

A Study on the Current Application, Problems, and Optimization Strategies of Artificial Intelligence in Vocational Undergraduate Nursing Education

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Abstract: With the continuous advancement of educational digitalization and medical intelligence, artificial intelligence, especially generative artificial intelligence, is profoundly reshaping teaching concepts, instructional organization, and learning modes in nursing education. Vocational undergraduate nursing education is characterized by strong practicality, a clear job-oriented focus, and rapidly updated knowledge, which makes it highly suitable for AI empowerment while also exposing it to such issues as superficial technological application, insufficient teacher literacy, data security risks, and academic integrity concerns. Based on the actual teaching context of vocational undergraduate nursing educators, this paper reviews the current application of artificial intelligence in nursing education, analyzes the main existing problems and their causes, and proposes optimization strategies from the perspectives of curriculum system construction, teacher training, teaching scenarios, evaluation mechanisms, ethical governance, and school-hospital collaboration. The study argues that artificial intelligence is not intended to replace teachers, but rather to become an important tool for restructuring the whole process of “teaching-learning-assessment-practice.” Only by adhering to student competency development as the center, job competence as the orientation, and normative governance as the bottom line can artificial intelligence truly contribute to improving the quality of vocational undergraduate nursing talent cultivation.

1. Introduction

In recent years, artificial intelligence has developed rapidly. In particular, generative artificial intelligence represented by large language models has demonstrated strong capabilities in text generation, intelligent question answering, knowledge summarization, scenario simulation, and learning support, and has gradually penetrated higher education and medical education [1-3]. Nursing education integrates theoretical learning, skills training, clinical thinking cultivation, and humanistic literacy development, and therefore places high demands on teaching resources, personalized guidance, and practical feedback. Traditional nursing education still faces certain limitations, such as

large class sizes, insufficient practical training resources, obvious differences in students' foundational knowledge, and delayed updates of clinical cases. In contrast, artificial intelligence shows clear advantages in resource supply, learning analytics, virtual simulation, and intelligent feedback [4-5].

Vocational undergraduate nursing education emphasizes the integration of morality and skills, work-study integration, and competency-based education. Its core goal is not merely to impart disciplinary knowledge, but to cultivate high-level technical and skilled nursing professionals for clinical, community, elderly care, and rehabilitation positions. Therefore, the integration of artificial intelligence into vocational undergraduate nursing education should not remain at the superficial level of simply using chatbots, generating slides, or assigning tasks. Instead, it should focus on nursing job competency standards and explore more systematic, standardized, and assessable instructional application pathways [6].

At the national level, the strategy of educational digitalization has been continuously promoted. The *Outline for Building a Leading Country in Education (2024–2035)* and related policies on accelerating educational digitalization both emphasize deepening the integration of artificial intelligence into educational reform, improving teachers' and students' digital literacy, and promoting the deep integration of intelligent technology with teaching and learning [7-8]. These policies provide clear guidance for AI-enabled reform in vocational undergraduate nursing education. As a vocational undergraduate nursing teacher, the author has already felt students' strong interest in and growing dependence on AI tools in daily teaching practice, and has also observed their practical value in case analysis, nursing document training, knowledge review, and oral expression. At the same time, issues such as students' overreliance on AI and lack of discernment, teachers' ability to use tools but inability to design AI-based teaching effectively, and institutions' lack of sound systems despite having platforms have become increasingly prominent. Therefore, exploring the current application, problems, and optimization strategies of artificial intelligence in vocational undergraduate nursing education is both practically urgent and highly meaningful.

2. Current Application of Artificial Intelligence in Vocational Undergraduate Nursing Education

2.1 Gradual Intelligence in Teaching Resource Development

At present, the most common application of artificial intelligence in vocational undergraduate nursing teaching is the development of teaching resources. Teachers can use AI tools to quickly complete course outline organization, case preparation, situational dialogue generation, test item design, knowledge point summarization, and multimodal teaching material production. Compared with traditional lesson preparation, AI can improve preparation efficiency, shorten the time required for resource development, and help teachers generate more targeted materials for different teaching contents. For example, in courses such as Fundamentals of Nursing, Internal Medicine Nursing, Surgical Nursing, and Geriatric Nursing, teachers may use AI to generate case introductions, nursing assessment form samples, discharge education instructions, and nursing communication scenarios, thereby enriching classroom materials [1][4].

2.2 Students' Learning Modes Are Becoming More Personalized

On the student side, artificial intelligence can provide relatively immediate support for questioning, review, and practice. Students may use generative AI for concept explanation, key-point summarization, case-based Q&A, self-test question generation, nursing terminology translation, and study plan arrangement. For vocational undergraduate nursing students, course contents are complex,

knowledge modules are numerous, and the burden of memorization is heavy. Therefore, AI tools show clear convenience in pre-class preview, post-class consolidation, and examination review. Especially for students with weak foundations and insufficient autonomous learning ability, AI can function to some extent as an “always-online learning assistant” [2][9].

2.3 Continuous Expansion of Skills Training and Scenario Simulation

Nursing education relies heavily on situational teaching and skills operation training. In recent years, virtual simulation, intelligent manikins, and AI dialogue systems have gradually entered nursing practical teaching. Some institutions have begun to integrate AI into Objective Structured Clinical Examination (OSCE) training, standardized patient interaction, nursing risk identification, and communication script training, enabling students to repeatedly practice in a relatively safe environment and thereby improve their adaptability and clinical thinking ability [3][10]. For instance, in scenarios such as “fall risk assessment for elderly patients,” “postoperative pain nursing,” and “observation of infusion complications,” AI may assist in constructing case progress and generating patient responses, thus increasing the authenticity of training.

2.4 Teaching Evaluation Begins to Shift toward Data-Driven Approaches

Traditional nursing teaching evaluation mainly relies on usual performance, final examinations, and skills assessments, often featuring delayed feedback and insufficient process evaluation. With the adoption of learning platforms and AI analytics tools, some courses have begun to use learning trajectories, response records, interaction frequency, and error distribution to judge students’ learning conditions and provide support for precision teaching [4]. For example, teachers may use AI analysis to identify students’ weaknesses in nursing diagnosis, nursing intervention formulation, or medication calculation, and then provide targeted instruction.

3. Main Existing Problems and Their Causes

3.1 Applications Remain at the Level of Tool Use and Lack Systematic Design

From actual teaching practice, many teachers have begun to contact AI, but more often treat it merely as an “upgraded search engine” or a “writing assistance tool,” mainly using it to generate lesson plans, summarize knowledge points, or design test questions. Few truly embed AI into curriculum objectives, teaching activities, and competency evaluation. In other words, many current applications still remain at the level of “knowing how to use the tool” rather than “knowing how to design teaching with the tool.” The integration of artificial intelligence with nursing curriculum content, job tasks, and competency standards is still insufficiently deep, resulting in fragmented and superficial application that is difficult to sustain in improving teaching quality.

The causes of this problem are mainly threefold. First, some teachers do not deeply understand the principles, applicable boundaries, and pedagogical logic of artificial intelligence. Second, institutions lack mature AI-based curriculum application plans and demonstrative cases. Third, vocational undergraduate nursing teaching tasks are already heavy, so teachers are more inclined to use AI as an efficiency-enhancing tool rather than as a driver of deep teaching reform.

3.2 Insufficient AI Literacy among Teachers Restricts the Quality of Application

The key to AI-empowered teaching does not lie in whether tools are available, but in whether teachers can use them correctly, safely, and effectively. At present, some nursing teachers face the

following situations: first, they are unable to formulate precise prompts, resulting in vague or even distorted outputs; second, they lack the ability to verify AI-generated results and may directly adopt responses that are not rigorous or evidence-based; third, they lack the ability to transform AI outputs into meaningful teaching tasks; fourth, they have insufficient awareness of data privacy, ethical boundaries, and academic norms [11-12]. Nursing education itself is highly specialized and involves condition judgment, nursing procedures, medication information, and patient communication. If teachers lack AI literacy, students may receive inaccurate or even risky information.

3.3 Students' Overdependence on AI Weakens Independent Thinking and Professional Judgment

From the perspective of student use, although AI improves learning convenience, it also brings obvious dependency problems. Some students tend to let AI directly generate answers when completing assignments, writing case analyses, or organizing nursing plans, and then submit them after simple modification. Some students even regard AI-generated content as the “standard answer,” neglecting the individual differences and complexity of nursing situations and clinical judgment. In the long term, this may weaken students' problem-analysis ability, critical thinking, and independent expression [9][13]. The nursing profession requires rigor, prudence, and a patient-centered professional spirit. If students form a habitual pattern of “copy-paste-submit,” it will be detrimental to the cultivation of job competence.

3.4 Prominent Data Security, Ethical Risks, and Academic Integrity Problems

Nursing teaching often involves case materials, nursing records, health assessment information, and clinical situational resources. If teachers or students input content containing real patient information into external AI platforms, privacy leakage and data security risks may arise [3][14]. At the same time, AI-generated content is subject to the “hallucination” problem, namely, responses that appear reasonable but are factually incorrect. If such content is used in teaching without verification, professional accuracy will be affected. Another practical issue is academic integrity. Students' use of AI to ghostwrite assignments, reflections, and reports is becoming increasingly common, which creates new challenges for learning evaluation. If institutions lack clear regulations, the boundary between “reasonable use of AI” and “cheating with AI” may become blurred.

3.5 Insufficient School-Hospital Collaboration Restricts the Depth of Application in Practical Teaching

Vocational undergraduate nursing talent cultivation emphasizes school-hospital collaborative education. However, the current application of artificial intelligence is more common in classroom teaching than in clinical practical teaching. There is still insufficient smoothness in platform construction, resource sharing, evaluation standards, and teaching data exchange between schools and hospitals. On the one hand, some affiliated hospitals or internship hospitals adopt a cautious attitude toward AI teaching, worrying that it may affect clinical safety and management order. On the other hand, there remains a disconnect between curriculum design on campus and competency demands in clinical positions, leading AI applications to serve theoretical teaching more than the cultivation of key competencies such as clinical communication, nursing decision-making, and practice reflection.

4. Optimization Strategies for Empowering Vocational Undergraduate Nursing Education with Artificial Intelligence

4.1 Reconstruct Curriculum Application Scenarios Guided by Job Competence

Reform in vocational undergraduate nursing education must adhere to a job-oriented principle. The use of artificial intelligence should not be separated from the nursing workflow; rather, learning tasks should be designed around the nursing process of “assessment-diagnosis-planning-implementation-evaluation.” Teachers may embed AI application scenarios at different levels across courses: emphasizing knowledge organization and terminology understanding in foundational courses, strengthening case analysis and nursing plan design in professional courses, and introducing human-computer dialogue, situational decision-making, and reflective improvement in integrated practical training. Through the integrated design of “course content-job tasks-AI tools-competency goals,” formalism can be avoided.

For example, in a geriatric nursing course, AI may be used to generate care scenarios for elderly patients with multiple diseases, enabling students to complete fall-risk assessment, medication observation, health education, and family support plan design. In nursing communication courses, AI can simulate different roles such as anxious patients, family members of chronic disease patients, and terminally ill patients, so as to train students’ empathetic communication and expression ability. In nursing documentation courses, AI may help students identify recording errors and optimize expression logic, but the final documentation must still be completed independently by students in accordance with professional standards.

4.2 Establish a Teacher AI Literacy Training Mechanism for Nursing Education

Institutions should incorporate AI literacy training into the teacher development system and systematically promote five dimensions: understanding, using, designing, evaluating, and governing AI. First, teachers should be helped to master basic AI knowledge, prompt design methods, and risk identification. Second, their awareness of verifying professional nursing content generated by AI should be strengthened. Third, teachers should be trained to integrate AI into instructional design, task assignment, classroom interaction, and formative assessment. Fourth, their understanding of AI ethics, privacy protection, and academic norms should be improved. Fifth, teachers should be encouraged to co-construct case libraries and exemplary courses in teaching-research activities.

For vocational undergraduate nursing teachers, AI literacy development should not be detached from professional backgrounds, but rather should adopt a training mode integrating educational technology, nursing teaching, and clinical scenarios. Only when teachers first acquire the ability to use AI in a regulated and informed way can students’ AI use become rational and efficient.

4.3 Construct a Teaching Model of “Teacher Leadership, Student Subjectivity, and AI Assistance”

After AI enters the classroom, the role of the teacher is not weakened; instead, it shifts from a transmitter of knowledge to a designer of learning, a guide of values, and a gatekeeper of results. Nursing education should clarify the principle that “AI may assist, but cannot replace professional judgment,” and build a teaching model characterized by teacher leadership, student subjectivity, and AI assistance. Teachers are responsible for raising authentic problems, designing complex tasks, controlling professional standards and ethical boundaries; students are responsible for active inquiry, comparative analysis, practical reflection, and independent expression; AI is responsible for resource support, simulation interaction, and immediate feedback.

In specific practice, a “three-step approach” may be adopted: first, students independently analyze the problem and form preliminary answers; second, AI is used for extension, comparison, and revision; third, under the teacher’s guidance, evidence verification and reflective summarization are completed. In this way, the auxiliary function of AI can be brought into play while avoiding complete student dependence on tools and promoting the development of higher-order thinking.

4.4 Improve Diversified Evaluation Mechanisms and Prevent Overemphasis on Results

In the context of artificial intelligence, traditional homework and single written examinations can no longer fully reflect students’ real abilities. Vocational undergraduate nursing courses should establish an evaluation system combining process-based, performance-based, and authentic assessment. First, greater weight should be assigned to classroom tasks, case presentations, skills operation, oral expression, and learning reflection. Second, assignments involving AI should include usage statements requiring students to indicate the stages in which AI was used, the prompt logic, and the extent of human revision. Third, emphasis should be placed on students’ ability to verify, critique, and transform AI-generated results rather than only on the completeness of the final text. Fourth, in skills and situational assessments, on-site questioning and random response tasks should be strengthened to examine students’ genuine professional competence.

By adjusting evaluation mechanisms, students’ tendency to treat AI as a ghostwriting tool may be reduced, and they may be guided to regard AI as a learning partner and a support tool for thinking.

4.5 Strengthen Ethical Governance and Data Security Management

Nursing education involves patient privacy, medical information, and professional ethics; therefore, AI application must adhere to bottom-line thinking. Institutions should formulate specific regulations for the use of AI in nursing teaching as soon as possible, clearly defining which data may be input, which materials must be de-identified, and which scenarios may only be used on closed on-campus platforms. In case teaching, teachers should prioritize virtual cases, de-identified cases, and authorized materials, and avoid directly inputting sensitive real-patient information into external systems [14]. At the same time, AI ethics education should be included in courses to guide students in understanding algorithmic bias, content inaccuracy, privacy leakage, and accountability issues, thereby cultivating standardized, safe, and responsible use awareness.

4.6 Promote School-Hospital Collaboration and Expand the Depth of Practical Teaching Application

The distinctive feature of vocational undergraduate nursing education lies in practice. If artificial intelligence is to truly improve the quality of talent cultivation, it must extend from classroom teaching to clinical internship and job training. Schools may collaborate with affiliated hospitals and internship hospitals to co-construct intelligent case libraries, nursing virtual simulation resources, and job-task evaluation standards, and explore AI-supported clinical thinking training, nursing risk identification training, and patient communication training. Through jointly designing authentic tasks, jointly evaluating student performance, and jointly feeding back teaching improvements, AI application can be promoted from a mere “course tool” to an integrated “education system.”

5. Conclusion

The rapid development of artificial intelligence, especially generative artificial intelligence, has brought new opportunities for the reform of vocational undergraduate nursing education. It can

improve the efficiency of teaching resource development, support personalized learning, enrich skills training scenarios, and promote greater precision and process orientation in teaching evaluation. However, from current practice, AI application in vocational undergraduate nursing teaching still faces problems such as insufficient systematic design, inadequate teacher literacy, increasing student dependence, prominent ethical risks, and insufficient school-hospital collaboration.

Therefore, future AI application in vocational undergraduate nursing teaching should take job competence cultivation as its core, teacher professional guidance as its prerequisite, students' authentic growth as its goal, and institutional regulation and ethical governance as its guarantee. Specifically, reform should be promoted simultaneously from curriculum restructuring, teacher training, teaching model innovation, evaluation reform, risk governance, and practical collaboration. Only in this way can artificial intelligence truly become a powerful tool for improving the quality of nursing education and promoting students' professional competence development, rather than merely a short-term trend or superficial decoration. For vocational undergraduate nursing teachers, it is necessary to actively improve their own AI literacy, seize the opportunities of technological transformation, and explore more suitable intelligent teaching models for vocational undergraduate talent cultivation while maintaining the professionalism, humanistic nature, and safety bottom line of nursing education.

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