Prompt Literacy

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Prompt literacy enables anyone to communicate with and direct generative AI systems without needing expertise in computer programming. Prompts are commands formulated in natural human language that unlock the capabilities of AI and guide its outputs. With prompt literacy, people can successfully interact with generative AI to achieve defined objectives, while exercising judgment and responsibility. Prompts serve as an accessible interface between users and automated systems, translating human intents into AI-compatible directives. Effectively crafted prompts are key to enabling generative AI to produce meaningful, targeted results. Just as traditional literacy involves mastering the written word, developing prompt literacy requires learning how to clearly formulate instructions for AI in its processing language. Command of this skill allows humans to reap benefits from AI, directing its open-ended potential to useful and ethical ends through targeted prompts.

In the digital era, the emergence of Generative AI (GenAI) systems has revolutionized the way we interact with technology (Chiu, 2023; Moorhouse et al., 2023). GenAI systems or tools are available to the general public as both free and paid services, and include names such as ChatGPT, Claude AI, Google Bard, Pi.ai and Bing AI. At the heart of this interaction lies Prompt Literacy, a skill that empowers individuals to communicate with AI without the complexity of programming languages (Gattupalli et al., 2023; Jacobs & Fisher, 2023;). It's a bridge crafted from everyday language, enabling users to guide AI through tasks with simple, direct commands. This skill has rapidly become a cornerstone of digital fluency, akin to learning to navigate a website or send an email in the early days of the internet.

The evolution of prompt literacy parallels the rise of user-friendly AI interfaces (Abedin et al., 2022). GenAI tools now respond to the layperson's inquiries, from complex problem-solving to creating art in the form of images (such as Dall-E 3). Prompts are simply nothing but conversations and dialogue between a real human transforming their abstract thought into concrete AI action.

For the general public and STEM educators alike, mastering prompt literacy is not just about efficiency; it's about shaping the future. As GenAI becomes more integrated into our daily lives and learning environments, the ability to harness its potential responsibly and effectively becomes crucial. Prompts are not just about the commands we give, but understanding the language that breathes life into ideas, making technology an extension of human intent.

Crafting Effective Prompts

Crafting effective prompts is akin to providing a skilled artisan with the precise tools and clear instructions to create a masterpiece. The art of prompt crafting lies in the specificity and clarity that guide a GenAI tool to generate desired outcomes. As we delve into this craft, let's explore proven strategies and highlight common pitfalls to avoid.

Strategies for creating effective prompts

Crafting effective prompts serves as the foundation for meaningful interaction with Generative AI. By precisely tailoring our language, we can direct AI towards producing specific, relevant, and accurate outputs, ensuring that the technology reliably amplifies human intent. As we stand on the brink of a new era of human-AI collaboration, the ability to communicate effectively with these advanced systems becomes not just advantageous, but imperative for unlocking their full potential.

- **Be Specific:** Narrow down your "ask" to be as detailed as possible. Specificity helps GenAI produce targeted responses (Deng et al., 2023).

- **Context is Key:** Provide background information and supply as much data as possible, when necessary. Context helps GenAI understand the scope and relevance of the task (Ronanki et al., 2023).

- **Using Simple Language:** Clarity trumps complexity. Using simple, direct language prevents misunderstandings, and thus reduces inaccuracies (Deng et al., 2023; Kim et al., 2023).

- **Setting Boundaries:** Define the limits of the task. Evaluate prompts for the "scope" as it helps prevent the AI from generating overly broad or irrelevant content (Tjuatja et al., 2023; Deng et al., 2023).

- **Iterating and Refining Prompts:** Treat your first prompt as a draft. Refine it based on the AI's responses to improve accuracy (Jacobs & Fisher, 2023; Wang et al., 2023).

Common pitfalls to avoid in prompt construction

When venturing deep into the field of GenAI, the efficacy of communication is not solely determined by what we ask but also by how we ask it. We believe crafting prompts is a delicate balance where common missteps can lead to a cascade of confusion and inaccuracy. This is called "hallucinations" (Hanna & Levic, 2023; Yao et al., 2023). Large corporations are working to minimize such inaccuracies in generated outputs, and it will only lead to improvements in future models. However, recognizing these pitfalls is crucial for anyone looking to harness the power of AI effectively. Here are some common pitfalls and why they matter:

- **Being Too Vague:** A precise prompt is like a map that leads to treasure; being too vague is akin to having a map filled with fog. Vague prompts lack the necessary detail that GenAI requires to produce a specific outcome, often resulting in generic responses that hold little value. For instance, asking "Tell me about dogs" could yield a broad spectrum of canine-related information, whereas "Explain the training techniques for service dogs" prompts the AI to focus on a specific aspect of canine behavior. This [public GitHub repository](#) focusing on prompt engineering techniques shows a variety of prompts that are specific, and to the point.

- **Overcomplication:** As mentioned, the elegance of a prompt lies in its simplicity. Overcomplicating a prompt can befuddle an AI, much like how a convoluted question can perplex a human. Complex sentence structures, overly technical jargon, or including too many elements in one prompt can lead to outputs that are difficult to decipher and may stray from the intended purpose.

- **Ambiguity:** Clarity is the cornerstone of effective communication with AI. Ambiguous prompts leave too much room for interpretation, causing the AI to fill in the gaps in unpredictable ways. This can lead to inconsistent and sometimes contradictory results. For example, asking for a "report on Jaguar" could result in information about the animal, the car manufacturer, or even the operating system, depending on how the AI interprets the context.

- **Ignoring AI Capabilities:** Each GenAI system has its strengths and limitations. Ignoring these capabilities can be likened to asking a chef to paint a portrait; while they may have a broad skill set, their expertise lies elsewhere. While there are many general purpose GenAI tools on the internet, it is important to understand what the AI you are using is optimized for—whether it's language translation, creative writing, or data analysis—and to craft prompts that align with these strengths. This ensures that the AI operates within its realm of proficiency, providing outputs that are useful and relevant.

Prompt Engineering Frameworks

Navigating the intricacies of GenAI requires more than a rudimentary understanding of technology; it demands proficiency in prompt literacy, a discipline that shapes the very dialogue between humans and machines. As educators and learners grapple with the nuances of this interaction, structured models for prompt crafting offer a roadmap to clarity and efficacy. The CAST model (Jacobs & Fischer, 2023), the CLEAR model (Lo, 2023), and the TRUST model (Trust, 2023) not only optimize communication with GenAI systems but also imbue the process with ethical considerations, universal design for learning (UDL), and pedagogical integrity. These models serve as blueprints, guiding educators and users alike in formulating prompts that harness the full potential of GenAI systems responsibly.

CAST Model

The CAST model, conceived by education researchers Jacobs and Fisher (2023), stands for Criteria, Audience, Specifications, and Testing. It instructs users to delineate the constraints or rules for GenAI outputs (Criteria), identify the intended recipients of the information (Audience), incorporate detailed descriptors for precision (Specifications), and employ a cycle of user feedback and refinement (Testing). This model is akin to a compass in the hands of explorers, guiding both teachers and students through the GenAI landscape with prompts that are as educational as they are functional.

Figure 1

Evolution of a GenAI prompt using the CAST Model.

FIGURE 1. Transforming a Prompt with the CAST Model

Initial Prompt:
Summarize the main theme of Elie Wiesel's *Night*.

CAST Prompt:
Acting as a docent (A) for a Holocaust Museum, prepare a bulleted list (C) of statements to explain how identity and the resilience of the human spirit (S) were important themes of Elie Wiesel's *Night,* on a 7th grade level (A).

Revised Prompt (after Testing):
Acting as a visitor (A) to a Holocaust Museum, describe examples of types of exhibits (C, T) that show how identity and the resilience of the human spirit (as exemplified in Elie Wiesel's *Night*) are represented in the museum.

Source: Jacobs & Fischer, 2023.

CLEAR Model

The CLEAR framework streamlines prompt engineering into five fundamental components: Concise, Logical, Explicit, Adaptive, and Reflective (Lo, 2023). This model advocates for brevity and directness (Concise), a coherent structure of inquiry (Logical), unambiguous output expectations (Explicit), flexibility in approach (Adaptive), and a commitment to continuous improvement (Reflective). Emphasizing prompt precision and adaptability, the CLEAR model acts as a "scaffold" that elevates the quality of AI-generated content, particularly in academic libraries, ensuring relevance and applicability to the task at hand.

TRUST Model

The TRUST model—focused on Transparency, Real World Applications, Universal Design for Learning, Social Knowledge Construction, and Trial and Error—serves as a pedagogical tool to deter student reliance on AI for academic dishonesty. Developed by Trust (2023), this model encourages educators to clarify assignment purposes (Transparency), connect learning to tangible outcomes (Real World Applications), cater to diverse learning strategies (Universal Design for Learning), foster collaborative understanding (Social Knowledge Construction), and embrace a growth mindset (Trial and Error). The TRUST model is not merely a prompt-crafting guide but a manifesto for designing educational experiences that are robust against the temptations of AI-assisted cheating, promoting integrity and deep learning.

Together, these models form a triad of strategies that empower users to wield GenAI with intentionality and insight, ensuring that this powerful technology serves as a catalyst for learning and innovation, rather than an oracle that obfuscates the learning journey.

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