

# The Use of Generative AI to Support Inclusivity and Design Deliberation for Online Instruction

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## **Abstract**

Generative AI presents significant opportunities for instructional designers to create content and personalize online learning environments. Alongside its benefits, generative AI also poses ethical considerations and potential risks, such as perpetuating biases or disrupting the learning process. Navigating these complexities requires an approach to design deliberation that involves careful analysis, discussion, and decision-making throughout the design process. This paper proposes a conceptual framework to support instructional designers in leveraging generative AI to promote inclusivity within their design deliberations, emphasizing the importance of addressing ethical considerations and engaging in iterative design practices.

*Keywords:* Design deliberations, ethical analysis, localization of context, instructional design, decision-making

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Over the past decade, we have seen a growing body of scholarship exploring how instructional designers engage in decision-making across different contexts. These studies have explored their decision-making approaches, the various types of design judgments they make while working on a project, and how they engage in reflection-in-action during the design process (e.g., Boling et al., 2017; McDonald, 2023; Tracey et al., 2014). There has also been growth in exploring the localization of context as it relates to instructional design practices (Stefaniak, 2024; Glahn & Gruber, 2020; Tracey & Baaki, 2022). Decision-making is deeply influenced by context, as the specific circumstances, environmental factors, and available resources directly impact the choices instructional designers and educators make. The context ultimately guides the decision-making process towards outcomes that are perceived as most effective or appropriate for learners.

Acknowledging contextual factors such as learners' prior knowledge, cultural backgrounds, and learning affordances can significantly influence the effectiveness of instructional strategies. This is even more important for the instructional designer to address when developing online experiences where learners may be spread out geographically since this can present challenges for fostering learner-to-learner interactivity and customization of instruction. By designing online instruction through a localization of context, instructional designers approach their tasks through two distinct lenses: the designer context and the learner context (Baaki & Tracey, 2022). To approach design through these two lenses, instructional designers can leverage generative AI technologies to help them adhere to sound design processes to craft more personalized instructional experiences that are adaptable and learner-centric.

Generative AI has the potential to support the instructional design of online learning environments to be more learner-centric, inclusive, and responsive to individual needs. With this increase in design affordances, there is an opportunity to explore how generative AI can be leveraged to support design deliberations for online learning. Designers and instructors can leverage efficiencies from generative AI to focus online instructional design efforts in deliberative ways to optimize designs and design time around personalization, innovation, and inclusivity in online learning. They can also evaluate existing tools for features that facilitate increased accessibility and inclusivity and identify ways in which generative AI tools may be leveraged in online learning spaces to better facilitate accessibility and inclusion, such as auto-captioning, voice interfaces, and adaptive interface designs. Realizing those potentialities, however, requires that the use of generative AI be situated within a deliberative design process—thus generative AI can be both a support for design deliberation and the object of deliberative design.

## **Potential Benefits and Harms of Using AI in Instructional Design**

Generative AI encompasses artificial intelligence systems designed to generate new content in the form of text, images, and videos that is increasingly difficult to distinguish from content created by human beings (Hodges & Kirschner, 2024; Hsu et al., 2023). Generative AI offers several learning affordances that have the potential to change the way instructional designers design and develop content. Building upon Gibson's (1979) conceptualization of affordances, generative AI should be evaluated for the opportunities and challenges it may

contribute to learners' perception of their learning experience. One primary advantage lies in the realm of content generation. Large language models (LLMs) are a subset of generative AI and are designed to process and generate language (Hsu et al., 2023). GPT-4 is a LLM that is gaining traction in higher education. Automated processes powered by generative AI enable the rapid development of diverse instructional materials, from written content to multimedia elements (e.g., Bozkurt, 2023; Tlili et al., 2023; Trust et al., 2023). Furthermore, generative AI facilitates adaptability in learning experiences by tailoring content to individual learner needs. Through continuous analysis of user data, AI algorithms can personalize learning paths, ensuring that each learner receives content and assessments aligned with their strengths and weaknesses (Firat, 2023; Kuhail et al., 2023). This adaptability enhances engagement and promotes a more inclusive learning experience for individuals with diverse educational backgrounds.

Another significant capability is the augmentation of feedback and assessment processes. Generative AI enables automated and immediate feedback mechanisms to provide learners with quicker results related to their academic performance on assignments (Kadaruddin, 2023; Su & Yang, 2023). This not only fosters a sense of continuous improvement but also lightens the burden on instructors by automating routine grading tasks. The efficiency gained through AI-driven assessment processes allows educators to redirect their efforts toward more personalized guidance and support for learners (Hsu & Ching, 2023; Kohnke et al., 2023). Additionally, generative AI contributes to the creation of dynamic and immersive learning environments through scenario and simulation generation. These affordances collectively position generative AI as a powerful tool in shaping a more personalized, efficient, and engaging instructional experience (Bozkurt et al., 2023; Ray, 2023; Ruiz-Rojas et al., 2023).

However, capabilities are not just about the positive possibilities of a given design but all the possible ways a user may use features. Laptops, for example, similarly have many capabilities that support learning, but they also have affordances that can be disruptive and distracting to the learning process. Online learning itself affords a variety of learning and societal impacts, both beneficial and harmful, from increased access to education to adjunctification of higher education to designs that interfere with learning—all dependent upon design decisions and how the systems are optimized. The potential harms of educational technologies broadly and generative AI specifically have received increased attention, as these technologies can also afford disruptions to the learning process and perpetuate biases or facilitate misuses and abuses of the technology (e.g., UNESCO, 2022). For example, one study on a large-scale natural language processing (NLP) system demonstrated a tendency for the model to generate negative sentences when word strings included a reference to disabilities (Hassan et al., 2021). Conversely, disabilities and accessibility communities have been exploring how uses of generative AI can make online and digital environments more accessible and inclusive through improved captioning, text-to-speech and speech-to-text, and accessibility testing of websites and digital artifacts (Henneborn, 2023).

Navigating potentially harmful and potentially beneficial affordances of complex technologies such as generative AI requires a deliberative process during all stages of design, development, implementation, and evaluation (Moore & Tillberg-Webb, 2023; Moore et al., 2024; Stefaniak, 2023). In this paper, we seek to explore the increasingly necessary competency of *design deliberation*, essential for instructional designers in working technologies like

generative AI into desirable shapes and directions (Moore et al., 2024). *Design deliberation* is the careful process of considering various factors and exercising design judgment during the creation or improvement of a design. This comprehensive approach involves a form of reflection-in-action (Schön, 1983) characterized by careful analysis, discussion, and decision-making to ensure that the resulting design is both effective and well-suited to its intended purpose (Penuel et al., 2022). Design deliberation encompasses multiple stages, starting with a clear understanding of the problem or challenge at hand, identification of potential benefits and harms, followed by research and exploration of potential solutions (Visscher-Voerman et al. 1999).

### ***Purpose of Paper***

The purpose of this paper is to propose a conceptual framework that supports instructional designers' use of generative AI for inclusivity in design deliberations. Emphasis will be placed on exploring how generative AI can be used to instructional designers' abilities to conduct a more in-depth learner analysis and engage in recursive design deliberations that prompt designers to address inclusivity and other ethical considerations in their online instructional design processes and designed artifacts. To explore this, after presenting the framework, we work through a common scenario encountered in online learning where an instructor or designer might consider using AI to help them quickly address last-minute information that a student in the online class will have one or more disabilities. Drawing on our framework and what is illuminated in the scenario, we then propose an emergent research agenda on generative AI and accessible, inclusive instructional design to invite scholars and practitioners to test and expand methods and techniques we can use to work generative AI in such desirable directions.

## **Theoretical Underpinnings**

### **Generative AI and Instructional Design**

2023 has seen scholarship published at an exponential rate exploring the capabilities and concerns associated with generative AI and education. The field of learning, design, and technology has begun to see the potential that generative AI poses for transforming the instructional design process (Hodges & Kirschner, 2024). Generative AI algorithms can analyze datasets of educational content, identify patterns, and generate new and contextually relevant materials to ensure a more personalized learning experience that caters to the diverse needs of individual learners (Kadaruddin, 2023).

By continuously analyzing learner interactions and performance, designers and instructors can adjust the learning journey for individual learners (Chang et al., 2023; Hodges & Kirschner, 2024). This adaptability may help to ensure that learners receive content and assessments at an appropriate difficulty level, fostering a more engaging and effective learning experience (Chan & Hu, 2023). As a result, instructional designers can leverage generative AI to build flexible, learner-centric learning pathways that respond to the evolving needs and progress of each student.

Generative AI can also play an innovative role in assessing and improving instructional design outcomes which can support instructional designers' ability to refine their design

decisions and optimize the learning experience. By leveraging generative AI for ongoing assessment and optimization, instructional designers can create a more iterative and responsive design process (Salinas-Navarro et al., 2024; Thanh et al., 2023). This has the potential to expedite instructional designers' decision-making abilities and move from the design of instructional solutions to development and implementation much quicker.

Despite the potential to leverage generative AI to support instructional design activities, several concerns warrant careful consideration. One significant issue related to promoting learner-centered instruction is the potential for algorithmic bias. If training data used to develop generative AI models are biased or incomplete, existing educational disparities can be perpetuated and even amplified (Kadaruddin, 2023). Another concern relates to the ethical implications of using generative AI for personalized learning. Instructional designers and educators must be mindful of the level of detail they provide when attempting to use generative AI to create a customized learning experience for their learners. A balance is needed between developing personalized learning experiences and protecting the rights and privacy of learners (Ruiz-Rojas et al., 2023). To achieve this balance, instructional designers need to carefully deliberate during their design process to uphold their responsibility to the design process and their learning audience.

### Deliberative Design

To support how instructional design practices should evolve in the context of generative AI technologies, we want to introduce the concept of *deliberative design* as an essential design practice. Cambridge Dictionary defines “deliberative” as “involving careful thought and discussion,” and defines “deliberation” as “a slow, careful way of doing something.” Merriam-Webster defines “deliberate” as “to use one’s powers of conception, judgment, or inference.” Deliberative processes or deliberation as an act are often defined as participatory practices as well, meaning that the deliberation is done with others, especially other stakeholders or decision-makers. In a sense, one might liken *deliberative design* to *participatory design* where the design process intentionally engages learners and others impacted by a design (Cook-Sather, 2003; Könings et al., 2005, 2011, 2014). However, a key distinction is that there is an intentional cognitive and reflective engagement with the design task or activity to engage in any given design task “carefully.” The word “careful” appears in every definition of deliberative, deliberation, or deliberate that we found. Thus, *deliberative design* is an intentional act of exercising care in design. Here we formulate *care* not merely as a feeling of caring but also as a form of duty or responsibility in the course of one’s design praxis, forming a distinctive characteristic of professional practice.

In the context of using generative AI to support instructional design tasks such as learner analysis, it becomes essential to evoke professional knowledge and skill when managing the output of a generative AI. In the specific instance of designing for diverse learners, generative AIs—such as ChatGPT—will often generate output and recommendations based on debunked theories of learning such as learning styles. In one example of this, Hodges (2024) recently shared results from one AI tool when prompted to generate a lesson plan that is differentiated for all learners. The resulting lesson plan was entirely anchored in the theory of learning styles, mapping out what to do for visual learners, auditory learners, kinesthetic learners, reading/writing learners, collaborative learners, and individualized instruction.

Despite a longstanding body of evidence demonstrating that learning styles do not exist and are not effective as a strategy (Reiner & Willingham, 2010; Kirschner, 2017), LLMs draw from very large data sets that include all manner of information sources including many that perpetuate bunk theories of learning. This low-quality information then clogs the arteries of these systems. The computer science adage of “garbage in, garbage out” (GIGO) remains true with generative AI. These issues highlight how a designer cannot merely punch in prompts and expect a generative AI to function like a calculator that does reliable math (even the use of generative AI for math tutoring generates problematic results; see Barnum, 2024). Instead, the results are a composite return of all the available information in a given ecosphere, including the junk. The tool itself is not doing any sort of analysis of what is quality and what is not; it is merely predicting what the most likely next word would be based on a large set of linguistic data. If discussions on learner diversity, for example, often veer into learning misconceptions or even biases or discrimination, then the product of a generative AI is going to reflect those features. Sorting through what is wheat and what is chaff in that output requires both professional knowledge (in this case, knowledge of the research on learning styles and knowledge of better alternative theories and practices) and a deliberative process by which the designer carefully considers and reasons through the output.

The implications of this are that the use of a generative AI can never be the last step in a design process or design task. Use should always be situated in a deliberative process during which the designer is intentionally engaged in what Schön (1983) calls “reflection-in-action.” Schön described reflection-in-action as a sort of conversation that a designer or design team has with a particular problem or situation. In studying reflection-in-action in instructional design practice, Tracey and Baaki (2014) described how IDs evidenced a series of “questioning, making a decision, reflecting on the consequences of the decision, then making another move” (p. 4). This is what deliberation during the design process looks like, whether done as internal deliberation by the designer or externally in partnership with other members of a team or other stakeholders.

#### Localizing Learner and Contextual Analyses to Inform Design Deliberations

Conducting a learner analysis is often regarded as an important task during the instructional design process, yet many instructional designers will attest that there are significant challenges with gathering sufficient data that emphasize and highlight the needs of their learners (Stefaniak, 2024; Tracey & Baaki, 2022). Designing effective learning experiences requires a nuanced understanding of learners' differences and needs which makes it challenging to create a one-size-fits-all product.

A common issue among instructional designers is that they are often required to make assumptions about their learners when designing instruction (Boling & Gray, 2015; Stefaniak et al., 2023). This becomes particularly problematic when designing instruction that may be sold to clients because little or no information may have been provided about the learning audiences' unique needs. It also becomes challenging to balance the needs of many learners when designing for environments such as higher education and K-12.

Instructional designers face a common pitfall when they make assumptions about their learners, potentially leading to significant problems in the effectiveness of educational materials

and experiences. Assuming a homogenous learner profile can result in content that is either too advanced or too basic for certain individuals, leading to disengagement or frustration (Gurjar & Bai, 2023). Overlooking the varied needs of learners can hinder the effectiveness of instructional activities. If instructional designers base their assumptions on generalized characteristics, they may inadvertently perpetuate stereotypes related to gender, race, or socio-economic status. This not only compromises the inclusivity of educational content but also creates a learning environment that may alienate or marginalize certain groups (Gunawardena et al., 2018; Rao, 2021). This ultimately becomes an all too familiar predicament where the instructional designer is navigating design tensions between needing to advocate for information regarding their learners and attempting to engage in design conjecture to maintain the momentum of the project.

### Shifting to a Localization of Context

Adapting to context is another task performed by instructional designers throughout the design process (Baaki et al., 2017; Baaki & Tracey, 2022; Herman et al., 2023). Recognizing that instructional design is recursive, instructional designers often approach their design with a flexible and adaptive mindset (Authors, 2024). This allows them to make the necessary adjustments as more information becomes available regarding learners' and instructional affordances and expectations for how learners will transfer their newly acquired knowledge to other settings.

Similar to gaining access to sufficient data to understand learners' needs and learning affordances, instructional designers also encounter obstacles when trying to encapsulate how their learners will transfer knowledge and skills gained through instruction (Stefaniak, 2024; Yang & Watson, 2022). Unless the instructional designer works in-house for an organization and has immediate and ongoing access to a learning audience, this can become a daunting task.

Traditionally, context analysis had placed autonomy on the instructional designer to ensure alignment and coverage between the organizational, immediate environment, and learner goals as they relate to orienting, instructional, and transfer contexts (Tessmer & Richey, 1997). Instructor designers often experience challenges making connections among these contexts due to the limited availability of information (Stefaniak et al., 2023; Boling & Gray, 2018). Furthermore, these challenges are further exacerbated when learners will be applying their newly acquired knowledge in different transfer settings. Recognizing that instructional designers often hold the most control in the instructional context, they can reframe how they approach their design with the transfer context in mind. Stefaniak et al. (2023) suggest instructional designers can support learners' transition from instructional to transfer contexts by providing tools to offload their cognitive demands.

Researchers in human-computer interaction and user experience design have begun to shift the conversation of context in instructional design to a more localized use of context that provides autonomy to the user engaging in an experience. Such an approach enables users to integrate their perspectives to support their abilities to engage in meaning-making. This empowers users with a more contextualized and adaptive environment that fosters a symbiotic relationship where technology seamlessly aligns with their individual preferences.

Baaki and Tracey (2019, 2022) have shifted the conversation of contextual analysis in instructional design to take a more localized approach whereby contexts (e.g., orienting, instructional, and transfer) are examined through the lenses of the learner and the designer. Such an approach engages the learner earlier in design conversations and positions them to be at the forefront of design. They argue that approaching design in this way promotes a more dynamic environment and is grounded by five premises: Learner and designer contexts are dynamic, are about interpretation, are focused on filling spaces, are about meaning-making, and are about creating meaning to support moving forward (Baaki & Tracey, 2022).

As more advanced and adaptive technologies become available to instructional designers, they need to consider the impact that these technologies may pose for both learner and designer contexts. In the following section, we introduce a conceptual framework to guide (a) design deliberations (b) approach design through a localized context and provide (c) a summary of specific design activities that serve as outcomes for taking a more localized approach to design decision-making.

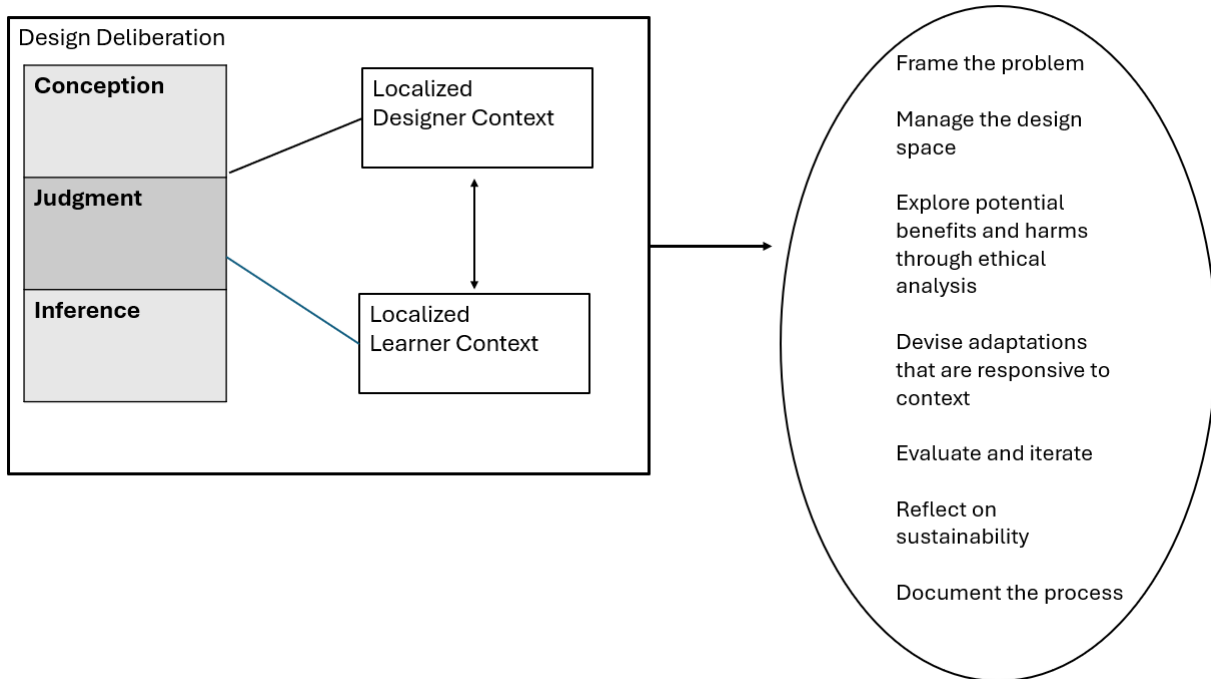
### **Conceptual Framework**

To support instructional designers' abilities to engage in careful design deliberations that involve the use of generative AI to support their decision-making, we present a framework that guides how designers can approach their deliberations through a localized context of use that approaches design from designer and learner contexts (Figure 1). In this framework, deliberation is the starting point. It evokes the role of a designer as one who devises a plan or idea (conception), exercises decisions that are carefully considered (judgment), and draws conclusions based on evidence and reasoning (inference). Given Baaki's and Tracey's (2022) definition of localization of context, we can see how conception, judgment, and inference are exercised through recognizing the complexities of context, engaging in intentional and thoughtful interpretation and meaning making, and making decisions on how to move forward. Localizing design deliberations into designer and learner contexts allows for the instructional designer to negotiate and prioritize decisions from different perspectives. This is particularly important when attending to careful design practices and prioritizing learners' needs.

Figure 1

*Deliberate Localization Design Framework*





Instructional designers pull from their intellectual and creative powers—conception for generating ideas, judgment for making decisions, and inference for drawing conclusions—to guide their design deliberation process. This process begins with accurately framing the educational problem at hand, which sets the foundation for all subsequent steps (Svihla, 2021). Designers then manage the design space, a phase that involves organizing and prioritizing resources, constraints, and potential solutions (Stefaniak, 2024). Ethical analysis plays a critical role as designers explore the potential benefits and harms of their designs.

Throughout this iterative process, instructional designers employ a reflective practice to evaluate and refine their designs. As instructional designers refine their practice, they engage in ongoing reflection to consider the sustainability of the solutions they are designing (McDonald, 2022). They consider environmental, economic, and social impacts. While documentation is listed as a final step in this framework, instructional designers should document their design decisions throughout the project. This is of particular importance when documenting prompts that are used within generative AI to support their design deliberations.

### Early Deliberative Activities

Early design activities include *framing the problem* and *ethical analysis* that identifies potential harms and benefits, which can then become a part of the problem framing. *Framing the problem* is defined by Svihla (2020) as a process by which a professional takes ownership of a problem and works iteratively to define it, often with other designers or stakeholders. This process is an act of conception through which a designer also exercises judgment about what is included or excluded and how to proceed in solving the problem. This also helps to explain why designers may approach what seems like the same problem in different ways. Svihla (2020) observes that designers solve different problems because they’ve framed what appears to be the same problem in different ways. Moore and Tillberg-Webb (2023) drew on Svihla’s conception

of problem framing to argue that ethics are not about rules that require adherence but—especially in design—function as individual perspectives that influence problem framing and definition process. Often the influence of one’s ethical perspective may be latent, even to the designer, but it can also be explicitly evoked through *ethical analysis* to intentionally map out both potential benefits and potential harms (Moore et al., 2024). Those potential benefits or harms help to identify ethical and systemic considerations in addition to technical and learning specifications and requirements; thus, the designer’s ethical perspectives and priorities become part of problem framing, both through what is included and what is excluded.

In the example of generative AI, as with most technologies, our work can be framed in different ways. It can be framed in very technical terms that focus on the technology and developing technical competencies, such as prompt engineering. The problem of generative AI can also be framed as a learning problem, attempting to conceive of impacts on learning by drawing on various ways learning is theorized and by inferring from both theory and research what the best use may be (as well as when it may interfere with learning). The problem can be framed more systemically, considering both ripple effects that constitute ethical considerations as well as other types of infrastructural or longitudinal impacts such as what supports learners, designers, and/or educators have, what incentives or disincentives are created by policies and resourcing, and what environmental impacts exist. While learning and systemic framing together introduce a great deal of complexity, we posit that they also introduce necessary considerations that are precisely why professional conception, judgment, and inference are essential in driving any new technology toward desired impacts.

### Ongoing Deliberative Activities

One of the challenges with many instructional design frameworks is that they are often interpreted as promoting a linear and systematic process of design. It is important to note that the seven outcomes presented in this framework are not intended to occur in a linear process; rather, many of them will be revisited several times throughout a project. *Managing the design space* calls for the instructional designer to engage in a continuous scan of their environment, design constraints imposed on the project, and learners’ needs. All of these areas are subject to change or be modified as additional information becomes available.

Continuous surveillance of the design environment involves the careful consideration of various elements such as time, budget, technology, content, and learner needs. By understanding the scope and context of the project, designers can delineate boundaries and identify opportunities within the design space. We propose that designers should approach their design deliberations related to the management of their design space by examining the situation from both designer context and learner contexts. To fully account for the tensions that may occur between these two contexts, the designer needs to recognize where there is synergy and where they may appear to be operating in mutually exclusive contexts. Design deliberations from the designer’s lens should uphold the expectations of the profession and adhere to sound design standards. At the same time, the instructional designer should work to customize and flex their approach to design to accommodate and nurture the needs of their learning audience.

Depending on the design constraints imposed on the system (or the design space), the instructional designer may be in a position to negotiate and compromise their decisions to satisfy these two contextual lenses. This is no less true for ethical considerations, such as accessibility

and diversity, which can present design tensions that force each designer or design team to make choices about how they will navigate those tensions. Lomellini et al. (2023), for example, discuss how instructional designers must “grapple with the practical reality that achieving ‘perfection in’ accessibility can be a challenging and, at times, unattainable goal” (para. 2). Rather than an all-or-nothing approach, they describe how an iterative, flexible, and reflective design-based approach helps to propel design forward and reduce preoccupation with the unattainable goal of perfection. Thus, the non-linearity of design and different design activities is a boon for tackling complicated design spaces.

Generative AI has the potential to support instructional designers as they navigate these two contextual lenses of learner context and design context during their design deliberations. One significant advantage lies in its ability to create contextualized learning experiences. By analyzing vast amounts of data, generative AI algorithms can generate customized content and activities that can be tailored to the learners’ needs and account for the realities of environmental and technological affordances imposed on the design space. This contextualized approach not only enhances engagement but also promotes more effective knowledge retention and transfer.

Instructional designers can leverage generative AI in rapid prototyping and refining their design solutions. With the assistance of generative AI, instructional designers can input various design constraints and information about the designer and learner contextual lenses to generate instructional activities and assessments. This iterative process allows designers to scale their activities to create multiple versions and iterations of activities and instructional content that can be adapted to learners' individual needs.

### Reflective Deliberative Activities

Reflecting upon the sustainability of design decisions is an important aspect of design deliberation, particularly when leveraging generated AI to support the process. We have tried to weave themes of *carefulness* and *intentionality* within design deliberation. One of the skepticisms of generative AI is that it may not be able to address the necessary level of complexity associated with various subject matter. Researchers have also shared concerns regarding generative AI perpetuating stereotypes among learners (Bozkurt et al., 2023; Hodges & Kirschner, 2024).

We propose that this framework can serve as a blueprint to guide instructional designers as they engage in design deliberation to avoid such pitfalls. Morrison et al. (2013) suggest that instructional designers should promote efficiency and effectiveness of learning and contribute to ease of learning. While scholarship on reflection-in-action as it relates to instructional design (e.g., McDonald, 2022; Tracey & Baaki, 2023) has addressed providing instructional designers with the necessary tools, they need to embrace the recursiveness that is instructional design. These guidelines proposed by Morrison and colleagues call for instructional designers to intentionally consider the sustainability of their design solutions.

We believe that reflecting upon the sustainability of our design decisions is an inherent part of the design process and warrants additional attention as our field continues to explore the possibilities that generative AI has to offer instructional design. This can be accomplished by further investigating the efficiency, effectiveness, and ease of learning that generative AI may offer the designer and learner contexts.

Instructional designers can also reflect on the economic and social dimensions of their design decisions by assessing the cost-effectiveness of instructional materials and technologies. They can consider the accessibility and inclusivity of their designs, ensuring that all learners, regardless of background or ability, have equitable access to educational resources and opportunities (Asino et al., 2017). Additionally, instructional designers can reflect on the scalability of their designs within the broader system. They examine the scalability of instructional solutions, considering factors such as adaptability to different contexts, ease of maintenance, and potential for expanding offerings.

We began our conversation of design deliberation with *problem framing* and we conclude with documentation. While both activities provide bookends for deliberation activities in instructional design, they do not occur as isolated and singular events. Rather, they are ongoing throughout a design project. Documenting instructional design decisions and processes is not a new concept for instructional designers. Documenting design decisions and keeping track of variation iterations of a design are common practices in many, if not all, design environments.

When leveraging generative AI in instructional design, detailed documentation allows instructional designers to maintain transparency and accountability throughout the project. By recording each step, designers can trace back decisions and iterations to ensure the ability to reproduce their decisions. For generative AI, this is important as the technology rapidly evolves and a development environment can differ greatly across mere months. This serves as a valuable resource for future reference, aiding in troubleshooting, refinement, and adaptation of AI-generated content. Doing so will aid instructional designers in gaining a deeper understanding of the AI's strengths, limitations, and biases and help them fine-tune prompts to align with the affordances of the design space. Such transparency enhances the reliability and efficacy of generative AI in instructional design and promotes responsible and ethical AI deployment in design.

### Applying the Framework to an Online Learning Scenario: Designing for a Deaf-Blind Online Learner

In applying the framework to online learning and learner diversity specifically, we imagined a common scenario for online instructors that has happened to both of us: the disability or accessibility center at your institution notifies you a few days before the start of classes that a student has registered for your online class, and that student has a hearing disability, a visual disability, or both. We explored the use of generative AI in supporting an online designer or instructor in adapting an online course for a student with a mix of these disabilities using the framework we presented above. In reporting the output below, we have opted to incorporate screenshots instead of text boxes so that readers may have a sense of how ChatGPT formatted the output. In some instances, the screenshot may be truncated because it was impossible to get all of the output onto one screen for capture and keep the text readable; our goal is not to try to provide all of the output (which can be accessed in full through the links provided) but to provide a representative sample sufficient for discussion.

We started with a prompt articulated around an initial problem framing: “How can I modify my online course for a student who is deaf and blind?” A screenshot of the response

provided by ChatGPT 3.5 (on 3-10-24) is provided in Figure 2, capturing 8 of the 10 items in its list.

Figure 2

*Screenshot of Output from ChatGPT on How to Modify an Online Course for a Deaf-blind Learner*

1. **Communication Methods:**
  - Utilize tactile communication methods such as Braille for written content.
  - Use sign language interpreters for video content, or provide transcripts and captions.
  - Consider text-based communication methods like email or text messaging for non-verbal communication.
2. **Accessible Course Materials:**
  - Convert all course materials into accessible formats such as Braille, large print, or electronic text that can be read using screen readers.
  - Provide tactile graphics or models for visual information.
3. **Assistive Technology:**
  - Ensure that your online platform is compatible with screen readers and refreshable Braille displays.
  - Provide training on how to use assistive technology if needed.
4. **Alternative Assessments:**
  - Offer alternative assessment methods that align with the student's abilities, such as oral exams or tactile projects.
  - Allow for extended time on assignments or exams if necessary.
5. **Accessibility Features:**
  - Ensure that your online platform supports accessibility features such as keyboard navigation and screen reader compatibility.
  - Provide options for adjusting text size, color contrast, and other visual settings.
6. **Supportive Environment:**
  - Foster a supportive learning environment by encouraging communication and collaboration among students and providing resources for support.
7. **Regular Feedback and Communication:**
  - Maintain regular communication with the student to address any concerns or difficulties they may encounter.
  - Provide feedback on their progress and offer assistance when needed.
8. **Accessibility Statement:**
  - Include an accessibility statement in your course syllabus or on your course website, outlining the steps you've taken to make the course accessible and providing contact information for

In this case, the suggestions generated were accurate, if basic. It's also important to note that these generated responses do not function like search results. Because of a disruption to the ChatGPT session, we had to re-enter that same prompt (same date and version). In doing so, we received a different response that had some similar suggestions that also waxed generic and basic. Both responses raise a host of additional considerations that the online designer or instructor must then consider.

Analyzing the first recommendation on “Communication Methods” and its sub-recommendations illuminates why design deliberation is so important and provides an analytic frame for all the other items in the output. In the first sub-item (“Utilize tactile communication methods such as Braille for written content”), little is known about both the design or instructional context and the learner context. Does the institution have equipment that can produce Braille output? One must wonder whether having the institution produce Braille output is even the best approach for an online class, as that would mean someone has to produce printed materials and mail them to the student. Braille keyboards have existed for many years, and learners with a mix of visual and hearing disabilities frequently use such keyboards. Perhaps the learner already has a Braille keyboard or some other sort of access device they prefer. Better understanding the needs and resources of the actual learner would clarify, and possibly even

simplify, the solution set in this case. A generative AI cannot substitute for that sort of hyper-local analysis; it only provides a jumping-off point for what the designer could investigate further.

For the second bulleted suggestion (“Use sign language interpreters for video content, or provide transcripts and captions”), the designer will again need to determine what resources exist at the institution and whether tools that provide captioning, such as Zoom, may be an option. Additionally, these two solutions are not the same in terms of learner engagement. This simple-seeming suggestion requires a lot of unpacking. The use of a sign language interpreter during a live video conference session would afford the learner the ability to participate directly in any discussion or collaboration. Providing transcripts is an after-the-fact solution that can exclude learner-to-learner, learner-to-instructor, and learner-to-content interactions critical for online learning (Moore, 1989, 1993). Real-time captions may be a more viable alternative that allow the learner to at least listen in real time if those captions can be read by a Braille keyboard. The generative AI prompts, however, do not account for how the learner can be an active participant. The output tends to emphasize accessibility as information access versus learning access (Rieber & Estes, 2017). Does a Braille keyboard interface with Zoom or some other software that allows the deaf-blind learner to participate? An instructional designer needs to carefully unpack these considerations for learners in the online environment, overlaying frameworks such as the Community of Inquiry model (Garrison et al., 2000), types of interaction (Moore, 1989, 1993), and learning access (Rieber & Estes, 2017) as tools for critical analysis of the output. It is also necessary to work collaboratively with the actual student in finding viable solutions, likely including research on how Braille keyboards interface with virtual conferencing software (FYI, in this case, there are indeed several viable options).

For the third bulleted suggestion (“Consider text-based communication methods like email or text messaging for non-verbal communication”), most online learning tends to be text-heavy already. While that may be a point of critique for other reasons, in this scenario, that becomes a potential affordance of common online learning practices. Still, the designer or instructor may want to reconsider tools such as video discussions.

In all, ChatGPT generated 10 main items and 17 sub-items. While this appears to be a rich response full of ideas, making meaning from the generated suggestions requires that the ideas be situated in a more localized learner and context analysis that a generative AI simply cannot provide but may be able to support. Generative AI is devoid of context, so it becomes the designer's responsibility to overlay the specific design and learner context as a way of exercising judgment about what ideas are viable and worth iterating on. We explored using generative AI for some initial learner analysis and then incorporated localized design and learner analysis to further refine our prompts.

#### Iterations on the Use of ChatGPT for Learner Analysis and Accessible Online Design

In exploring the use of ChatGPT to help with some general learner analysis in this scenario, we asked, “How can a student who is deaf *or* blind access online learning?” and then, “How can a student who is deaf *and* blind access online learning?” (emphasis added here for clarity). In the first response, suggestions were broken down into categories of only supporting students who were deaf or blind, mirroring the structure of the prompt. In the second response, options focused on the intersection of blindness and deafness, with recommendations focusing

on the use of tactile communication, Braille displays, haptic feedback devices, and tactile devices. This suggests that using generative AI helps narrow the field of options in this scenario. From there, the output trailed off into more generic recommendations like “promote inclusivity,” with the elaboration that one should create an environment where the student who is deaf-blind feels valued, supported, and empowered to participate fully. Such suggestions are hardly actionable and require a designer or instructor to determine exactly what that means and devise specific strategies for accomplishing that within class culture. However, using generative AI for a preliminary learner analysis may provide designers unfamiliar with accessibility options a good starting point that can help them further investigate possible solutions.

Drawing on both localized design context and framing the problem to include online interactions, we then introduced design context constraints and drafted a more specific prompt focused on ideas for accessible but interactive online learning ideas. The following is our revised prompt that incorporates more localized design context, learner context, online interactions, and inclusive/accessible design as problem framing (bounded to three ideas). We have annotated in italics the components that reflect this framing (these italicized phrases were not included in the prompt given to ChatGPT 3.5):

Devise three different online learning activities, including live interactions via video conferencing and asynchronous discussions or activities (*drawing on types of interaction*), that would be accessible for an online learner who is deaf-blind (*inclusive/accessible design*). Assume that I do not have a Braille printer available (*local design context*) but that the student does have a Braille keyboard (*local learner context*).

With these different design considerations incorporated into the prompt, the output becomes more specific and actionable. Figure 3 is a screenshot of the output for this prompt.

Figure 3

*Localized and Situated Output for Interactive, Accessible Online Learning Ideas*

1. **Live Tactile Diagram Exploration via Video Conferencing:**
  - Activity Description: Host a live session via video conferencing where the instructor shares a tactile diagram or model related to the course material. The instructor describes the diagram verbally while the student explores it using their Braille keyboard to interact with the digital version.
  - Implementation:
    - Prepare tactile diagrams or models related to the topic of study, such as a map, graph, or geometric figure.
    - Share your screen via video conferencing software to display the diagram.
    - Verbally describe the elements of the diagram, providing context and explanations as needed.
    - Encourage the student to ask questions or request clarification using text-based chat during the session.
2. **Asynchronous Collaborative Document Creation:**
  - Activity Description: Facilitate a collaborative document creation activity where students work asynchronously to contribute ideas and information related to a specific topic.
  - Implementation:
    - Create a shared document using a collaborative platform like Google Docs or Microsoft Word Online.
    - Assign a topic or question related to the course material for students to discuss and contribute their thoughts.
    - Provide clear instructions and guidelines for formatting and organizing the document.
    - Encourage the student to participate by using their Braille keyboard to input their contributions directly into the document.
    - Monitor the document periodically to provide feedback and guidance as needed.
3. **Interactive Quizzes with Tactile Response Options:**
  - Activity Description: Design interactive quizzes or assessments where the student can provide responses using tactile input methods, such as a Braille keyboard, while receiving immediate feedback on their answers.
  - Implementation:
    - Create a series of quiz questions related to the course material using an online quiz or assessment tool.
    - Include multiple-choice or short-answer questions that allow for tactile input.
    - Provide clear instructions on how the student can navigate the quiz interface and input

Features of this prompt include (1) employing more robust problem framing that incorporates localized design and learner context to help manage the design space, (2) explicitly leveraging generative AI to derive potential benefits (e.g., making online learning more accessible), and (3) anchoring the prompt in a professional body of knowledge on effective online learning characteristics where the learner’s ability to interact with other learners, the content, and the instructor are essential ingredients and reflect an emphasis on active participation in learning rather than passive reception of information. We interpret the outputs from this prompt as being more robust scaffolding for actionable ideas in this scenario.

We then iterated yet again, incorporating more specific contextual considerations into the prompt such as the course topic and the specific types of learning activities we would like the student to be engaged in. Here is that revised prompt, again incorporating more localized design context, learner context, online interactions, and inclusive/accessible design as problem framing (and again, bounded to three ideas and annotated with italics for clarity).

If I am teaching a course on online communication practices (*design context*), create three instructional activities that would be accessible to a student who is blind and hard of hearing (*learner context*) that would engage students in developing a communication plan for a local school regarding homework expectations (*learner-content interaction*). One of the activities should be designed to be completed asynchronously, the second



synchronously online, and the third should be one a student could download and complete offline (*leveraging synchronous and asynchronous online affordances*).

Even though slightly different design considerations are incorporated into the prompt, the output is once again specific and actionable. It can be further tightened by incorporating additional contextual considerations, such as the assumptions about available resources or infrastructure and the student's setup. Figure 4 is a screenshot of the output for this prompt (the third suggestion was truncated because of screen capture limitations).

Figure 4

### *Localized and Situated Output for Accessible Online Learning Activities*

#### 1. Asynchronous Activity: Discussion Forum

- **Objective:** Engage students in brainstorming and sharing ideas asynchronously.
- **Instructions:**
  - Create a dedicated discussion forum on the course's online platform accessible with screen readers.
  - Post a prompt asking students to share their thoughts on effective communication strategies for conveying homework expectations.
  - Encourage students to provide detailed responses, considering different communication channels such as emails, newsletters, or online platforms.
  - Require students to respond to at least two peers' posts, offering constructive feedback or additional insights.
- **Accessibility Considerations:**
  - Ensure the online platform is screen reader-friendly, with proper headings, alt text for images, and keyboard navigation options.
  - Provide alternative means of participation, such as allowing students to submit their responses via email if the online platform is inaccessible.

#### 2. Synchronous Activity: Virtual Workshop

- **Objective:** Facilitate real-time collaboration and discussion among students.
- **Instructions:**
  - Schedule a virtual workshop using accessible video conferencing software.
  - Before the session, provide materials in accessible formats, such as Word documents or accessible PDFs.
  - During the workshop, present a case study scenario about homework communication challenges in a school.
  - Divide students into small groups, assigning each group a specific aspect of the communication plan to focus on (e.g., format, content, delivery channels).
  - Facilitate group discussions using text-based chat or sign language interpreters for students who are hard of hearing.
  - Encourage groups to collaborate on a shared document to outline their communication plan.
- **Accessibility Considerations:**
  - Ensure the video conferencing platform supports real-time captioning and sign language interpretation.
  - Provide written instructions and materials in advance to accommodate students using screen readers or Braille displays.

#### 3. Offline Activity: Braille-Based Homework

As we introduce more context-specific details to the prompt, the output becomes more useful for adapting, or even devising, novel ideas for inclusive and accessible online learning that can help a designer or instructor respond to a student's needs in this scenario. There are some limitations, however. For example, we tried introducing other common constraints to develop these ideas, such as the time availability and lack of institutional support for devising accessibility solutions. These constraints were handled less effectively. In the instance of limited time, ChatGPT interpreted the time constraint as delivery or implementation of the activity itself, not addressing planning or preparation time, even when we clearly stated “I have only 2 hours to develop all of the suggestions” as a possible boundary. And the constraint of lack of support staff was entirely ignored. Thus, a designer or instructor still must very carefully consider the feasibility of the output as the next step of design.

#### Wrong Theory Protocol—Devising Intentionally Bad Solutions

Finally, we explored an intriguing design technique called “wrong theory protocol” which is an ideation technique that may help to prompt empathetic and creative ideas in designers (Svihla & Kachelmeier, 2020). Using this approach, designers are prompted to frame a problem and then generate possible solutions that would harm or humiliate intended learners or users before being asked to come up with beneficial ideas. Svihla and Kachelmeier (2020) suggest that using the wrong theory protocol before prompting beneficial ideas produces a wider range of ideas that are more creative and empathetic. Our intention for incorporating this here was to test the boundaries of using a generative AI for ethical analysis that helps identify potential benefits and potential harms. To try this protocol using a generative AI, we adapted one of our prompts to include the word “worst,” italicized below for emphasis:

If I am teaching a course on online communication practices, create three *of the worst* instructional activities for making these accessible to a student who is blind and hard of hearing that would engage students in developing a communication plan for a local school regarding homework expectations. One of the activities should be designed to be completed asynchronously, the second synchronously online, and the third should be one a student could download and complete offline.

Here, the output from ChatGPT was very interesting, starting to provide some actual discussion of what makes the options harmful. The output starts by clearly stating that creating intentionally inaccessible instruction goes against ethical and inclusive practices. The tool does go on to generate examples of bad ideas, but they are situated as illustrations of why accessibility is important, and each bad idea features only a brief description followed by a much longer elaboration on the issues (Figure 5).

Figure 5

#### *Generating Bad Ideas Using Wrong Theory Protocol*



**ChatGPT**

Creating intentionally inaccessible instructional activities for students who are blind and hard of hearing goes against ethical and inclusive teaching practices. However, to illustrate the importance of accessibility and the potential challenges of excluding certain learners, here are three examples of poorly designed instructional activities:

1. **Asynchronous Activity: Unlabeled Video Presentation:**
  - **Description:** Upload a video presentation discussing communication strategies for homework expectations without providing captions or audio descriptions.
  - **Issues:**
    - The student who is hard of hearing would have difficulty accessing the verbal content without captions.
    - The student who is blind would not be able to access visual content without audio descriptions.
    - Both students would be excluded from participating fully in the activity, leading to frustration and disengagement.
2. **Synchronous Activity: Live Lecture Without Accommodations:**
  - **Description:** Conduct a live lecture via video conferencing without providing sign language interpreters or real-time captioning.
  - **Issues:**
    - The student who is hard of hearing would struggle to follow the verbal content without captions or sign language interpretation.
    - The student who is blind would miss out on visual cues or presentations shared during the lecture.
    - Both students would feel isolated and unable to fully participate in the discussion, leading to feelings of exclusion and frustration.
3. **Offline Activity: Visual Task Worksheet:**
  - **Description:** Provide a downloadable worksheet with visual tasks related to developing a communication plan for homework expectations.
  - **Issues:**
    - The student who is blind would be unable to access or complete the visual tasks without alternative formats such as tactile graphics or written descriptions.
    - The student who is hard of hearing may struggle to understand the instructions or content presented visually without accompanying text or sign language interpretation.
    - Both students would face barriers to participation and comprehension, leading to a lack of

Part of what we find so interesting in the issues listed is that they start to explain more of the *why* in accessible design considerations for online learning over and above *what* characterizes earlier output. It may be that using the wrong theory protocol as an early-stage design tool, even from a generative AI that generates a determination of what is ethical, may still evoke more empathy and care in design by providing a designer more insight as to *why* these practices are important and what the potential harms would be for learners. Of particular interest, we note the last bullet under the second item that observes "Both students would feel isolated and unable to fully participate in the discussion, leading to feelings of exclusion and frustration." Here, the use of the wrong theory protocol has prompted precisely the sort of critique we initially imposed that the suggestions from ChatGPT did not incorporate considerations of participation, only information access. Still, entering the same initial prompt into ChatGPT generates a more basic list, meaning the tool itself isn't learning from any insights into the issues. It is up to the designer to intentionally wrest meaning and implications from these issues that they then fold into continual design deliberation.

### Implications for Research and Practice

As researchers expand on what it means to take a localized context of use with generative AI technologies, we recommend future research that encompasses case studies that use think-aloud protocols to examine instructional designers in practice as they navigate between designer and learner contexts. This research is needed to gain a better understanding of how they navigate tensions that may occur between these two contexts as well as provide additional insight into the non-linearity of such design deliberations.

Additionally, our exploration of the use of wrong theory protocol (Svihla & Kachelmeier, 2020) further suggests additional research on how particular design tools combined with generative AI tools may help to prompt more empathetic and creative design ideas. The presence of explanations about *why* certain solutions were harmful may mean that using generative AI to ideate bad ideas may facilitate better ethical analysis as part of a deliberative design framework. The output from this response scaffolds the identification of both potential harms and potential benefits, positing potential harms in terms of impacts on the learners themselves (e.g., feeling isolated) as well as impacts on learning (e.g., unable to complete the task, missing out on cues or presentation, unable to participate in discussion, lack of engagement and learning). Conversely, potential benefits can be identified, such as students experiencing an increased sense of belonging, increased engagement, and improved learning because they can pick up on cues and information, complete tasks, and participate in discussions.

Studying the use of wrong theory protocol as a design technique with generative AI for instructional design is necessary to answer the question of whether designers using generative AI go on to generate more creative and empathetic solutions in follow-on ideation. A design research agenda can also examine differences in designers' ability to identify potential harms and benefits inherent in each problem space and whether output that explains more *why* may lead to (a) a more robust schema of potential harms and potential benefits and (b) designs that aim to maximize benefits and minimize harms.

Further exploration of design deliberations and the use of wrong theory protocols also have significant implications for instructional design pedagogy. Using generative AI tools coupled with wrong theory protocols may facilitate learning opportunities around ethical considerations and design deliberations. Through these analyses, instructional design students may gain a deeper understanding of the complex ethical dilemmas inherent in design. This expands on the need for research on how to integrate ethics into instructional design courses. It also provides students with the space necessary to learn from design failures by exploring possible bad designs without investing significant time in prototyping actual bad designs and affords students opportunities to examine the pitfalls of relying too heavily on generative AI technologies to supplant design activities rather than using it as an additional tool to inform design decisions.

**Authors' Note:** The full responses for all prompts described here can be located at <https://chat.openai.com/share/4d3975fc-8d12-4bb1-94c8-21124b8cc936> and <https://chat.openai.com/share/88d6942c-5d64-4e55-a821-a1116ffb226c>. This documentation should allow others to inspect our results for themselves and also provide accessible versions of the screenshots included in this paper.

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