their own knowledge. Students are not merely passive recipients of information but actively construct their own understanding. This project has established a student-centered, problem/task-oriented dual-cycle teaching model integrating in-class and extracurricular activities. It actively employs advanced teaching methods such as inquiry-based learning, discussion-based learning, experiential learning, and project-based learning to stimulate students' interest in learning and promote the organic integration of knowledge transmission with the development of competencies and qualities.

No statistically significant improvement was observed in critical thinking scores in this study ($P = 0.057$). This finding contrasts with several studies reporting significant improvements in critical thinking through educational interventions [10] [11]. Several factors may explain why significant improvement was not achieved. First, critical thinking represents a complex higher-order cognitive skill that typically requires longer developmental timelines and more sustained instructional emphasis than other competencies such as clinical communication. Second, although our teaching model promoted active learning, it may not have provided sufficiently explicit scaffolding for metacognitive processes essential to critical thinking development, such as systematic analysis of assumptions, evidence evaluation, and reflective reasoning. Additionally, the assessment instrument employed measures thinking disposition rather than demonstrated cognitive skills, which may not fully capture situational improvements resulting from short-term educational interventions. Future research should consider incorporating longitudinal tracking, explicit critical thinking instruction, and performance-based assessments to better evaluate the development of this multifaceted competency.

A potential limitation of this study is the use of students from different academic cohorts (the class of 2021 as the control group and the class of 2022 as the intervention group). Differences in knowledge foundations, evolving curriculum requirements, and distinct educational environments between the two cohorts may partially explain the observed outcomes. Although baseline characteristics showed no statistically significant differences in the measured parameters, unmeasured factors associated with cohort identity might have influenced the results. Future studies should consider adopting a parallel cohort design or implementing randomized allocation within the same academic year to help mitigate this potential bias.

5. Summary

The application of the dual-cycle teaching model (integrating in-class and extracurricular activities) in the Maternal and Newborn Health Nursing course has sig-

nificantly enhanced students' knowledge application skills, self-directed learning abilities, and clinical communication competencies. Following the implementation of this model, notable improvements were observed in both learning motivation and classroom participation, demonstrating its feasibility and effectiveness as an instructional approach.

The successful implementation of the dual-cycle teaching model integrating in-class and extracurricular activities in maternal and child health nursing demonstrates its potential for adaptation across diverse nursing courses and institutional contexts. Successful implementation requires contextualizing learning tasks to specific course objectives, leveraging institutional digital resources, and fostering faculty capacity in facilitating iterative learning cycles. This model offers a scalable approach to systematically bridge theoretical knowledge and clinical competency development, ultimately contributing to the advancement of pedagogical innovation in nursing education.

Future research will expand to include both qualitative and quantitative studies to further investigate the mechanisms through which this model enhances teaching quality, thereby providing evidence for its continued optimization.

Funding

1) Teaching research project of Hubei Education Department (fund number: 284).

2) Teaching research project of Yangtze University (fund number: JY2022056).

Conflicts of Interest

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

References

[1] Ministry of Education of the People's Republic of China (2019) Implementing Opinions on the Construction of First-Class Undergraduate Courses. http://www.moe.gov.cn/srcsite/A08/s7056/201910/t20191031_406269.html

[2] (2025) Student-Centered: The Path to Contemporary Undergraduate Education Reform. *Peking University Education Review*, **23**, 2. (In Chinese)

[3] Sharma, S., Saragih, I.D., Tarihoran, D.E.T.A.U. and Chou, F. (2023) Outcomes of Problem-Based Learning in Nurse Education: A Systematic Review and Meta-Analysis. *Nurse Education Today*, **120**, Article ID: 105631. https://doi.org/10.1016/j.nedt.2022.105631

[4] Xiao, S.Q. and Li, X.H. (2008) Development of the Self-Directed Learning Competence Scale for Nurses. *Journal of Nursing Science*, **20**, 1-4. (In Chinese)

[5] Peng, M.C., Wang, G.C., Chen, J.L., *et al.* (2004) Research on Reliability and Validity Testing of the Critical thinking ability Assessment Scale. *Chinese Journal of Nursing*, **39**, 7-10. (In Chinese)

[6] Yang, F.Y., Shen, N. and Li, Z.J. (2010) Preliminary Development of a Clinical Communication Competence Scale for Nursing Students. *Chinese Journal of Modern Nursing*, **16**, 3721-3724. (In Chinese)

[7] Zuo, D.X., Shi, L., Zuo, D.Q., *et al.* (2025) Exploration on Cultivating Nurse-Patient

Communication Competence in Nursing Interns. *Journal of Medicine and Theory and Practice*, **38**, 3230-3232, 3240. (In Chinese)

[8] Zhou, H.Y., Wang, Q., Wang L., *et al.* (2025) Impact of an OBE-Oriented Clinical Clerkship Teaching Model on Core Competencies and Self-Directed Learning Ability among Nursing Undergraduates. *Chinese Journal of General Practice*, **23**, 1234-1238. (In Chinese)

[9] Osman, A.D., Yasan, C., Philip, S., Wain, K., Ireland, K., Cooper-Blair, C., *et al.* (2025) Critical Thinking, Teaching Satisfaction, and Clinical Placement Readiness among Undergraduate Nursing and Midwifery Nursing Students in Block Model Learning. *Teaching and Learning in Nursing*. https://doi.org/10.1016/j.teln.2025.09.005

[10] Zang, Z.R., Liu, Q., Mao, J., *et al.* (2025) Practical Exploration of Evidence-Based Nursing Teaching Methodology Based on Critical Thinking Training in Nursing Research Courses. *Health Vocational Education*, **43**, 60-63. (In Chinese)

[11] Stenseth, H.V., Steindal, S.A., Solberg, M.T., Ølnes, M.A., Sørensen, A.L., Strandell-Laine, C., *et al.* (2025) Simulation-Based Learning Supported by Technology to Enhance Critical Thinking in Nursing Students: Scoping Review. *Journal of Medical Internet Research*, **27**, e58744. https://doi.org/10.2196/58744