Nurse Educator

Prompt Engineering for Nurse Educators

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ABSTRACT

Background: The integration of generative artificial intelligence (AI) tools like OpenAI's ChatGPT into nursing education marks a transformative advance in personalized learning and interactive engagement.

Problem: Variability in faculty's experience with AI outputs highlights the need for well-crafted prompts that align with educational objectives, maximize learning outcomes, and ensure contextual relevance. Effective prompting is a key to eliciting accurate, relevant responses from AI, fostering a dynamic learning environment that bolsters student comprehension of complex topics.

Approach: This article examines the critical role of prompt engineering in optimizing AI-generated content's effectiveness within academic settings. With a detailed guide and strategies specifically designed for nursing education, the article prepares faculty to proficiently use generative AI.

Conclusions: By mastering prompt engineering, educators can leverage AI tools as powerful aids, potentially significantly enhancing teaching effectiveness, work efficiency, and student learning outcomes.

Keywords: artificial intelligence (AI), educational technology, information literacy, nursing education

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The emergence of generative artificial intelligence (AI) and tools like Open AI's ChatGPT has continued to storm through academia.[1] Powered by sophisticated algorithms, these tools can generate text, solve problems, and simulate conversations in a manner that closely mimics humans. Their versatility and accessibility make them particularly appealing for educational purposes, offering unprecedented opportunities for personalized learning, interactive engagement, and the automation of content creation.[2-4] However, the effectiveness of these tools is profoundly influenced by the input they receive, known as prompts.[5] The quality and structure of prompts determine the relevance, accuracy, and utility of the AI-generated content, underscoring the critical role of prompt engineering in educational settings.[6]

The Imperative for Effective Prompting

As faculty across disciplines begin to integrate generative AI tools into their teaching and learning ecosystems, their experiences have been inconsistent and widely variable. While some educators report breakthroughs in student engagement and personalized learning, others face challenges stemming from the AI's lackluster responses to poorly constructed prompts.[6,7] These mixed results highlight a common hurdle: the lack of expertise in crafting effective prompts that align with educational objectives.[6] The nuanced dynamics of teaching and learning require prompts that not only elicit correct information but also provoke critical thinking, creativity, and deeper learning.[8] Effective prompting plays a critical role in educational settings when utilizing generative AI tools.[6] Unfortunately, without a foundational understanding of prompt engineering, faculty may find themselves navigating a trial-and-error process, potentially leading to frustration and missed opportunities for both faculty and students.

These inconsistencies in faculty's experiences sets the stage for a focused exploration of prompt engineering.[8,9] The need for structured guidance in designing prompts is evident, as is the potential of generative AI to transform educational practices.[5,6] By equipping faculty with the knowledge and skills to harness the power of prompt engineering, we can unlock new dimensions of interactive and personalized learning.[2,8] The goal of this article is to provide a comprehensive guide to prompt engineering, tailored to the unique demands of nursing education. Through practical strategies, this paper aims to demystify the process of prompt creation, enabling faculty to craft prompts that maximize the educational benefits of generative AI.

What is Prompt Engineering?

Prompt engineering is both an art and a science, involving the careful crafting of questions or prompts that guide

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generative AI tools like ChatGPT to produce accurate, relevant, and beneficial outputs.[10] This involves an understanding of the nuances of how AI models interpret language and how specific prompt formulations can yield vastly different outcomes.[11] Effectively, it is about fine-tuning our communication with AI to fully harness its capabilities, ensuring that the interactions lead to outcomes that align with our intentions.[10,11]

In the realm of nursing education, where precision and nuance are critical, prompt engineering plays a pivotal role. Well-crafted prompts ensure that both faculty and students receive information that is not only precise but also customized to meet their specific educational and clinical needs. This process is critical for leveraging AI's potential and creating more interactive, engaging, and personalized learning experiences. By using AI to generate scenarios, questions, and learning materials tailored to individual needs, faculty can cultivate a dynamic learning environment that facilitates and enhances students' understanding of complex concepts and practices.

Prompt engineering helps empower faculty to leverage AI effectively, enhancing the delivery of content and facilitating a deeper comprehension of nursing practice among students. This ensures that the use of AI in educational settings goes beyond mere automation, becoming a crucial tool in educational innovation and effectiveness.[12] Ultimately, for faculty, mastering prompt engineering can unlock the full potential of AI as a tool for teaching, learning, research, and scholarship.[13,14]

A Step-by-Step Guide to Writing Effective Prompts

Define the Objective

Defining the objective is the foundational step in prompt engineering. It is essential to start by clearly articulating the specific goals to be achieved with the prompt. Whether it involves generating a lecture outline, creating exam questions, or providing student feedback, the objective should precisely guide the prompt's structure. By establishing a clear target for what faculty expect the generative AI to produce, the prompt can be meticulously tailored to be both targeted and effective. This principle is demonstrated in Table 1, which provides

Table 1. Examples of Defining the Objective

Aspect	Objective	Specific Prompt	Why This Works
Generating a lecture outline	Create a comprehensive outline for a lecture on pediatric nursing care	"Generate a detailed lecture outline covering the major principles of pediatric nursing care, including patient assessment, common illnesses in children, medication administration, family involvement, and emergency care. Include subtopics for each major principle and suggest interactive activities that can engage nursing students."	This prompt clearly communicates the desired output and specifics. By asking for interactive activities, it tailors the AI's response toward educational engagement
Creating exam questions	Develop a set of exam questions for a course on pharmacology relevant to nursing practice	"Create 10 multiple-choice questions and answers on pharmacology for nursing practice, focusing on drug classifications, mechanisms of action, therapeutic uses, side effects, and contraindications. Ensure each question tests critical thinking and application to clinical scenarios."	The prompt specifies the format, content area, and critical thinking aspects, guiding the AI to produce complex, application-based questions
Developing engaging case studies	Develop a case study for a cardiology module	"Generate a comprehensive case study for a patient with congestive heart failure including detailed patient history, symptoms, diagnostic steps, and management strategies. Include decision points where nursing students must choose between multiple care options to encourage critical thinking."	This prompt helps generate detailed, realistic scenarios that mirror real-world situations nursing students will face, enhancing their diagnostic and decision-making skills. It is specific enough to produce targeted content that meets educational goals, encouraging deep learning and application of knowledge
Developing virtual patient simulations	Develop a virtual patient simulation to enhance critical reasoning skills	"Create a detailed simulation involving a pediatric patient with type 1 diabetes experiencing a hypoglycemic event. Include symptoms presentation, necessary interventions, and potential complications to guide students through the management process."	This prompt helps generate a practical, realistic simulation to help nursing students practice and enhance critical reasoning skills. Simulations like these use AI to create dynamic scenarios that mimic real-life clinical situations, challenging students to apply their knowledge and make decisions under pressure, while still in a safe environment. This promotes deep learning and prepares students for actual clinical encounters

Abbreviation: AI, artificial intelligence.

examples of prompts that clarify objectives for generating lecture outlines, creating exam questions, and developing engaging case studies and virtual patient simulations. Table 1 also provides the rationale underlying these prompts, explaining why they can enhance the effectiveness of generative AI tools.

Best Practices for Defining Objectives

Defining clear and precise objectives in prompt engineering is critical for nurse educators using Gen AI technologies. By establishing explicit, context-rich, and outcome-oriented prompts, faculty can enhance the relevance and accuracy of AI-generated content. These strategies not only ensure that the AI responses better align with faculty's specific educational goals but can also foster a deeper engagement and understanding among students. Open-ended questions further encourage comprehensive exploration, while iterative refinement of prompts allows for continuous improvement. Incorporating these strategies is essential for maximizing the effectiveness of generative AI tools in nursing education (Table 2).

- *Be explicit:* Clearly state what is expected of the AI to generate. Use specific terms and conditions to avoid ambiguity. Provide to narrow down the focus of the prompt. The more precise the prompt is, the more relevant the AI's response will be.
- *Context matters:* Incorporate any relevant context that might influence the content or structure of the AI's response or that might help the AI understand the prompt better. This could mean specifying the level of complexity, clinical context, or educational standards.
- *Outcome-oriented:* Frame the prompt in a way that directly aligns with the learning outcomes or educational goals that are desired.
- *Use open-ended questions:* Encourage comprehensive and exploratory responses by framing prompts as open-ended questions.

Table 2. Examples of Best Practices

Best Practice	Good Prompt Example for Faculty	Why It Is Good	Bad Prompt Example for Faculty	Why It Is Bad
Be explicit	Develop a simulation scenario where nursing students must respond to a cardiac arrest in a hospital setting, including specific patient vitals, team roles, and intervention steps to be practiced	This prompt is detailed, setting clear expectations and focusing on specific skills, which helps in creating a highly targeted and effective learning experience	Create a cardiac arrest scenario for acute care nurse practitioner students	Lacks detail on specific patient conditions, roles, or actions, making it difficult to design effectively
Context matters	Design a case study that explores the ethical considerations in end-of-life care, incorporating recent guidelines from the American Nurses Association and real patient scenarios	The prompt integrates current professional guidelines and real-world context, making it relevant and deeply educational for students preparing to enter the field	Create a case study on patient care	Too broad; lacks a focus on specific clinical or ethical issues or guidelines, which are critical in competency-based education
Outcome-oriented	Create a detailed assessment rubric for a clinical skills checkoff on administering IV medications, aligning with the competencies required for nurse licensure	Directly ties the activity to professional standards and licensure requirements, ensuring the activity is purposeful and directly related to students' career preparation	Make a rubric for clinical skills for nurse practitioner students	Does not specify which skills or standards to focus on, leading to potentially ineffective assessment criteria
Open-ended questions	Formulate a discussion question that encourages nursing students to analyze the impact of health care policy changes on patient care practices, especially in underserved communities	Promotes critical thinking and application of policy knowledge to practical nursing, enhancing student engagement and understanding of broader health care implications	Create some discussion topics and questions for students to discuss health care policies	Lacks specificity, which may not provoke detailed analysis or understanding of the specific impacts of health care policies
Iterate	Based on student performance and feedback on the pharmacology module, refine the learning activities to include more case-based examples of drug interactions in elderly patients	Uses feedback to make the module more relevant and practical	Add a few more drug examples to the existing pharmacology module	This prompt suggests merely expanding the content superficially, without a structured review of teaching efficacy or integration of new guidelines. It lacks a focused approach to genuinely assessing students' understanding and application of the content

- *Iterate:* View prompt engineering as an iterative process. Refine the prompts based on the responses received to improve clarity and relevance.
- Ask the Generative AI tool for help in creating the prompt!

Understand the Audience

Understanding the audience is vital for creating prompts that engage and motivate students while effectively addressing their educational needs. This step involves crafting prompts that are both engaging and tailored to students' diverse backgrounds, expertise levels, interests, and learning styles, serving as a bridge between theoretical knowledge and practical application.[15]

Faculty need to consider the specific stages of students' educational programs, academic proficiency, and clinical experience to ensure prompts are suitably challenging, appropriate, and relevant to their real-world clinical roles and anticipated career paths.[16] This can also involve recognizing the diversity of learning styles— visual, auditory, reading/writing, and kinesthetic—to write prompts to develop various learning activities that effectively cater to the entire spectrum of preferences and needs.[17] Ultimately, prompts should incorporate real-world relevance, reflecting the complexities and ethical dilemmas of health care practice to prepare students for the multifaceted nature of their profession.[18] Moreover, adapting prompts to suit various learning environments—online, in-person, or hybrid—is critical in today's digital age, helping to build community and engage students effectively across different platforms.

Regularly soliciting feedback from students and faculty on the effectiveness of the prompt-generated learning activities and encouraging iterative assessment are also essential practices.[19] This feedback is valuable for refining prompts, ensuring they remain relevant and aligned with educational goals. By integrating these elements, faculty can craft prompts that enhance nursing education, making it more interactive and tailored to the evolving needs of future health care professionals (Table 3).

Apply the CLEAR Framework

The Conciseness, Logic, Explicitness, Adaptiveness, and Reflectiveness (CLEAR) framework[20] was developed to address the need for more effective and engaging prompt-based learning activities in educational settings, particularly in fields requiring critical thinking and practical application, such as nursing. This framework was introduced by educational theorists and instructional designers who recognized that traditional methods of prompt creation often lacked the structure and clarity necessary to maximize student engagement and learning outcomes.[21] By focusing on 5 key principles—Conciseness, Logic, Explicitness, Adaptiveness, and

Table 3. Examples of Prompts Tailored to the Audience

Aspect	Strategy	Example of Tailored Prompt
Stages of educational programs	Consider the educational stages of students to ensure prompts are challenging and relevant	*For first-year students:* Describe the basic steps of performing a patient assessment. *For final-year students:* Develop a comprehensive care plan for a patient with multiple chronic conditions
Academic proficiency	Tailor prompts based on the academic proficiency levels of students to match their skills and knowledge	*For students with advanced pharmacology knowledge:* Analyze the pharmacokinetics and pharmacodynamics of a new medication. *For less advanced students:* Describe the common side effects of this medication
Clinical experience	Adjust prompts to reflect the clinical experience of students, making them suitable for real-world clinical roles	*For students with minimal clinical experience:* Describe the procedure for administering a flu shot. *For experienced students:* Discuss the management of adverse reactions to vaccines in a clinical setting
Diverse learning styles	Recognize and cater to various learning styles (visual, auditory, reading/writing, and kinesthetic) in prompt design	*For visual learners:* Create a flowchart of the steps in a surgical procedure. *For auditory learners:* Listen to a podcast on surgical techniques and summarize the key points
Real-world relevance	Incorporate real-world scenarios and ethical dilemmas to prepare students for the complexities of health care practice	Discuss a case where a patient refuses treatment due to cultural beliefs. How would you handle this situation ethically and professionally?
Adaptation to learning environments	Adapt prompts to various learning environments (online, in-person, and hybrid) to build community and engage students across different platforms	*For online learning:* Participate in a virtual simulation of a patient intake process. *For in-person learning:* Perform a role-playing exercise in class to practice patient communication skills
Feedback and continuous improvement	Regularly solicit feedback from students and faculty to refine prompts and ensure alignment with educational goals	After completing a module on patient safety, provide anonymous feedback on the effectiveness of the prompts and suggest areas for improvement

Reflectiveness—the CLEAR framework provides a structured approach to designing prompts that are both instructional and deeply engaging.

Each element of the CLEAR framework plays an important role in crafting prompts that are not only instructional but also deeply engaging and reflective of the complexities of nursing practice:[20]

- **C**oncise: Keep AI-generated prompts brief and focused to ensure clarity and prevent confusion in the tasks they generate. *Example AI Prompt*: "Generate a brief scenario where a patient presents with symptoms of pneumonia and outline 3 key steps a nursing student should take to assess the patient." *Rationale*: This AI-generated prompt is designed to create concise scenarios or questions for faculty to create assignments that help guide students to focus on essential steps without being overwhelmed by unnecessary information.
- **L**ogical: Structure AI-generated prompts logically to lead students through a coherent thought process. *Example AI Prompt*: "Create a case study starting with a list of symptoms of pneumonia, followed by a step-by-step guide on how to prioritize these symptoms and suggest initial interventions." *Rationale*: This AI-generated prompt helps faculty develop logically structured materials that guide students from symptom identification to prioritization and intervention.
- **E**xplicit: Ensure AI-generated prompts clearly state the expected output, format, or scope of responses. *Example AI Prompt*: "Design a care plan template for a patient with diabetes that includes sections for assessment, diagnosis, interventions, and evaluation." *Rationale*: This AI-generated prompt assists faculty in creating explicit templates and guidelines, making it clear what students are expected to produce.
- **A**daptive: Allow AI-generated prompts to encourage flexibility, enabling students to approach the material from different angles or perspectives. *Example AI Prompt*: "Generate a discussion prompt about a patient who is resistant to medication due to cultural beliefs. Include at least 2 strategies for addressing this resistance." *Rationale*: This AI-generated prompt encourages faculty to develop materials that foster creativity and critical thinking, allowing students to explore different approaches.
- **R**eflective: Incorporate AI-generated prompts that prompt students to reflect on their responses, learning process, or the implications of their answers in nursing practice. *Example AI Prompt*: "Create a reflective question for students to answer after completing a care plan, focusing on how this exercise deepened their understanding of managing chronic illnesses." *Rationale*: This AI-generated prompt helps faculty design reflective questions that encourage students to connect theoretical knowledge with practical application.

Incorporating the CLEAR framework into prompt engineering ensures that prompts are effective not only in conveying content but also in fostering critical thinking, adaptability, and reflective practice among students. By adhering to these principles, faculty can create a learning environment that is both rigorous and supportive, preparing students for the challenges and complexities of the nursing profession.[22]

After writing the initial prompt, critically review and test out the prompt for potential ambiguities or misinterpretations. Assess whether the generated output is appropriate to help determine whether the prompt might be too broad or too narrow, which could either overwhelm students or limit their analytical scope. This step is critical for refining the prompt to achieve the right balance between guiding students and encouraging independent thought. Consideration of the students' diverse backgrounds and learning styles during the review process ensures the prompt's accessibility and relevance. Soliciting feedback from colleagues or a test group of students can offer further insights for adjustment. Through this meticulous drafting and review process, faculty can develop prompts to help create various teaching tools that can effectively stimulate student engagement, critical thinking, and reflective learning, ultimately preparing students for their various roles in practice.

Pilot test the output generated from the prompt

Piloting the output generated from the prompt with a select group of students or colleagues before full implementation is a strategic step to ensure its effectiveness. This trial run can reveal any confusion or areas needing refinement, providing critical feedback that can be used to improve the prompt's clarity, engagement, and overall impact. Based on this feedback, adjustments should be made to refine either the output or the prompt itself, ensuring it meets its educational objectives and resonates with the intended audience. This iterative process of testing and revising is key to developing a prompt that successfully generates an output that facilitates the desired level of learning and reflection.

Implement, Reflect, and Iterate

Once the prompt or its output has been refined through feedback, it is time for deployment. Observe how students engage with the assignment and the quality of responses it elicits. This observation phase is important for assessing the prompt's effectiveness in achieving the assignment's goals. After deployment, engage in a reflective process to evaluate the output's success and identify areas needing improvement. This iterative

approach to improvement allows for the adjustment of future prompts, ensuring a continuous enhancement of learning activities. By adopting this cycle of implementation, reflection, and iteration, faculty can develop increasingly effective prompts that create assignments that foster deep engagement and meaningful learning experiences for students.

Avoiding Common Pitfalls

In leveraging generative AI for nursing education, it is important to avoid common pitfalls that can undermine the effectiveness of the content generated (Supplemental Digital Content, Table 1, available at: http://links.lww.com/NE/B617). One such pitfall is vagueness, where overly broad prompts result in generic and nonspecific responses. To counter this, prompts should be detailed and contextual, focusing precisely on the educational objectives, such as requesting comprehensive overviews on specific medical conditions with clear educational strategies. On the other end of the spectrum, is the pitfall of over-complication; when prompts are too complex, they can confuse the AI, leading to fragmented or incomplete responses. Simplifying prompts into focused, manageable questions can help in generating more useful content.

Furthermore, it is essential to acknowledge the limitations of AI models, which might not be up-to-date with the latest research or lack the nuance of human experience. Faculty should always supplement AI-generated content with current studies and clinical guidelines to ensure accuracy and depth. Misalignment with educational goals, overreliance on AI-generated content, insufficient customization for diverse learning styles, and lack of contextual depth are additional challenges. Effective prompt engineering in developing course content should align closely with curriculum goals, incorporate faculty insights, cater to diverse learning preferences, and integrate real-world case studies to enhance relevance and depth. By strategically addressing these pitfalls with a mindful approach to using AI in educational settings, faculty can maximize the potential of AI tools to effectively complement and supplement traditional teaching methods and enrich the learning experiences for students (Supplemental Digital Content, Table 1, available at: http://links.lww.com/NE/B617).

Broader Applications of Prompt Engineering

While the primary focus of this manuscript has been on using prompt engineering to create assignments and learning activities, it is important for faculty to recognize the broader applications of this technique in nursing education. Generative AI can also be effectively utilized to create grading rubrics, study guides, feedback mechanisms, and other educational resources. By crafting precise and well-structured prompts, faculty can leverage AI to generate comprehensive and detailed materials that support various aspects of the educational process. For instance, AI can assist in developing grading rubrics that ensure consistent and objective evaluation of student performance, or in creating personalized study guides that cater to the diverse learning needs of students. Additionally, AI-generated answer sheets can provide students with valuable insights into the comprehensiveness of their own responses and allow for self-reflections on areas for improvement.

Moreover, by better understanding prompt engineering, faculty can help guide students in effectively using generative AI as valuable learning aids. These tools can supplement and enhance students' understanding of complex concepts, enabling them to engage with the material in a more meaningful way. For instance, AI can be employed to generate personalized quizzes that help students identify their strengths and areas for improvement, fostering a culture of continuous self-assessment and growth. Additionally, generative AI can serve as a powerful resource for self-directed learning, allowing students to explore topics at their own pace and depth. By using AI to generate comprehensive study guides and interactive learning modules, students can gain a deeper understanding of the material and develop critical thinking skills. These AI-generated tools can include detailed explanations, practical examples, and interactive elements that make learning more engaging and accessible. Faculty can also teach students to use prompt engineering to create AI-driven feedback mechanisms for further insight into their own work, promoting reflective practice and continuous improvement. By incorporating all of these additional and various uses of prompt engineering in generative AI, faculty can enhance the overall quality of the educational experience, making it more interactive, personalized, efficient, and effective.

Evaluating Prompt Effectiveness

Evaluating the effectiveness of prompts used in AI-driven nursing education and curricula is essential for ensuring that the responses generated align with educational goals and truly benefit students (Supplemental Digital Content, Table 2, available at: http://links.lww.com/NE/B618). This process requires a careful examination of several critical aspects. First, the relevance of the AI's response must be assessed to ensure it directly addresses the specifics of the prompt and relates closely to the intended objectives. Accuracy is also paramount. The information provided by the AI must be factually correct and reflect the latest clinical guidelines and theoretical knowledge. Completeness is another essential factor. The AI's response should comprehensively cover all aspects requested in the prompt, providing a full and detailed answer to the posed question or task. Moreover, the understandability and educational value of the content are important—responses should be easily comprehensible for the intended audience and should enhance learners' understanding of the subject matter.

To optimize the quality of AI-generated responses, faculty should engage in iterative refinement of the outputs and their prompts. This involves adjusting the prompts based on initial responses to improve clarity, depth, and focus. Faculty can also experiment with different formulations of the prompts to see how minor changes can significantly impact the AI's outputs. By adopting this thoughtful and systematic approach to developing and refining prompts, faculty can leverage AI tools effectively to create educational content that is both high-quality and closely tailored to the needs of their students (Supplemental Digital Content, Table 2, available at: http://links.lww.com/NE/B618).

Conclusions

As nursing education evolves, faculty must adapt and innovate to prepare students effectively for their professional roles. Prompt engineering offers a vital approach for harnessing the potential of generative AI to facilitate more interactive, personalized, and effective learning environments, fostering the creation of rich and adaptive learning experiences that can both captivate and challenge students. However, the effectiveness of AI-generated content significantly depends on the clarity, specificity, and relevance of the prompts used, which requires an understanding of how AI interprets and responds to input. By emphasizing clarity, engagement, and alignment with educational goals, prompt engineering allows faculty to enhance traditional teaching methods to better prepare students for the complexities of modern health care. Through ongoing refinement and iterative revisions of prompt engineering strategies, faculty can fully utilize the capabilities of generative AI to deepen understanding, enrich interaction, and tailor learning experiences. Integrating these technologies and strategies into competency-based education frameworks enables faculty to transition toward more dynamic, immersive, and student-centered teaching methods. This strategy not only elevates the effectiveness of learning but also equips students to skillfully navigate a future health care landscape increasingly shaped by generative AI technologies, ensuring they are prepared to meet the evolving demands of their profession.

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