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# Prompt Literacy: A Pivotal Educational Skill in the Age of AI

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## Abstract

Prompt literacy signifies a major leap in education, offering a potent tool to interact with generative AI systems. As an emerging necessity in the 21st century and beyond, it encompasses the formulation, interpretation, and analysis of AI prompts. Poised to be foundational for all future generations, this discourse brings to light its emergence in parallel with generative AI and its transformative role in pedagogical contexts for the coming decades and beyond.

**Keywords:** Prompt Literacy, Generative AI, Education, STEM learning, 21st Century Skills

## Introduction

Artificial intelligence (AI), one of the most significant scientific achievements of our time is rapidly changing the way we live and work, and education is no exception. AI-powered tools are already being used to create personalized learning experiences, generate interactive content, and assess student progress. Education is standing on the precipice of a seismic transformation. As we progressively embrace the 21st century, the advent of AI, and particularly generative AI, is radically reshaping the contours of learning and teaching. With its unmatched capabilities, educators and students can now generate essays, learning plans, tests and quizzes, images and videos, and a plethora of other educational content with a level of ease and specificity that was previously unimaginable, all through the use of simple, thoughtfully engineered prompts.

The AI revolution is not only changing the way we perceive educational content but is also transforming the fundamental skills and literacies required to navigate this evolving landscape. The linearity of traditional education is giving way to more dynamic, personalized, and adaptive learning environments. Harnessing the potential of AI in this capacity offers unprecedented possibilities for both educators and students. The shift we are witnessing is more than just an adoption of a new technology. It is a redefinition of literacy itself in the digital age.

However, like any innovation, these exciting possibilities also introduce new challenges and responsibilities. As scientists and educators, we find ourselves bearing a civic, social, and scientific duty to understand and utilize these AI-based tools effectively. This task involves mastering an emergent competency, termed "prompt literacy", that is rapidly gaining prominence. Grasping the subtleties of this developing literacy and integrating it into our educational frameworks is vitally important. This short paper ventures into exploring this unique concept, crafting, examining its implications for educators, learners, and educational researchers. We pay special attention to its impact within the realm of STEM disciplines, a field where the influence of this literacy could prove particularly transformative.

## What are Prompts?

Prompts are a common language between humans and AI systems. They are typically used in simple English language, or the language of the user. A prompt is a set of instructions or questions that are given to a large language model (LLM) to guide its output. LLMs such as ChatGPT, Bing AI, and Facebook's Llama can all be used with prompts.

For demonstration purposes, we utilize ChatGPT (version 3.5) as it was freely available to the general public. Prompts can be used to control the content, style, or format of the generated output. For example, a prompt for ChatGPT might be *Write a poem about a cat*. This prompt would tell ChatGPT (or other such LLM services) that the desired output is a poem about a cat. The prompt does not specify the length of the poem, the rhyme scheme, or the meter. This allows ChatGPT to have some creative freedom in generating the output.

In other words, prompt literacy is the ability to effectively formulate, understand, and evaluate prompts to elicit appropriate responses from AI systems. It involves not just the comprehension of the questions or commands given to the AI, but also the evaluation of the AI-generated output. As AI technology evolves, the "prompt" transitions from a simplistic interaction tool to a more nuanced form of AI communication.

# Crafting Prompts: A 21st Century Skill

As we navigate through the 21st century's emerging AI revolution, an emerging literacy skill is steadily solidifying its relevance - the art of crafting prompts (Chen, 2023). It's an interesting crossroad where technology intersects with human-computer linguistics, necessitating a novel form of literacy - Prompt literacy. The groundwork of this essential skill has been set by the CAST model, which stands for Criteria, Audience, Specifications, and Testing model (Jacobs & Fisher, 2023).

Transitioning smoothly from the age-old chalk-and-board methods to the AI-assisted classroom of the future requires adaptability, where educators and learners alike are prepared to become drivers of AI, not merely its passengers. Such a transition is not just about incorporating new tools, but understanding and effectively leveraging them.

As AI becomes an integral part of the classroom, its role transcends beyond text generation. It could manifest in images, videos, or presentations and multimedia forms, enriching the learning landscape. However, it's essential to remember that these tools are fundamentally "prompt-dependent". Their efficiency, and in turn, their value, lies in the hands of the teachers and students who engage with them through well-crafted prompts. Before educators and students delve into the realms of generative AI technology, it is essential that they grasp how to interact effectively with it. This is where prompt literacy comes to the forefront. Matt Ginsberg, renowned computer scientist from Google's secret innovation company X and key figure behind the development of transformer-based text generation technology, recently highlighted the importance of prompting in the StarTalk podcast, hosted by science communicator and astrophysicist Neil deGrasse Tyson. He identified prompting as the "real skill that we are going to need" in this AI-dominant era (Startalk, 2023).

## Implications for Education

Needless to say, AI usage in education is only going to increase. As K12 teachers and university professors embark on the journey of integrating AI technology into their classrooms, it is crucial that they understand the significance of this emerging skill of prompt literacy. The ability to create effective prompts will determine the success of AI integration, making it imperative for educators to adapt, personalize, and prioritize this skill. Here are some ways we propose teachers can adapt to the changing educational landscape:

1. Educators must recognize that the role of AI in the classroom goes beyond mere tool replacement. It is about harnessing the power of AI to enhance

teaching methods and foster deeper learning experiences. To adapt, teachers can start by familiarizing themselves with the basics of prompt literacy. They can explore various resources such as articles, webinars, and workshops that discuss the best practices for creating effective prompts. Additionally, educators can participate in online communities and forums where they can exchange ideas and learn from peers who have already implemented AI-driven instructional strategies.

2. Educators can promote collaborative learning activities where students work together to create prompts that can be used with AI tools. In doing so, their students could develop teamwork, problem-solving, and critical thinking abilities while gaining exposure to the art of prompt creation. Likewise, teachers can partner with AI software developers and researchers to provide feedback on the effectiveness of existing prompts and suggest improvements, contributing to the advancement of AI technology in education.
3. Schools and educational institutions must place greater emphasis on prompt literacy in teacher professional development workshops and new teacher training programs. This entails equipping aspiring educators with the knowledge and skills necessary to develop impactful prompts that facilitate AI-assisted learning. By doing so, novice teachers can confidently enter the classroom, ready to utilize AI technologies and optimize student outcomes. Furthermore, PD opportunities focusing on prompt literacy can be offered to veteran teachers, ensuring they stay updated on the latest trends and best practices in AI-enhanced education.
4. Teachers and teacher candidates need to spend time writing different versions of prompts for the same topic and then comparing the statements they get from AI systems. Even small changes in the wording of a prompt can produce meaningfully different results. In our previous research, we asked ChatGPT-4 for strategies for solving 4th grade math word problems (Maloy et al., 2023), and calculated the effectiveness of generated hints with teacher candidates (Gattupalli et al., 2023). We then used a revised prompt to ask for easy-to-read strategies as measured by the Flesch-Kincaid Reading Ease scale (Counihan, 2021). The revised wording of our prompt produced strategies that were more concise and presented in more student-accessible language. Prompt writers need to be relentlessly concrete in drafting their inquiries and be ready to revise the statements in order to maximize the information they get from AI systems.

## Final Thoughts

Prompt literacy, propelled by generative AI, is rapidly establishing itself as a key skill of the 21st century. It holds significant promise for transforming education, particularly within STEM and non-STEM fields, facilitating personalized learning, easing content creation, and fostering critical thinking. As we navigate this new educational landscape, the importance of prompt literacy cannot be overstated, and the onus is on educators and researchers to prepare learners to thrive in an increasingly digital world.

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