

ORIGINAL RESEARCH

Integration of artificial intelligence in quality improvement projects for undergraduate nursing students: Enhancing nursing education through innovative applications

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ABSTRACT

Background and objective: Nursing faculty have been hesitant to incorporate artificial intelligence into coursework due to various reasons, including the risk of affecting academic integrity and the potential for receiving inaccurate information. As nursing cohorts continue to grow, innovative approaches are needed to meet learning objectives; such as artificial intelligence. Incorporating artificial intelligence into group projects may increase responsible, ethical, and critical use of artificial intelligence and support programs in managing larger cohorts. The purpose of this initiative was to integrate artificial intelligence into the literature review process for a quality improvement group project to develop students' ability to use artificial intelligence responsibly, ethically, and critically. This approach included validating the accuracy of artificial intelligence generated information.

Methods: This initiative was offered as an honors conversion opportunity within the Clinical Science II course to undergraduate nursing students. Six students opted to participate and were divided into two groups of three. Groups selected a topic related to the course content and aligned it with one of the Joint Commission national patient safety goals. Groups developed a clinical question, search strategy, conducted a literature review, and used artificial intelligence to identify evidence.

Results: Benefits of using artificial intelligence included the generation of creative ideas, provision of workflow steps, and a broad range of solutions. Challenges included a lack of concrete examples and a tendency for artificial intelligence generated information to be more practical than theoretical. Groups found artificial intelligence generated findings aligned with most articles from their literature reviews.

Conclusions: Incorporating the utilization of artificial intelligence into nursing curriculums can help programs monitor usage while managing growing cohorts. Allowing students to engage with artificial intelligence under guided instruction enhances understanding of its practical applications in clinical settings. This will better prepare students for real-world practice while ensuring academic integrity is maintained.

Key Words: Artificial intelligence, Innovation, Nursing education, Quality improvement

1. INTRODUCTION

The increasing integration of artificial intelligence (AI) in healthcare has prompted significant attention within nursing

education. Despite its growing relevance, nursing students often lack sufficient preparation regarding the practical applications of AI.^[1] Concurrently, nursing faculty have expressed

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hesitancy in incorporating AI into coursework due to concerns about academic integrity and the risk of inaccurate or unreliable information generated by AI systems.

As nursing programs experience expanding student cohorts, innovative instructional strategies are needed to effectively meet learning objectives while maintaining educational quality. The integration of AI into nursing curricula represents one such strategy. Developing a foundational understanding of AI concepts, along with the ability to critically apply AI tools, may enhance students' readiness for contemporary healthcare environments.^[2] Structured integration of AI into learning activities, such as group-based assignments, may further support appropriate use while assisting programs in managing increased enrollment demands.

1.1 Background

Emerging literature in nursing education highlights both the potential benefits and the challenges associated with the integration of AI in nursing education.^[1-7] AI has been incorporated into curriculum design, particularly in alignment with competency-based education frameworks.^[8,9] Additionally, AI has demonstrated value in promoting student engagement^[3,7,10] and supporting clinical education through simulation and virtual learning environments.^[5]

Beyond educational applications, AI holds promise in enhancing clinical readiness by streamlining patient documentation processes and fostering leadership competencies essential for new graduate nurses transitioning to practice.^[2,9,11] These applications underscore the importance of preparing nursing students to engage with AI technologies in a manner that aligns with professional standards and evidence-based practice.

However, significant concerns persist regarding the integration of AI in nursing education. The potential for academic misconduct remains a primary issue.^[3,4,7] Additionally, AI-generated outputs may include inaccurate information or fabricated references, raising questions about reliability and scholarly integrity.^[3,8] The literature emphasizes the need for both faculty and students to develop competencies in the ethical and appropriate use of AI tools.^[3-5,7,8]

Further challenges include student anxiety related to AI use and a lack of consistent institutional guidance.^[1,4,8] In response, current evidence supports the implementation of faculty-designed assignments that intentionally incorporate generative AI while requiring independent verification and critical appraisal of AI-generated content.^[7,8] Such approaches promote responsible use while reinforcing essential skills in critical thinking, information literacy, and professional accountability.

1.2 Purpose

The purpose of this educational initiative was to integrate AI into the literature review process for an undergraduate nursing quality improvement (QI) project to develop students' ability to use AI responsibly, ethically, and critically. Specifically, the initiative aimed to strengthen students' ability to evaluate the accuracy, relevance, limitations, and applicability of AI-generated content by validating it against peer-reviewed evidence. Through this guided approach, students were expected to recognize AI as a supportive but fallible tool, distinguish AI-generated insights from scholarly evidence, and demonstrate transparency and accountability in its use.

2. METHOD

This initiative was performed at a public land-grant research university with five campuses throughout the state. The university's school of nursing was founded in 1942 and is accredited by the Commission on Collegiate Nursing Education (CCNE). The mid-sized school offers traditional and accelerated baccalaureate, master's, and doctoral nursing degree programs. This project was classified as an educational evaluation initiative; ethical approval and consent were not applicable.

2.1 Participants

This initiative was piloted within the Clinical Science II course, which focused on foundational clinical concepts, evidence-based practice, and the introduction of QI principles for sophomore-level undergraduate nursing students. The initiative was offered as an honors conversion voluntary opportunity rather than a required course assignment. Six students elected to participate and were divided into two small groups of three to conduct the project.

2.2 Implementation process

The objectives were by the end of the initiative that students should be able to identify a QI project topic of interest related to the course content and the Joint Commission 2025 National Patient Safety Goals (NPSGs); address a real-world issue in healthcare that can be measured, analyzed, and improved through evidence-based interventions; assess AI in combination with performing a literature review to address QI project topic including validating AI information received for accuracy; and apply relevant findings from evidence to support implications and recommendations for practice for QI project.^[12] An orientation virtual session was held to review course content, the Joint Commission website, assess students' current comfort level with AI, provide an overview of the project outline, objectives, clear expectations regarding ethical AI use, documentation of prompts, and validation

processes. Best practices on Population, Intervention, Comparison, Outcome, and Timeframe (PICOT) question development, establishing a search strategy, conducting a search, and presentation development resources were reviewed and provided to the students. Faculty held bi-weekly virtual sessions to meet with groups to provide them with orientation to project steps and to address any needs or concerns, throughout the semester.

Before engaging with AI tools directly, each student read the peer-reviewed article titled *Advancing Nursing Practice with Artificial Intelligence: Enhancing Preparedness for the Future*.^[12] This article provides an overview of AI concepts, current applications in nursing, and future implications for practice and education. Following the reading, students completed an individual written reflection addressing two key questions: what did you learn about AI from the article and second, how could AI enhance your clinical preparedness as a future nurse. Each student group was instructed to select a QI project topic relevant to the course content and aligned with at least one of the 2025 Joint Commission Hospital NPSGs.^[12] The two topics ultimately selected were medication safety and the improper use of antibiotics. Each group submitted a one-page document describing their rationale to choosing their topic and how it correlated to the course content and at least one NPSG. Approval and feedback were provided prior to moving forward.

Faculty provided a demonstration on how to develop a PICOT question, search strategy, and use databases to search for relevant and high-quality articles. The groups designed their search strategies and PICOT questions to help guide them in performing their literature reviews. Students followed inclusion criteria to confirm final articles for literature review detailing reasons for exclusion. Data extraction evidence tables from articles were organized using Excel, which included article reference, study type, purpose, level of evidence, population, setting, variables, data analysis method, summary of findings, main takeaways, and nursing implications; for faculty cross analysis. Groups submitted their PICOT question, chosen articles, search strategies, and evidence table. Faculty reviewed articles against evidence tables for accurate extraction providing feedback and clarity.

PICOT questions were used to initiate searches within the AI platform and with supportive questions based on information provided. Groups submitted downloaded AI findings including questions asked and a written summary comparing AI results to chosen article's evidence to identify alignments and discrepancies. Faculty reviewed AI submitted information to ensure platform was used responsibly, ethically, and critically; feedback and approval were provided prior to groups

developing presentations. Each group presentation was required to include an overview of the current state of the topic problem, explain which course content and NPSG chosen topic related to, summary of the Joint Commission's recommendations to address identified NPSG, summary of AI findings and literature review, evaluation of accuracy of AI received information compared to literature review, identified barriers that may prevent meeting NPSG, identified measures to promote meeting NPSG, recommendations for changes in practice, potential outcomes, and a reflection on effectiveness of incorporating AI within nursing learning. Both groups presented to the course student body. The project assignments were graded on a satisfactory/unsatisfactory criterion with a rubric; students were required to receive a grade of B- or better to earn honors credit for their academic profile.

3. RESULTS

Both student groups presented their QI projects using PowerPoint to their course section highlighting their literature review findings, AI-generated insights, recommendations, and an evaluation of AI's effectiveness. These presentations demonstrated that students were able to integrate AI outputs with scholarly evidence in a coherent and thoughtful manner. The projects revealed that AI-generated findings aligned with most peer-reviewed articles identified through traditional searches. This alignment helped build student confidence in using AI as a preliminary tool, while also reinforcing the importance of validation. In areas where discrepancies existed, students were able to articulate why peer-reviewed sources provided greater depth or theoretical grounding.

Students identified several benefits associated with using AI during their QI projects. One of the most frequently cited advantages was the generation of creative ideas and multiple potential solutions to clinical problems. AI helped students think beyond initial assumptions and consider a broader range of interventions. Another noted benefit was the provision of clear, step-by-step workflow suggestions. These outputs helped students conceptualize how proposed interventions might be implemented in practice, bridging the gap between theory and application. Additionally, students appreciated the efficiency of AI in synthesizing information and identifying common themes across sources. This efficiency allowed them to devote more time to analysis and discussion rather than information gathering alone. These benefits highlight how AI, when used appropriately, can enhance learning and support the development of essential nursing competencies.

Students also identified notable challenges associated with AI use. One limitation was the lack of detailed or concrete

examples in some AI-generated responses. Compared to peer-reviewed articles, AI outputs were often more generalized and less theoretically grounded. Students observed that AI-generated information tended to emphasize practical recommendations over underlying theory. While this can be useful, it may oversimplify complex clinical issues if not carefully examined. Faculty guidance played a critical role in mitigating these challenges. By setting clear expectations, facilitating discussion, and emphasizing validation, faculty ensured that AI use remained educationally sound.

Overall, the initiative demonstrated that guided integration of AI into a QI project literature review can promote responsible and ethical AI use while strengthening students' ability to critically evaluate AI-generated content alongside peer-reviewed evidence. Students demonstrated an understanding of both the utility and limitations of AI, recognizing its value for generating ideas, synthesizing information, and informing potential interventions while maintaining the need for scholarly validation and human judgment. To support students in developing critical thinking skills in an AI-enabled learning environment, faculty should look to incorporate AI tools into their curriculum, teaching students to consider AI as a fallible external tool rather than a decision maker.^[4] The student presentations demonstrated a level of critical thinking and reflection appropriate for undergraduate nursing education, suggesting that guided AI integration can support, rather than undermine, learning objectives.

4. DISCUSSION

Positioning the project as an optional honors conversion attracted students who were motivated to engage deeply with emerging topics and reflective practice. At the same time, the structure provided valuable insights into how AI integration might be scaled to larger cohorts in the future. Nursing curriculum should include AI literacy, critical appraisal skills, ethical reasoning, and analysis of AI outputs.^[4] The alignment with national patient safety goals strengthened the educational value of the project and underscored nursing's role in quality, safety, and leadership.

However, the sample size was small, involving only six sophomore undergraduate nursing students. As a result, findings cannot be generalized to larger cohorts or different educational contexts without further study. The honors conversion format also means that participants may have been more motivated or academically inclined than the general student population. The initiative was implemented within a single course in the undergraduate curriculum. Outcomes may differ if AI integration occurs earlier or later in a program, or within different course types such as clinical practicums or capstone projects.

Faculty expertise and comfort with AI also influence implementation and outcomes. Faculty development is essential to ensure they can model and teach AI use effectively.^[4] Acknowledging these limitations is essential for responsible interpretation and future planning. They highlight the need for additional research and iterative implementation to determine best practices for broader curricular integration.

This project contributes to the growing body of literature describing operationalization of the American Association of Colleges of Nursing (AACN) Essentials, one, by the inclusion of internal and external informatics including AI to address system-based clinical practice areas for improvement.^[13] Through learning the importance of The Joint Commission and the Hospital NPSGs, students promoted quality and safety by using established and emerging principles of safety science to address barriers in care delivery.^[12,13] Using scholarship to address identified areas for improvement allowed the students to see how nursing scholarship informs science, enhances clinical practice, influences policy, and impacts best practices.^[13] Allowing the students to take a lead in self-reflection and decision-making within their project outcomes promoted growth and asserted leadership.^[13]

5. CONCLUSION

This initiative demonstrates that incorporating AI into undergraduate nursing education is both feasible and beneficial when approached intentionally. Guided use of AI within group QI projects allowed students to engage with emerging technology while maintaining academic integrity and scholarly rigor. AI has potential to assist students through their learning process, allowing students to spend more time on the intellectual contribution of their scholarly assignments.^[7] Rather than diminishing learning, AI served as a catalyst for deeper discussion, critical appraisal, and reflection.

Students gained foundational AI literacy, developed skills in validation and evidence comparison, and increased their awareness of how AI may be used in clinical practice. Introducing AI early in nursing curriculum is crucial to ensure students acquire the insight needed for accountable AI integration into practice.^[5] Faculty were able to monitor AI use effectively to ensure the AI-platform was being used responsibly, ethically, and critically through transparent, structured assignment design. Preparing nursing students to navigate AI-rich healthcare environments is an essential component of contemporary professional education.

Expanding AI-integrated projects across the undergraduate curriculum would allow students to progressively build AI literacy and critical appraisal skills. The incorporation of AI may offer promising approaches to pedagogical delivery and

assessment.^[7] Including graduate nursing programs could further enhance sample size and explore advanced applications of AI in leadership and QI.

Faculty development is also essential. It is important for educators to familiarize themselves with AI platforms and capacities to tailor guidelines accordingly.^[7] Providing educators with training and resources related to AI will increase confidence and consistency in implementation. Clear institutional guidelines that balance innovation with academic integrity can support both faculty and students.

As AI technology continues to evolve, ongoing evaluation and research will be needed to refine educational approaches. AI is not going anywhere; therefore, nurse educators play a pertinent role in preparing the next nursing generation with the skills to excel in practice and deliver high-quality patient care in this ever-evolving digital era.^[5] By thoughtfully integrating AI into nursing education, programs can better prepare students for real-world practice while upholding the profession's commitment to evidence-based, patient-centered care.

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Dr. Brooks and Dr. Mayerson were responsible for initiative design and revising. Both authors contributed to drafting and revising the manuscript. All authors read and approved the final manuscript. Both authors contributed equally to the initiative.

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