Students' Experiences Using Generative AI Within Learning Experience Design Workflows

Chris Quintana
Marsal Family School of Education
University of Michigan
Ann Arbor, MI, USA
quintana@umich.edu

Rebecca M. Quintana
Marsal Family School of Education
University of Michigan
Ann Arbor, MI, USA
rebeccaq@umich.edu

ABSTRACT

There are questions about how generative AI can impact workflows where it is used to support practitioners in their fields. Here we explore the use of generative AI in design education, specifically to support students in a university program on "learning experience design". In order to see how generative AI can potentially be a "design partner", we asked students to use generative AI in a design assignment, and analyzed their reflections about its use for learning experience design. Students commented on their use of generative AI in the design process to generate new material and refine material they created. Students also commented on challenges with making sense of the output from these tools, and the need to learn new skills, such as prompt engineering. This early work can help us better understand how generative AI can support, but also hinder, student thinking while learning new workflows.

CCS CONCEPTS

• **Human-centered computing → Interaction design process and methods**.

KEYWORDS

Design education, Generative AI, Learning experience design

1 INTRODUCTION

Professionals in many fields are exploring the uses, benefits, and threats from generative AI (GenAI). Many are wrestling with ways to use GenAI within these fields, looking for the useful support these tools can provide, while also navigating a professional landscape filled with anxiety about the potential negative impacts of these tools and the implication for how these tools could fit in their work. Design disciplines are no different, and amid fears that GenAI will become full-fledged design tools that will displace professional designers, others are considering ways in which they might use GenAI throughout the design process. While we can see different software companies incorporating GenAI in their software (e.g., Adobe, Figma), questions remain of how GenAI can fit into professional workflows and how these initial uses of GenAI can point towards new tools that support and enhance professional activities in seamless ways.

1.1 Learning Experience Design

We are now thinking about similar questions and issues with GenAI, but in a design education context. Specifically, we are working with university graduate students interested in *learning experience design* (LXD). Learning experience design is a rapidly growing and evolving field that integrates ideas from human-centered and user experience design (UXD) methods, learning theory and learning sciences, and educational design (e.g., pedagogical theory, curriculum design) to create engaging and effective learning experiences for learners in formal and informal learning settings.

There are different descriptions of LXD emerging in the literature. Schmidt and Huang [18] define LXD as "a human-centric, theoretically-grounded, and socio-culturally sensitive approach to learning design, intended to propel learners towards identified learning goals, and informed by UXD methods". This encapsulates how LXD can be thought of as a design discipline that leverages traditional human-computer interaction (HCI) models, but with an eye towards designing "learning experiences that enable the learner to achieve desired learning outcomes in a human-centered and goal-oriented way" [5]. LXD can build on instructional design approaches, but also prior HCI work that describes the need for specific design approaches when designing for contexts of teaching and learning [12, 19]. We can look at LXD as using a more general user experience design process as a foundation, and then augmenting it with activity focused on designing experiences that support learning, which can involve not only designing instructional approaches, but the tools and media to support those designs.

1.2 Context: Learning-Experience Design Education and GenAI

With LXD growing in different settings (e.g., school/university, corporate settings, informal learning settings) [5, 10, 16], there is also a need to educate students who want to pursue the LXD profession, or simply learn more about LXD to support their educational activity. Our work is situated in such an educational context. Specifically, we are working within a university LXD certificate program that we have developed for graduate students. This unique program includes a set of graduate courses in LXD, learning theory, learning technologies, and other relevant courses that students select, plus a residency at a university center where students work alongside learning professionals and design teams developing a range of online and on-campus learning experiences.

Here we specifically focus on the core learning experience design course in the certificate. The course is a two-semester course where students learn about and engage in the LXD process, including the different design activities, the theoretical perspectives that underlie those activities, and various tools that LXDs use for their work. As GenAI has emerged more prominently in the last couple of years, we are exploring how it might be used for LXD to get a better sense of what students think about using GenAI within the LXD workflows they are learning about in class and in their residency.

This can give us some perspective on the use of GenAI in the LXD process and a sense of what kind of GenAI tools and functionalities could be developed to support LXD and design education more broadly.

We are interested in exploring the following overarching question: How do students learning about the LXD process, products, and profession experiment with GenAI tools to support their own learning about various LXD tasks during the early phases of design (e.g., brainstorming) and late phases of design (e.g., design refinement and iteration)?

In order to explore this question, we have recently introduced GenAI tools into our core LXD class to have students use them for design work in class and to reflect on their use of GenAI to think about the strengths and weaknesses of GenAI as a design tool. Here, we report on some of our initial observations from student use of GenAI for a set of LXD activities during a class applied project where students developed a short learning module on a topic of personal interest within an online learning platform.

2 GENERATIVE AI AND THE LEARNING EXPERIENCE DESIGN PROCESS

Because LXD integrates multiple disciplines, we have developed an overarching process overview for class that draws on HCI user-experience design processes, but we augment these processes with activities, ideas, and mindsets more focused on designing learning sequences and artifacts that support learning. We start the certificate program by discussing LXD processes and activities, and later, students engage in their own applied design activity. As students begin their design work, we now ask them to integrate GenAI so we can solicit their ideas and observations about the potential use of GenAI for their work and professional practice.

2.1 Learning Experience Design Process Overview

Our LXD foundation in class integrates different descriptions of design processes from HCI and in learning/instructional design. We start by discussing a general set of activities that emerges from these descriptions that include: (1) describing and understanding the problem, question, or goal you are working to address; (2) gathering and analyzing research for information about the goal, the context you are designing for, and people that may be impacted by your design; (3) generating some possible ideas for addressing the problem; (4) realizing those possible ideas into concrete solutions that you can test to see how well they address the problem; and (5) evaluating the solutions that you developed to consider how that solution may (or may not) address the problem.

Specifically, we begin with a design process from Kumar [7] that provides an general overview of a more typical user experience design approach, and we augment that process with steps and examples that are more specific to a learning experience design context. For example, discussing how we define and understand the core learning problem and audience would involve developing learner personas [15], describing the learning objectives, and the learning context. Discussing how we gather and analyze research to start generating ideas about a learning experience would involve articulating needs for learner scaffolding [13], developing the media and resources for the learning experience, the pedagogical strategies, etc. Discussing how we assess learning would involve developing different learning assessments (e.g., developing multiple choice quizzes, transfer tasks, reflective activities).

Aside from learning about the different design activities, we also discuss aspects about the nature of the design process itself and the mindsets that designers need to adopt. We discuss the fact that real-world design is an example of a “wicked process” [11] that has a complex activity space, requires iterative work and multiple design iterations, and is an opportunistic, non-prescriptive process where designers have to constantly take stock of their previous work to decide their plans and next steps.

2.2 Study: Exploring Generative AI as a Design Partner

Our LXD certificate and course gives us a context where we can start exploring the role of GenAI in the design process and how it might fit within the design workflow. By doing so, we can start to think about how GenAI might serve as a “cognitive tool” for learners as they engage in their design work. This perspective aligns with the idea of technology serving as an “intellectual partner" [17] with learners as they do and learn new activity, or how GenAI can be a “co-intelligence” with people to help enhance their activity [8].

In our context, we want to look at GenAI as a “design partner” for students as they learn about and engage in their own design activity, using it to generate ideas, iterate through different design possibilities, or try out different approaches. We do not want students to simply ask GenAI for full answers that they put forth as completed work without their review. Rather, we want students to think about their design tasks and work with GenAI to generate initial ideas that they can review like a rough draft, seeing what they can use, what they can expand on, and what they can discard. Students can see if GenAI generates new ideas they had not thought of, and they can see how, and if, they want to continue expanding on those new ideas. They can use additional and revised approaches and prompts for the GenAI to try new directions and continually expand on ideas through different iterations of the design process to discover new paths, refine their work, and ensure the quality of the content they are developing.

We have begun to explore this idea of a LXD design partner through an applied project assignment in our LXD course. The applied project is an opportunity for students to design a small learning experience about a topic of their choice. Students have to engage in the LXD process to define their topic and learning objectives, learner audience, and context. Students have to develop the learning experience, including ideas about their pedagogical approach, lessons for the experience, media to incorporate, and assessment instruments for learners (e.g., quizzes) throughout the experience.

Each of the 14 students in class developed an applied project. For the assignment, students were asked to try using GenAI for three parts of their design: (1) developing their learner personas, (2) developing the learning objectives for their experience, and (3) developing assessments (e.g., multiple choice quizzes). Students were asked to use the GPT tool recently developed by the university as their primary GenAI tool, though they were free to also try other

tools, which included GenAI tools from OpenAI and Meta. (We will collectively refer to these tools as GPT thoughout.)

Students then answered some reflective questions about their design process at the end of the assignment, which included questions about how GPT performed for crafting personas, learning objectives, and assessment drafts. Students were prompted to reflect on "what the tool did well" and "where it was lacking." Students reflected on the tool's ability to support their learning and work in two parts of the assignment: their project proposal and the final report. In the final report, students were asked to add on to their initial reflections with new insights and details that emerged from their sustained interactions with GPT over the course of the project. We are starting to review and analyze the students' responses to these questions in their final report to gather insights about how GPT supported completion of design tasks across the arc of their applied project, from brainstorming and drafting to refining and finalizing. We are also looking for evidence of how the use of GPT influences the development of students' professional identities as learning experience designers, such as how they demonstrate evidence of professional judgment and critical thinking.

3 OBSERVATIONS

We provide a preliminary analysis of the reflections students provided on how they used GenAI to support specific learning design tasks plus their overall observations of the role GenAI can play throughout the learning experience design process.

3.1 Developing Learner Personas

For the learner persona creation task, students did the following tasks in the drafting phase, asking the GPT to: (1) create a persona based on a set of known characteristics, (2) compare a persona generated by the GPT with a persona they had previously developed, and (3) use the GPT to draft multiple personas. For each of these tasks, students improvised design processes to suit their design goals. For example, when a ChatGPT generated persona was incomplete or lacking sufficient detail or depth of insight, one student added a second step using a second tool (MetaAI) to develop a more authentic, compelling persona. In another example, when a student asked the GPT to draft multiple learner personas, they combined the useful information from each persona with their own ideas to create a final persona. This approach required the student to first select promising characteristics from multiple sources and then combine them with their own ideas to create a coherent, cohesive finished design artifact.

Within the refinement phase of the learner persona creation task, students used the following approaches, asking the GPT to: (1) make a recommendation concerning one persona attribute, and (2) drill down on one learner persona category (e.g., comfort with technology) to understand a range of considerations related to this category. Use of the GPT in the refinement stage of the design process did not require students to adapt or improvise further process steps, although they may have ultimately decided that the resulting output was not useful and if so, they would not incorporate any of GPT generated information into their final persona.

3.2 Developing Learning Objectives

Within the drafting phase of the learning objectives development task, some students asked the GPT to draft a set of learning objectives with minimal input by, for example, providing a course topic or theme. The majority of students used the GPT within the refinement phase of this task, such as asking the GPT to: (1) refine a set of previously drafted learning objectives, (2) edit a very rough draft of learning objectives to tailor them to a specific learner audience, (3) evaluate learning objectives to ensure alignment with Bloom's taxonomy, [1, 2]; and (4) adjust learning objectives to ensure that they encompassed a range of cognitive process levels from Bloom's taxonomy from lower to higher order thinking. Using these approaches within the refinement process, some students generated output they deemed usable for their final projects. Other students further refined the learning objectives generated to ensure that they aligned with ideas discussed in class and requirements of their project. In one instance a student commented that some of the recommendations were beyond the original project scope and targeted learning level they had in mind, requiring them to adjust the learning objectives to be more in line with their design goals.

3.3 Developing Assessment Instruments

For the assessment creation task, students mainly used the GPT to generate ideas for assessments or quiz questions. Students followed similar approaches, asking the GPT to propose assessments based on a course topic or provided learning outcomes. Examples of more tailored approaches include asking the GPT to provide sample assessment question types and to generate an assessment strategy that aligns with a learner persona's characteristics. Students reported that the ability of the GPT to quickly generate a variety of options allowed them to select question types and assessment approaches that could be implemented using the available features on the online platform that they used for their project.

3.4 Reflections on the Utility of GenAI for Specific Learning Design Tasks

Students reflected on the utility of the outputs provided by the GPT for these three learning design tasks and the ways they responded to or adapted that output to ensure a viable workflow. For the learner persona creation task, students commented on a number of benefits and shortcomings of the tool to support their work. On the plus side, the GPT was useful for providing basic characteristics and all the requirements of a learner persona. "[The GPT] inspires and directs me. I can always find some useful or new ideas in its responses." On the negative side, the GPT provided output that felt too general or generic and the resulting persona lacked unique traits. Students commented that sometimes the GPT generated too much information and that it was overwhelming to sift through it. Students also noted that while some of the details provided by the GPT were interesting, they were not necessarily useful, showing that the GPT lacked the design judgment of a professional learning experience designer.

For the learning objectives drafting task, students generally found the use of the GPT to be helpful for creating learning objectives that were more detailed and specific, aligned with the language

of Bloom's taxonomy and representative of a range of cognitive processes, from lower to higher order thinking. One student remarked that the GPT output matched their individual ideas and writing style. Another student commented that the feedback provided by the GPT was useful for creating coherent content matched to learning objectives. Other students remarked that although the GPT output was technically accurate, it was lacking in ways that were difficult to quantify: "I feel that [the GPT] knows the algorithm to create [learning objectives], but it is missing something else."

For the assessment instrument development task, students valued the range of question types the GPT provided, such as a visual identification question, a comparative question, and a debate prompt. Similarly, the ability of the GPT to quickly generate draft questions (e.g., multiple choice questions) allowed students to focus on fine-tuning the questions and overall learning design sequence. Students also reflected on the usefulness of the GPT for detailing clear test question instructions. Students also outlined the weaknesses they identified in the tool for supporting the assessment development task, such as lack of in-depth questions, lack of originality, and lack of comprehensive coverage of a topic. Some students reported that despite multiple rounds of prompting and generating, they needed to create original questions to fully round out the set of assessment questions. "Overall, seeing the initial output from [the GPT] was helpful as some inspiration, but I did have to complete an in-depth evaluation to ensure I was testing the appropriate material." A common thread across students' reflections on all three learning design tasks was the importance of writing clear and specific prompts in order to generate useful outputs. Several students reflected on their own prompt writing ability and suggested they needed to hone their skills in this area.

4 DISCUSSION AND FINAL REMARKS

As we consider the student reflections and comments, we can start to see different strengths and weaknesses of GenAI in terms of functioning as a design partner. We have distilled two main categories of observations from student comments: (1) the students' different approaches for working with GenAI during their design activity, and (2) the students' comments about the challenges GenAI can introduce in the form of "cognitive shifts" in attention that can distract from the workflow. First, in terms of the way students did their design work with GenAI, it was interesting to see how for some tasks (e.g., developing learner personas and learning outcomes), students mostly used GenAI to *refine* work they initially created themselves. But for other tasks (e.g., developing assessments) they used GenAI to *create* the initial material from scratch that they then refined. We would like to look at that further to see how the nature of a task influences how someone might use GenAI for that task. We are also interested in this creative/refinement use of GenAI, especially in light of research showing that while GenAI can be useful for generating new ideas, there is also the potential for many of those new ideas to feel similar and less novel [4].

We can also see areas where GenAI might also interfere with the design workflow in different ways. For example, one issue is the chatbot interaction style required for the current generation of GenAI. Using GenAI involves formulating prompts of varying length and complexity and then possibly refining the prompt if the output from the GenAI is not sufficient. However, this can lead to two issues to consider from the perspective of how GenAI supports a workflow. Do we now have a situation where a disruptive cognitive shift results when the focus is no longer on the workflow, but rather on interacting with a tool that is supposed to support the workflow? Winograd and Flores [20] noted Heidegger's distinction about tools being *ready-to-hand* and *present-at-hand* [6], where ready-to-hand tools are those that we can use almost unconsciously, while present-at-hand tools are those that we need to focus on and potentially deconstruct to figure out how to use them. As tool designers, we would like to create ready-to-hand tools, but we may currently be in a situation where GenAI tools are more on the side of being present-at-hand because we need to shift our attention from the work flow to the GenAI in order to formulate what may have to be a complex prompt.

But this potential shift in attention, from the workflow to the external tool, leads to a second question asking whether GenAI is making the workflow it is supporting inherently more complex? Certainly, tools change the activities for which they used, for better or worse, and this is no different with GenAI. If we have to keep shifting our attention to developing and refining prompts during our workflow, are we now actually creating a new workflow that includes the task of prompt formulation? Indeed, we are seeing others who use GenAI for instructional design activities recognizing that *prompt engineering* is important enough that they have put forth a new workflow when using GenAI to design courses that includes prompt engineering [3]. How can GenAI become a more seamless, ready-to-hand tool that supports the workflow rather than distracting from it or making it more complex?

We also saw other examples of these cognitive shifts in instances when students struggled with the amount and type of output from the GPT. When students were working on their activities, the work needed to make sense of the material generated by the GPT could be useful for some students who integrate some of that material with their own work. But for other students, it was also somewhat overwhelming to make sense of the output, leading them to just discard the GPT output. If we are seeing the GenAI as a partner in the workflow, how can we think about more seamless communication back and forth between the tool and the human in ways that leads to a more productive understanding and conversation. These issues connect with the increasing awareness that we need to consider new and different interaction styles for the type of AI tools being used and developed now (e.g., [9]).

While our work is situated in an LXD context, it could apply to broader design contexts, which still encompasses many of the activities and mindsets allowing us to think of GenAI as a design partner. In our work, we continue to analyze student reflections to see how GenAI helped and hindered their design activity. We are also interested in thinking about how GenAI might guide students with the entire design process. Given work showing how learners need *metacognitive support* when they engage in complex processes like design [14], how can GenAI support people with the planning, monitoring, and reflecting in design workflows. Many questions remain about the full role that GenAI can play to support practitioners with the workflows they engage in, and those that students are learning as they are enculturated into new professions.

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