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Prompt Engineering Principles for Generative AI Use in Extension

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Abstract. The prevalence of Generative AI (GenAI) and Large Language Models (LLMs) is increasing rapidly. For Extension professionals, the utilization of prompt engineering is key to leveraging GenAI and LLMs effectively. Prompt engineering involves crafting prompts that elicit desired LLM responses. This article discusses prompt engineering principles, providing examples and guidance. The application of prompt engineering in Extension is explored, showcasing its potential to enhance programs, deliver personalized advice, engage audiences, and disseminate research-based information. By learning prompt engineering skills, Extension professionals can harness the power of GenAI and LLMs, enhancing their ability to address complex challenges in the twenty-first century.

PROMPT ENGINEERING PRINCIPLES FOR GENERATIVE AI USE IN EXTENSION

Generative AI (GenAI) is a new category of artificial intelligence that can create different types of content, such as text, images, audio, code, simulations, and videos (Google, 2023; Mollick & Mollick, 2023; Toner, 2023). It does this by learning from existing data and using that information to generate new, original content (Gordon, 2023; McKinsey & Company, 2023). GenAI is different from other types of AI that can only classify, group, or make selections. Examples of GenAI systems include large language models nd image, audio, and code generators (Google, 2023; Toner, 2023). Several universities are developing policies to guide the ethical use of GenAI (e.g., University of Virginia's Generative AI Task Force for Teaching and Learning). Therefore, Extension should take steps to envision how it can responsibly and ethically capitalize on the capability of GenAI to produce content. Table 1 provides examples of various GenAI systems with descriptions of their capabilities.

The GenAI systems outlined in Table 1 can enable new approaches for program development, curricula design, and program implementation in Extension. For example, large language models (LLMs), such as GPT-4, are a specific type of GenAI system trained on massive text and code data sets. In this way, they are exposed to vast amounts of written information from various sources (e.g., books, articles, websites, and software repositories). During the training process, the LLM becomes familiar with patterns, understands information, and creates sensible and fitting replies (McKinsey & Company, 2023). It learns the structure and meaning of sentences, allowing it to comprehend and generate text like humans do (Brynjolfsson et al., 2023). As such, LLMs can generate human-quality text, translate languages, write different kinds of creative content, and answer questions in an informative way (Chui et al., 2023). The emergence of LLMs can change the way Extension professionals communicate with clientele. Recent advances in GenAI have the potential to revolutionize the way Extension professionals and clientele create and consume content (Andreessen, 2023; Gawdat, 2021).

GenAI and LLMs have become increasingly prevalent in many industries, including healthcare and finance (Andreessen, 2023; Gawdat, 2021). Looking forward, Extension professionals could use LLMs to automate tasks, identify trends and patterns in data, generate marketing materials, develop tailored curricula, and even create innovative solutions for persistent community problems. These tools could also assist Extension professionals in discovering new ways of reaching audiences and engaging with them on important topics. However, Extension professionals must understand how to use these tools effectively and ethically to achieve their goals (Hill & Narine, 2023).

Table 1. A Selection of Generative AI Systems

System	Modality	Description
Midjourney	Image	Can create realistic images from text descriptions
DALL-E 2	Image	
Imagen	Image	
ChatGPT	Text	Can generate human-quality text, translate languages, and write creative content
Gemini	Text/Code	
Copilot	Text/Image	
Codex	Code	Can generate code from natural-language text descriptions
GitHub Copilot	Code	
Tabnine	Code	
MuseNet	Audio	Can create music, sounds, and voices from text descriptions
Resemble.ai	Audio	
Lyrebird	Audio	

"Prompt engineering" refers to the process of writing instructions (including questions) that produce effective and desired responses from an LLM (Liu & Chilton, 2022). The purpose of prompt engineering is to help the LLM generate responses that match what the user wants in terms of quality, relevance, and specificity (Zhou et al., 2022). Zamfirescu-Pereira et al. (2023) reported how crafting effective prompts can be challenging and recommended that knowledge workers improve their LLM prompt engineering literacy. Therefore, this Tools of the Trade article provides an overview of principles to guide prompt engineering in Extension work. Although we present examples herein, we encourage Extension professionals to liaise with their institutions to understand how to responsibly use GenAI within policy guidelines.

PRINCIPLES OF PROMPT ENGINEERING

Extension professionals should understand the principles of prompt engineering to use GenAI effectively. Prompt engineering involves designing effective prompts that elicit the desired response from an LLM. Table 2 provides a selection of prompt engineering principles with examples. Multiple prompt engineering principles from this table can be combined in a single prompt to improve LLM outputs (Birss, 2023).

APPLICATIONS FOR EXTENSION

Extension professionals should consider the appropriateness of applying one or more prompt engineering principle(s) in their roles based on the task. To remain relevant, Extension professionals could capitalize on prompt engineering to improve the effectiveness of their work. Although prompt engineering is a relatively new field, it has the potential to revolutionize the way Extension professionals communicate with and educate their audiences. By carefully crafting prompts in LLMs, Extension professionals can guide AI systems to produce accurate, relevant, and context-appropriate responses and program content.

As GenAI systems become more sophisticated, the potential of prompt engineering will increase. Extension professionals with the competency to effectively use GenAI and LLMs will be well positioned to help develop innovative programs to address the the complex problems faced by their communities. Table 3 contains a selection of prompt examples Extension professionals could adapt to improve their ability to use LLMs more effectively.

CONCLUSION

Prompt engineering presents new opportunities to increase the effectiveness of Extension. Extension professionals possessing the competency to use GenAI and LLMs may benefit from increased efficiency in their day-to-day tasks and improvements in their broader program planning and development goals. By learning to design effective

Table 2. A Selection of Prompt Engineering Principles

Principle	Examples	Notes
Specificity	"Write a 500-word essay on the benefits of budgeting." "Write a 300-word blog post about how to save for retirement."	The prompt should be specific enough to guide the LLM toward the desired output. It should include such details as word count, topic, and the desired outcome.
Clarity	"Explain the process of canning at an 8th-grade reading level."	The prompt should be clear and unambiguous to avoid confusion. It should be easy to understand and interpret, even for nonexperts.
Relevance	"Generate a list of 10 healthy dinner ideas." "Create a table of the seven most invasive species in the United States."	The prompt should be relevant to the desired outcome. It should relate to the topic or problem and help generate solutions or insights.
Context	"Write a report on the impact of climate change on corn production in the Midwest." "Write a blog post about the benefits of using drones for agricultural applications."	The prompt should help the LLM understand what you are asking for. It should be as specific as possible, providing details and using keywords while avoiding jargon. Without context, the LLM may generate outputs that are not relevant or helpful.
Role	"You are a first-class strategic consultant who is an expert in using strategic models to help clarify thinking and reach effective solutions. Please suggest the best strategic models for [insert task here]. Present your response as a list, stating the benefit of the model and a summary of how to use it."	The prompt should give the LLM a specific role or perspective when generating a response. By assigning a role, you can guide the LLM's behavior and ensure that it generates responses aligned with the intended purpose or context of the conversation.
Tone	"Write a friendly email inviting a potential volunteer to a community service project."	The prompt should convey the desired tone to the LLM. It should set the mood for the response and help create the appropriate level of formality or informality.
Creativity	"Generate a unique recipe for a healthy, gluten-free smoothie."	The prompt should encourage creativity and originality. It should allow the LLM to come up with new and innovative ideas.
Consistency	"Continue this explanation, using the same topic and background."	The prompt should be consistent with previous content or responses. It should build upon previous work or maintain a specific style or tone.
Flexibility	"Generate a response to this prompt that addresses either side of the argument."	The prompt should allow for flexibility and multiple perspectives. It should encourage the LLM to consider different viewpoints or approaches.
Domain-specific	"Write an outline for a scientific paper on the impact of climate change on deserts in the Mountain West region."	The prompt should be specific to the domain or field of expertise. It should require knowledge and understanding of a particular subject area.

Table 3. A Selection of Examples to Accelerate Prompt Engineering Mastery in Extension

Description	Example
Improve writing by receiving AI feedback.	"You are an expert editor. Proofread the writing below. Fix grammar and spelling mistakes. Make suggestions that will improve the clarity of this text." [Insert text]
Enhance problem-solving ability.	"Your role is that of a problem solver. Write a step-by-step guide to solving [insert your problem]."
Generate an outline for a scholarly article.	"I am writing a scholarly article about [insert topic]. Write an outline for this article and provide five options for a captivating title."
Summarize and simplify long, complex text.	"Summarize the text below into 500 words or less at the 8th-grade reading level. Create sections for each important point with a brief summary of that point." [Insert text]
Generate a customer persona.	"You are an expert user experience designer. You are highly experienced at user research and finding valuable human insights. Write a user persona for [person] who [situation]. Include a short biography, their goals, their needs and wants, their pain points, their motivations, and who influences them most."
Create a marketing campaign.	"Create a marketing campaign focusing on [ideal customer persona] considering psychological reactance. Emphasize the freedom offered by [Extension learning experience] and avoid controlling language or offers." Extension learning experience = [insert here] Ideal customer persona = [insert here]
Analyze decisions.	"Analyze the possible consequences of [decision] in the short term (1 week), medium term (1 month), and long term (1 year)." Decision = [insert here]
Create pricing options for an Extension course.	"Analyze [course name] and [course features]. Generate [number] pricing options for [course name] along with the features that should provide value for the options. Name the pricing options with unique and simple words." Course name = [insert here] Course features = [insert here] Number = [insert here]
Create an effective social media content strategy.	"Create a social media content strategy for [social media handles] for [time period] to attract [target audience]. Analyze and create 15 engaging and valuable topics in [content type] and an optimal posting schedule to help achieve [goals]. "Steps you need to follow: "1. Find 15 engaging and unique topics in [content type] that will achieve [goal]. "2. Optimal posting schedule format: h1. Week of the day, h2. 1st social media handle, h3. Multiple content types with time to post, h2. 2nd social media handle, h3. Multiple content types with time to post." Social media handles = [insert here] Time period = [insert here] Target Audience = [insert here] Content type = [insert here] Goals = [insert here]

Table 3. (*continued*)

Description	Example
Write an email update.	"Write an email from [job role] to [client] updating them about [update] in [project]. The email should maintain [tone]." Job role = [insert here] Client = [insert here] Update = [insert here] Project = [insert here] Tone = [insert here]
Generate referral tactics.	"Analyze [Extension program] and generate 10 unique ideas on how to encourage clients to refer others. The ideas should focus on adding value to existing clients as a reward for their referrals." Extension program = [insert program description and objectives here]
Answer program objections.	"Consider possible objections to [Extension program] and give step-by-step instructions on how to answer those objections in a way that will make clients prefer [Extension program]." Extension program = [insert program description and objectives here]
Write an ad script.	"Write a 1-minute advertisement script for [Extension program activity]. The ad should highlight the name of the [Extension program activity] and the [intended learning outcomes] of the [Extension program activity]." Extension program activity = [insert program description and objectives here] Intended learning outcomes = [insert here] Intended audience = [insert here]
Write an outreach email.	"Write multiple drafts of an outreach email from [sender] to [receiver]. The [reason] for the outreach email should be subtly highlighted and maintain [tone]. Conclude the email with [call to action]. Generate subject lines along with the drafts." Sender = [insert here] Receiver = [insert here] Reason = [insert here] Tone = [insert here] Call to action = [insert here]
Create a program tagline.	"Develop 10 taglines for [Extension program] that effectively convey the [Extension program] 's mission and inspire others to become a part of it. Taglines should be concise." Extension program = [insert program description, mission, and objectives here]
Generate a landing-page description.	"Write the landing-page description for [Extension program]. The first subtitle should explain the [problem] the [target audience] faces, and the second should detail how the [Extension program] addresses the problem." Extension program = [insert program description and objectives here] Target audience = [insert here] Problem = [insert here]

prompts, Extension professionals could use these tools to develop relevant programs, personalize learning experiences, and reach a broader audience.

We encourage Extension professionals to begin exploring prompt engineering and its application to their work to more effectively help the communities they serve. Yet we strongly urge Extension professionals to understand and adhere to the ethical and responsible use of GenAI, especially with respect to accountability, transparency, bias, and fairness. We recommend that Extension professionals and/or administration play an active role on policy-making committees within their institutions regarding GenAI use.

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