

## **UNLOCKING THE FUTURE OF NURSING EDUCATION AND CONTINUING PROFESSIONAL DEVELOPMENT BY EMBRACING GENERATIVE ARTIFICIAL INTELLIGENCE AND ADVANCED LANGUAGE MODELS**

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### **Abstract**

The rapid evolution of technology calls for innovations in nursing education and continuing professional development (NCPD) that are crucial for maintaining high-quality health-care delivery. As lifelong learners, nurses require effective and motivational educational resources that support their ongoing growth and enable them to adapt to changing health-care landscapes. Generative AI models such as OpenAI and Advanced language models such as ChatGPT present opportunities to enhance learning experiences and support knowledge acquisition. This article explores the potential of incorporating both generative AI and advanced language models in NCPD programs, focusing on design strategies, implementation, and possible challenges. By leveraging these innovations, nursing professionals can access personalized, on-demand, and interactive learning resources, advancing their professional growth and improving patient outcomes.

**Keywords:** advanced language models, artificial intelligence (AI), ChatGPT, nursing continuing professional development (NCPD), educational innovations, instructional design

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### **INTRODUCTION**

The landscape of health care is undergoing a seismic shift, marked by rapid technological advancements and evolving patient needs. As the backbone of health-

care delivery, nursing must adapt to these changes, necessitating continuous education and professional growth. Integrating advanced language models (ALMs) powered by generative artificial intelligence (AI) offer a novel approach to transforming nursing education and nursing continuing professional development (NCPD). According to Satya Nadella, Chairman and CEO of Microsoft, “This new generation of AI will remove the drudgery of work and unleash creativity. There’s an enormous opportunity for AI-powered tools to help alleviate digital debt, build AI aptitude, and empower employees” (Microsoft, Inc., 2023, p. 1).

Artificial intelligence tools such as ChatGPT, Bard, DALL-E, and Copilot will disrupt health care. Many nursing leaders are scrambling to understand the implications of this technology for nursing education in academia and NCPD. This article explores harnessing the capabilities of AI and ALMs for NCPD, focusing on design strategies, the implementation process, and likely challenges to unlocking the future of nursing education.

### **The Basics of Generative Artificial Intelligence**

Not all AI is generative AI. Recommendations found on Spotify™, Amazon™, or Netflix™ are examples of non-generative AI, as they are designed (or trained) to perform a specific task intelligently, learning from data and making predictions based on that data. AI is considered generative when its application is trained to generate new, original content or solutions such as text, images, music, and/or interactive simulations based on patterns within its original training data (McKinsey and Company, 2023).

ALMs, also called large language models (LLMs), on the other hand, are a specific type of generative AI that generates text-based content (Toner, 2023). These models are trained on large amounts of text data, and can learn human language patterns, grammar, and semantics. They can generate coherent, contextually relevant text, allowing them to perform such tasks as natural language understanding, translation, summarization, and even creative writing. They possess a high level of language understanding and generative capabilities (Toner, 2023).

## THE LIFELONG LEARNING IMPERATIVE

Nursing, often described as a blend of science and art, requires professionals to possess a diverse skill set encompassing clinical expertise, compassion, and adaptability. Lifelong learning is integral to nursing, enabling practitioners to stay current with developing medical practices, ethical considerations, and technological advancements. As nurses navigate complex health-care scenarios, their education must evolve alongside the industry. This imperative for ongoing learning lays the foundation for integrating ALMs into NCPD.

Adult education is directly linked to motivation for learning; therefore, it is worthwhile to address the connection between nursing professional development and the prioritization of needs as contained in Maslow's Hierarchy of Needs (Maslow, 1943). According to Maslow's theory, individuals need to fulfill their basic-level needs before progressing to higher-level needs (Maslow, 1943). Nursing education design tools that use AI and ALMs can support nursing practice and motivate nurses to continue their professional development and lifelong learning goals at advanced levels.

### **Maslow's Hierarchy of Needs Applied to Nursing Education and Professional Development**

**Physiological Needs:** By leveraging AI in nursing education and professional development, generative AI can continuously monitor and aggregate data from reputable sources such as medical journals and clinical studies, providing nurses with up-to-date information and evidence-based practices for meeting the needs of patients, saving time and effort, and reducing stress in the workplace.

**Safety Needs:** Generative AI can contribute to nursing education by creating realistic simulations and virtual scenarios that allow nurses to practice clinical skills and decision-making safely. Using AI-powered simulations, nurses can learn to recognize potential risks, respond to emergencies, and handle critical situations without compromising patient safety.

**Social Needs:** Nurses work in interdisciplinary teams and interact closely with patients, families, and colleagues. Generative AI can help meet the social needs of nurses by facilitating collaborative learning platforms and virtual communities. AI-powered platforms can connect nursing students, educators, and other nursing professionals, enabling them to engage in discussions, share experiences, and support one another. Such interactions can foster a sense of belonging and help nurses develop interpersonal relationships, enhancing their overall well-being.

**Esteem Needs:** Nurses require confidence and recognition in their professional roles. Generative AI can support nursing education by offering personalized learning experiences. AI algorithms can assess nurses' performance, identify areas for improvement, and provide tailored feedback. By receiving personalized guidance and acknowledgment of their progress, nurses can enhance their self-esteem and confidence in their clinical skills, contributing to their professional growth and development.

**Self-actualization:** Generative AI can facilitate self-actualization for nurses to make a meaningful impact in patient care by providing access to advanced resources and technologies. AI-powered platforms can offer nurses access to medical literature, research databases, and innovative tools that enable them to engage in evidence-based practice, conduct research, and contribute to advancing nursing knowledge. By empowering nurses to explore new avenues and pursue their passions, generative AI supports their self-actualization needs and consequently, contributes to their professional development and well-being, ultimately enhancing the quality of nursing practice and patient outcomes.

## **THE PARTNERISM FRAMEWORK**

An essential consideration for nursing educators when building the foundation for integrating ALMs and generative AI into professional development is to apply the Partnerism framework that aligns with Maslow's Hierarchy of Needs. Partnerism,

defined as “a socio-economic system where all relationships, institutions, policies, and organizations are based on principles of equitable partnership that supports linking rather than ranking and hierarchies of actualization rather than hierarchies of domination” (Partnerism.org, 2023), can foster a collaborative ecosystem where humans and AI coexist, enriching the educational experience. In this framework, AI serves as a supportive partner, addressing the nursing learner’s foundational physiological and safety needs. The application of Partnerism in nursing education holds great potential for addressing and rectifying issues of inequality in AI-generated data sets and information gathering while promoting global interdisciplinary collaboration.

Firstly, Partnerism emphasizes inclusivity and diversity (Partnerism.org, 2023), which will help to ensure that the development and programming of AI systems in nursing education involves input from a wide range of stakeholders. This collaborative approach helps mitigate biases and inequalities that may inadvertently be embedded in AI algorithms, as diverse perspectives are considered during the design phase.

Secondly, the framework encourages transparency and accountability in AI applications. By fostering partnerships between educators, students, health-care practitioners, and AI developers, Partnerism promotes a culture of ethical AI use. This includes continuously monitoring and evaluating AI-generated data sets to identify and rectify any biased or discriminatory language or applications, thus ensuring fairness and equity in nursing education.

Thirdly, Partnerism encourages interdisciplinary collaboration on a global scale. Nursing education, by its nature, is interconnected with various other disciplines, such as medicine, psychology, sociology, and public health. The framework facilitates partnerships not only within the field of nursing, but also across diverse sectors and countries (Eisler, 2021). This interdisciplinary approach allows exchanging of knowledge, best practices, and culturally sensitive AI applications, leading to a more holistic and globally relevant nursing education system (Eisler, 2021). This synergistic blend of AI and Partnerism enhances nursing education and exemplifies how technology

can be harnessed to elevate human potential and well-being, in harmony with Maslow's timeless principles.

## **DESIGNING INNOVATIVE LEARNING EXPERIENCES**

Integrating ALMs into NCPD marks a significant shift in conceptualizing and implementing instructional design. It necessitates a strategic, multidisciplinary approach that harmoniously blends nursing educators' expertise with AI specialists' insights. This collaboration is the cornerstone of creating learning experiences that resonate with nursing professionals and empower them to excel in their practice (Buchanan et al., 2021).

### **Other Benefits of Advanced Language Models Instructional Design**

**Emulating Real-World Nursing Practice.** At the heart of this transformation lies the intent to simulate real-world nursing scenarios, a critical area in core competencies for nursing education as identified by the American Association of Colleges of Nursing (2021). Armed with clinical insights, educators partner with AI experts who leverage ALMs such as ChatGPT to create immersive, interactive scenarios. These scenarios span a spectrum of health-care contexts, from high-acuity inpatient units to home care settings. By replicating the complexities of actual patient interactions, diagnostic puzzles, ethical quandaries, and the nuanced decision-making processes that nurses routinely encounter, these AI-driven scenarios bring authenticity to the learning experience. These scenarios also encourage students to utilize technology for decision-making and enhance their learning experience (The Ohio State University College of Nursing, 2022).

**Diverse and Challenging Scenarios.** The innovative instructional design encompasses an array of diverse and challenging scenarios that expose nursing professionals to a panorama of situations. These scenarios reflect the rich tapestry of patient care, ranging from intricate surgical procedures to empathetic conversations with terminally ill patients. Including scenarios encompassing a wide range of health-care contexts

fosters a comprehensive learning experience that prepares nurses to navigate the full spectrum of their roles and responsibilities (Institute of Medicine (US) Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine, 2011).

**Cultivating Core Nursing Competencies.** The overarching aim of this instructional design strategy is to cultivate core nursing competencies that underpin effective health-care delivery. Critical thinking, clinical reasoning, and empathy—vital qualities for any nurse—are intricately woven into the fabric of the AI-driven scenarios (Buchanan et al., 2021). Nursing professionals are challenged to analyze complex data, decipher multifaceted medical scenarios, and make well-informed decisions that profoundly impact patient outcomes. Moreover, the interactive nature of the scenarios nurtures empathy, encouraging nurses not just to treat patients, but also to understand and address their emotional and psychological needs.

**Fostering a Learning Ecosystem.** Beyond its role as an educational tool, this learning transformation in turn fosters a holistic learning ecosystem. Integrating ALMs into NCPD transforms learning from a passive endeavor into an engaging dialogue. Nurses actively engage with AI models in simulated conversations that emulate real-life patient consultations. These dynamic interactions encourage curiosity and exploration, propelling nurses to delve deeper into medical concepts and their practical applications (Booth et al., 2021).

**Personalized Learning Journeys.** One of the hallmarks of ALMs is their capacity to personalize experiences. As nursing professionals interact with AI-powered scenarios, the models analyze their interactions, responses, and performance. This data-driven approach enables AI to adapt the learning journey to individual needs, focusing on areas that demand further exploration while acknowledging strengths.

**Closing the Loop.** The beauty of this instructional design is its cyclical nature. Nursing professionals engage with AI-driven scenarios, apply critical thinking and clinical

reasoning, and receive feedback that guides their growth. This feedback loop reinforces learning, allowing nurses to refine their skills and expand their knowledge. Moreover, the ability to revisit scenarios and witness the outcomes of different decisions encourages reflective practice—an essential component of nursing excellence.

The strategic incorporation of ALMs into NCPD instructional design redefines the learning landscape for nursing professionals. It amalgamates the best of both worlds—technology’s analytical precision and human intuition’s empathetic touch. As educators and AI experts collaborate with companies that offer digital development products solutions to craft scenarios that mirror reality, nursing professionals are poised to embark on a transformative learning journey—one that equips them not just with information but with the profound ability to impact patient lives through enhanced critical thinking, clinical reasoning, and empathetic care.

## **IMPLEMENTATION: MERGING ARTIFICIAL INTELLIGENCE WITH NURSING EDUCATION**

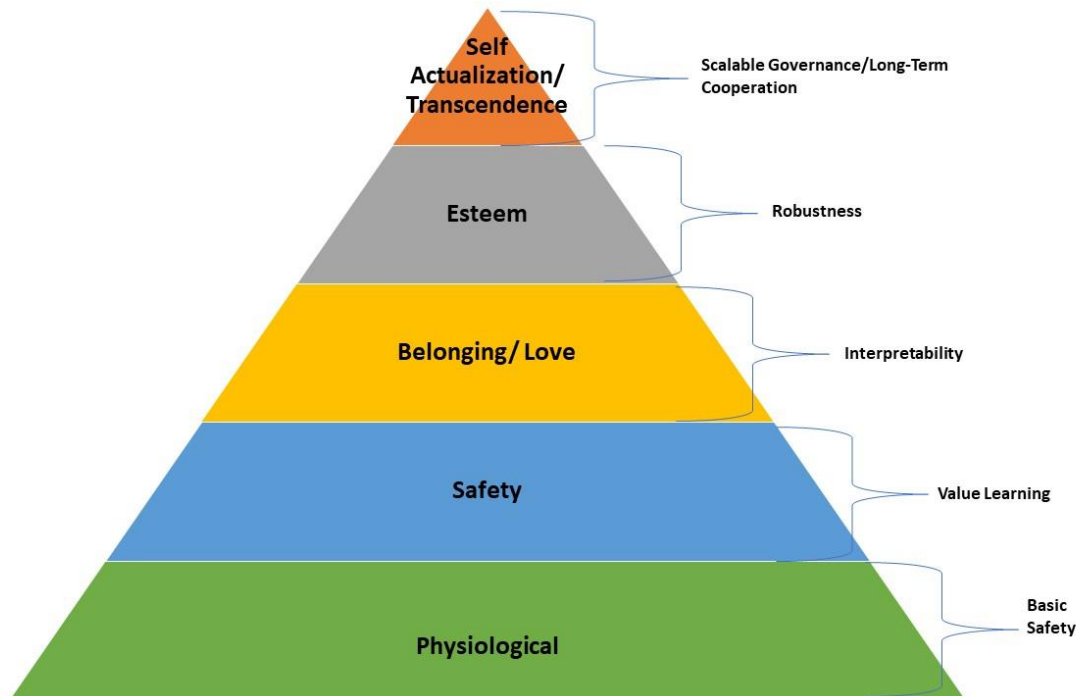
Integrating ALMs into academia and NCPD is a multidimensional endeavor that thrives on diverse expertise and strategic planning synergy. This collaborative approach unites leaders, educators, AI specialists, and subject-matter experts in a shared mission to transform nursing education through innovative technology. Hohulin (2023) developed a hierarchy of AI alignment based on Maslow’s framework that provides the steps to integrate AI systems to meet ethical goals and behaviors that connect with human needs and values.

- Basic Safety: Prevent unintended harm and malfunctions.
  - Value Learning: Understand and respect human values.
  - Interpretability: Ensure transparent, explainable AI.
  - Robustness: Resilient to adversarial attacks, perturbations.
  - Scalable Governance: Ethical frameworks, policies, guidelines.
  - Long-term Cooperation: Global collaboration for humanity’s interests.
- (Hohulin, 2023)



Figure 1 depicts the alignment between Maslow's Hierarchy of Needs and Hohulin's Hierarchy of AI Alignment.

Figure 1. Hohulin's Hierarchy of AI Alignment to Maslow's Hierarchy of Needs



Note: Adapted from Maslow (1943). Adapted from Hohulin (2023) with permission.

Central to this process is the curation of content that aligns seamlessly with nursing competencies and curricular objectives. Educators and subject-matter experts collaborate to develop scenarios, case studies, and dialogues that authentically reflect real-world healthcare experiences. These interactions span a spectrum of clinical scenarios, enabling nursing professionals to engage in dynamic dialogues that emulate the challenges and complexities they encounter in their practice (Institute of Medicine (US) Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine, 2011).

Other considerations for implementation strategy and planning include ensuring that the educational content generated by AI resonates with nursing practice realities and

aligns with established learning goals, providing comprehensive training for educators and nursing staff on the use of ALMs, addressing any apprehensions or misconceptions about AI technology, and highlighting its potential to augment, not replace, human expertise (Buchanan et al., 2021). Lastly, mechanisms for ongoing evaluation and improvement are needed. It is vital to regularly assess the effectiveness of AI-integrated modules in achieving learning outcomes and meeting ethical standards, and to gather feedback from nursing professionals to refine content and delivery methods (De Gagne, 2023). Nurse educators must scrutinize AI-driven scenarios for biases or inaccuracies and maintain the authenticity of patient interactions while developing strategies to keep nursing professionals engaged. Incorporating gamification, interactive elements, and real-time feedback will enhance the shared and immersive nature of the learning experience.

While still considered an emerging area, some organizations use AI and ALM in nursing education and practice and are leading the advancement. The Nursing and Artificial Intelligence Leadership Collaborative (NAIL) serves as a pioneering force in reshaping nursing education through the integration of AI. By fostering collaboration, developing AI-driven resources, offering professional development, conducting research, and advocating for evidence-based practices, NAIL empowers nursing educators and students to embrace AI's potential for enhanced learning and improved patient care (Ronquillo et al., 2021). Through its multidimensional approach, NAIL plays a pivotal role in preparing nursing professionals for the challenges and opportunities of an AI-driven health-care landscape.

The Ohio State College of Nursing and College of Engineering team uses technology-enabled learning tools across its core curriculum to build students' competencies that can be validated in clinical experience (The Ohio State University College of Nursing, 2022). Extended reality can provide adaptive learning, a best practice that tailors support to each student's needs. The artificial intelligence/machine-learning (AI/ML) tool can address critical points in patient care when decisive nurse interventions make life-or-death differences (The Ohio State University College of Nursing, 2022). The

collaborative team of nurses and engineers also developed a logic model providing best practices on inputs, strategies, and outcome measures for successful implementation (American Nurses Foundation, 2023).

Examples of AI application in nursing practice are the utilization of robotics in medication dispensing, special needs robotics, and decision-making applications for health management and coordination. Cobots, short for collaborative robots, are designed to operate harmoniously alongside humans in shared workspaces. An exemplary cobot, Moxi, crafted by Diligent Robotics, has demonstrated remarkable autonomy while navigating hospital environments. In an innovative pilot project by ChristianaCare, the potential of Moxi cobots is set to be fully harnessed within six to ten years (American Nurses Foundation, 2023). By integrating these cobots with electronic health records and the power of artificial intelligence, the aim is to proactively identify instances where nurses require equipment, supplies, medications, and laboratory support. Starting with an initial deployment across 11 inpatient units, this initiative will collaborate with more than 400 nurses. ChristianaCare is poised to evaluate comprehensively how the introduction of cobots like Moxi influences nursing practices to help scale this transformative technology to a broader spectrum (Grosso, et al., 2021).

Another example of the use of AI in clinical practice is Clinikly.ai, a pioneering virtual nursing platform designed to empower nurses with an innovative patient education and engagement tool. With Clinikly.ai, nurses can educate patients on effectively managing their medical conditions and adopting a healthier lifestyle. Through an intuitive interface, patients engage by responding to multiple-choice questions, which are then intelligently processed by the platform's algorithm. Drawing from an extensive library of educational videos, Clinikly.ai's algorithm curates personalized selections that precisely align with each patient's needs. This dynamic fusion of technology and education enables nurses to provide tailored and comprehensive guidance, fostering patient empowerment and promoting well-informed health-care decisions (University of North Carolina Wilmington, 2020).

## **CHALLENGES AND MITIGATION**

The journey to integrating ALMs into NCPD is not without its challenges; a delicate balance must be struck between the immersive experience of ALMs and the vital human touch intrinsic to nursing practice. One of the foremost challenges revolves around safeguarding data security and maintaining patient confidentiality. As ALMs interact with patient scenarios and data, robust encryption protocols and strict adherence to health-care regulations are imperative. Implementing stringent cybersecurity measures and conducting regular audits can mitigate the risks associated with potential data breaches, ensuring that patient information remains private and protected.

The integration of ALMs may encounter resistance from staff members who are less accustomed to advanced technology; thorough training initiatives can be devised to address this. Comprehensive training programs individualized to varying levels of tech-savviness can equip nursing professionals with the confidence and competence to navigate ALM-driven modules effectively. By offering ongoing technical support, nursing educators can create an environment where any technological barriers are resolved proactively.

Striking the right balance between the immersive experience provided by ALMs and the intrinsic human touch of nursing practice requires a delicate approach. While ALMs offer personalized learning journeys and interactive simulations, infusing these experiences with the empathy and compassion that define nursing care is essential. Incorporating reflective exercises, ethical discussions, and communication modules into ALMs can ensure that nursing professionals continue to develop the interpersonal skills vital for effective patient care.

The collaborative nature of nursing practice extends to integrating ALMs into NCPD. Nurses, educators, AI specialists, and regulatory experts must work together to ensure that ALMs meet ethical, educational, and technological standards. By fostering an

environment of interdisciplinary collaboration, potential challenges can be anticipated, assessed, and addressed holistically.

An evidence-based approach is essential to success in overcoming these challenges. By conducting pilot programs, gathering user feedback, and monitoring outcomes, nursing educators can refine the integration of ALMs based on real-world experiences and measurable results. This iterative process ensures that ALMs evolve to meet the needs of nursing education and professional development. By addressing these challenges head-on, nursing educators can harness the full potential of ALMs to elevate nursing practice and enhance patient care outcomes.

### **Building a Business Case**

Investing in AI-driven tools and techniques can yield enduring advantages for nursing education, including elevated learning outcomes, streamlined efficiency, and heightened efficacy of pedagogical methods. Often, this requires nursing educators to provide organizational leadership with a business case for allocating funding to new technologies. This is achieved by showcasing the transformative impact of these innovations. By highlighting the potential to enhance learning outcomes, promote clinical judgment, and prepare students for the evolving health-care landscape, educators can demonstrate the direct correlation between AI/ALM integration and the production of skilled and adaptable nursing professionals. Illustrating the alignment with industry trends and the competitive advantage of embracing modern educational tools can further underscore the value proposition (Peltonen et al., 2022). To solidify the case, emphasizing collaboration with AI experts, instructional designers, and technology providers underscores a comprehensive approach. Addressing potential challenges and mitigation strategies while outlining the long-term benefits of student success and institutional reputation ensures that the requested allocation of funds is not only an investment in technology but a strategic step towards advancing nursing education in the digital age.

## **FUTURE OPPORTUNITIES**

The integration of generative AI and ALMs in NCPD programs holds significant potential for transforming the learning experience of nursing professionals. By employing effective instructional design strategies, implementing robust processes, and addressing potential challenges, nursing professionals can leverage these educational innovations to enhance their knowledge and skills. As the field continues to evolve, exploring the integration of ALMs in NCPD is crucial, ultimately leading to improved patient care outcomes. Additionally, nursing educators and nursing professional development (NPD) specialists are crucial to conducting research, contributing to evidence-based practice, and enhancing patient care. Generative AI can assist educators and NPD specialists in knowledge discovery by analyzing vast amounts of medical literature, extracting relevant information and summarizing key findings. AI algorithms can help identify research gaps, suggest potential research questions, and even generate hypotheses based on existing data (Peltonen et al., 2022). This accelerates the research process and provides nursing educators with valuable insights to inform their education design and ultimately guide nurses in evidence-based practice.

## **CONCLUSION**

By harnessing the capabilities of generative AI, personalized learning pathways can be developed, catering to individual student needs and preferences. ALM platforms can deliver dynamic and interactive content, such as simulations and virtual patient scenarios, providing real-time feedback and assessment. AI-powered tutoring systems function as virtual nursing tutors, offering support and guidance around the clock. Furthermore, data-driven insights can be derived from AI analysis of educational data, aiding educators in refining teaching methods and curricula. Ethical considerations regarding data privacy and bias mitigation must be addressed throughout the implementation process. Generative AI and ALM offer promising avenues to enhance

nursing education, fostering skilled and competent nursing professionals equipped to excel in their practice and improve patient outcomes.

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