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Reflecting on the Integration of Generative AI in Design Education: Lessons from the Field*

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ABSTRACT

This testimonial article reflects on integrating Generative Artificial Intelligence (GenAI) into design education through three distinct experiences: personal explorations as a designer and educator, collaborative faculty learning in design technology, and integration within an undergraduate digital design course. This paper aims to contribute to discussions on how GenAI tools can support creative and educational practices. It employs a phenomenological approach to document these experiences, assessing the impact of AI on creativity, pedagogical practices, and learning outcomes. The theoretical framework draws on Constructivist Learning Theory, Kolb's Experiential Learning Theory, Reflective Practice, Technological Pedagogical Content Knowledge (TPACK), and the concept of the democratization of creativity. These theoretical perspectives help to analyze how learners and educators construct knowledge through interaction with AI technologies, iterate through cycles of experimentation, and reflect on their practice. The analysis reveals the transformative role of GenAI in enhancing educational equity and creative engagement while also highlighting ethical considerations such as biases, intellectual property, and the risks of over-reliance. This paper invites educators to critically engage with AI, proposing strategies to integrate these technologies thoughtfully in design education.

KEYWORDS

constructivist theory, design education, experiential learning, generative artificial intelligence, higher education.

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Reflexionando sobre la integración de la inteligencia artificial generativa en la educación en diseño: lecciones desde el campo

RESUMEN

Este artículo testimonial reflexiona sobre la integración de la inteligencia artificial generativa (IAG) en la educación del diseño a través de tres experiencias distintas: exploraciones personales como diseñador y educador, aprendizaje colaborativo del profesorado en tecnología del diseño, e integración en un curso de diseño digital a nivel de pregrado. Este artículo tiene como objetivo contribuir a las discusiones sobre cómo las herramientas de IAG pueden apoyar las prácticas creativas y educativas. Se emplea un enfoque fenomenológico para documentar estas experiencias y se evalúa el impacto de la inteligencia artificial (IA) en la creatividad, las prácticas pedagógicas y los resultados de aprendizaje. El marco teórico se basa en la teoría del aprendizaje constructivista; la teoría del aprendizaje experiencial de Kolb; la práctica reflexiva; el conocimiento tecnológico, pedagógico y de contenido; y el concepto de la democratización de la creatividad. Estas perspectivas teóricas permiten analizar cómo los estudiantes y educadores construyen conocimiento a través de la interacción con tecnologías de IA, iteran en ciclos de experimentación y reflexionan sobre su práctica. El análisis revela el papel transformador de la IAG para mejorar la equidad educativa y el compromiso creativo, al tiempo que destaca consideraciones éticas como los sesgos, la propiedad intelectual y los riesgos de una dependencia excesiva. Este artículo invita a los educadores a involucrarse críticamente con la IA, para lo cual propone estrategias que facilitan integrar estas tecnologías de manera reflexiva en la educación del diseño.

PALABRAS CLAVE

aprendizaje experiencial, educación en diseño, educación superior, inteligencia artificial generativa, teoría constructivista.

Refletindo sobre a integração da inteligência artificial generativa na educação em design: lições da prática

RESUMO

Este artigo testemunhal reflete sobre a integração da inteligência artificial generativa (IAG) na educação em design através de três experiências distintas: explorações pessoais como designer e educador, aprendizagem colaborativa da equipe docente em tecnologia de design e integração em um curso de design digital de graduação. Este artigo visa contribuir para as discussões sobre como as ferramentas de IAG podem apoiar práticas criativas e educacionais. Emprega-se uma abordagem fenomenológica para documentar essas experiências, avaliando o impacto da inteligência artificial (IA) na criatividade, nas práticas pedagógicas e nos resultados de aprendizagem. O referencial teórico baseia-se na teoria da aprendizagem construtivista, na teoria da aprendizagem experiencial de Kolb, na prática reflexiva, no conhecimento tecnológico, pedagógico e de conteúdo,

e no conceito de democratização da criatividade. Essas perspectivas teóricas ajudam a analisar como estudantes e educadores constroem conhecimento por meio da interação com tecnologias de IA, iteram em ciclos de experimentação e refletem sobre sua prática. A análise revela o papel transformador da IAG no aumento da equidade educacional e do engajamento criativo, ao mesmo tempo em que destaca considerações éticas, como preconceitos, propriedade intelectual e os riscos de uma dependência excessiva. Este artigo convida educadores a se envolverem criticamente com a IA, propondo estratégias para integrar essas tecnologias de forma consciente na educação em design.

PALAVRAS-CHAVE
aprendizagem experiencial, educação em design, ensino superior, inteligência artificial generativa, teoria construtivista.

Generative artificial intelligence (GenAI, a type of artificial intelligence that generates new content, such as text, images, audio, video, etc.) has rapidly emerged as one of the most significant technological advancements in recent history. The potential impact of these technologies in education has positioned GenAI at the center of academic discussions, drawing interest from educators, researchers, policymakers, and society at large. As schools and universities navigate these changes, educators are actively exploring how GenAI can create new opportunities for learning, creativity, and collaboration.

The uncertainty surrounding the impact of GenAI in education, and the need to critically reflect on its potential and limitations motivated the experiences, explorations, and reflections presented in this article. Rooted in a pragmatic paradigm (Creswell, 2014), this paper offers a reflective analysis of three experiences integrating GenAI into my teaching, research, and creative practice as a design scholar. By analyzing and reflecting on these experiences, the paper aims to foster a critical and constructive dialogue on the potential impacts of AI in educational practices in design. This paper documents the real experiences of students and educators engaging with GenAI, helping to understand how these technologies impact their learning and creative outputs. To further contextualize these experiences, the paper synthesizes recent studies on the use of GenAI tools in various educational settings, which helps to ground my experiences and reflections in current empirical evidence.

The first experience involves my personal exploration as a designer and educator, experimenting with GenAI to enhance my creative practices and pedagogical methods. The second experience centers on collaboration within a faculty learning community, where colleagues and I collectively examined the impact and possibilities of GenAI in our shared creative practices. Finally, the third experience focuses on integrating AI tools in an undergraduate digital design course, providing insights into how students engage with these technologies in a structured educational context.

Ultimately, this paper aims to contribute to the discussion on AI's role in education by offering reflections and practical insights rooted in the experiences described and analyzed in this article. It invites educators to reflect on how these technologies can reshape teaching and learning practices, expand creative processes, and foster collaboration, while also considering potential risks and ethical issues. These reflections intend to provide insights for educators to assess, approach, and engage critically and thoughtfully with these technologies.

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Theoretical Framework

This paper's theoretical framework draws on the following theories to provide a lens for analyzing and reflecting on the integration of GenAI in design research, teaching, and practice.

Constructivism: This learning theory suggests that learners actively construct knowledge through experience, reflection, and interaction with their environment (Fostnot, 2005; Piaget, 1970; Vygotsky, 1978). In the context of GenAI integration, constructivism provides a framework for understanding how students and educators build knowledge through hands-on experimentation with AI tools. This theory emphasizes the importance of creating learning environments that encourage active exploration, critical thinking, and the construction of personal meaning (Lubart, 2005). Additionally, Vygotsky's (1978) theories highlight the role of social interactions in mediating learning, which is seen in the faculty learning community initiatives and classroom experiences, where collaboration between educators and students is fundamental in exploring and integrating GenAI tools. The constructivist approach is especially relevant to this paper as it supports a discovery-based learning model. In this context, students and faculty build on their existing knowledge of design principles and practices, integrating new understandings gained through their interactions with GenAI.

Experiential Learning Theory: Kolb's theory (1984) provides a cyclical model of learning, emphasizing concrete experiences, reflective observation, abstract conceptualization, and active experimentation. This model aligns closely with the iterative nature of design processes and the experimental approach required when integrating GenAI into educational practices. Kolb's theory supports the analysis of how students and educators engage with GenAI tools through this cycle of experimentation and reflection. It is particularly relevant to understanding how learners develop skills and insights as they move from initial encounters with GenAI tools to more sophisticated applications in their design work. Kolb's model focuses on the iterative, personal learning cycle, which helps in detailing how hands-on experience with GenAI can lead to deep learning.

Reflective Practice: Donald Schön's concept of reflective practice (1983) emphasizes the importance of learning through action followed by critical reflection. A reflective practitioner learns by doing and then thinks critically about their actions to improve their understanding and solidify their skills. Schön's reflective practice encourages an iterative learning process where professionals engage in "reflection-in-action" and "reflection-on-action," to continuously refine their knowledge and skills by analyzing their experiences. Reflection-in-action allows practitioners to adjust during their creative processes, fostering a responsive and flexible approach to problem-solving. Reflection-on-action, on the other hand, provides the space to critically assess completed activities, enabling the identification of insights, patterns, and areas for future growth. Schön's concept of reflective practice is at the core of this article's approach, as it provides a space to describe, reflect on, and improve my creative and teaching practices based on my experiences with GenAI in multiple settings, and share these reflections and insights to inspire and inform other educators and practitioners.

Technological Pedagogical Content Knowledge (TPACK): This framework, developed by Mishra and Koehler (2006), provides a model for understanding the complex relationships between technology, pedagogy, and content knowledge in teaching. In the context of GenAI in design education, TPACK addresses the intersections between technological tools (AI), pedagogical strategies, and design content knowledge. TPACK emphasizes the importance of understanding how each domain interacts and influences each other. For educators integrating GenAI, this framework offers a lens to examine how they navigate the intersection of AI capabilities with pedagogical practices and design principles.

Democratization of Creativity: This theory focuses on how technological advancements, such as GenAI, make creative tools and design processes more accessible to a broader audience (Fleischmann, 2015). AI tools are reported to lower technical barriers, allowing individuals who lack formal training to engage in creative and design activities (Eapen et al., 2023). These technologies empower a broader audience to create and communicate their ideas with ease, overcoming the constraints and steep learning curve of traditional media for self-expression. These new uses of digital technologies generate new opportunities for creative engagement and innovation, allowing a more diverse group of people to participate in design processes that are increasingly more inclusive and engaged (Escobar, 2017; Lubart, 2005). In the context of design education and practice, the democratization of creativity facilitated by AI challenges traditional notions of expertise and authorship (Fleischmann, 2015) and redefines the role of designers as facilitators and curators of creative processes rather than sole creators (Duggal, 2024).

Empirical Perspectives on Generative AI in Education

This section synthesizes empirical research that has explored the integration of GenAI in educational settings, offering insights into their implications for ethics, pedagogy, creativity, and policy.

Pedagogical Integration and Curriculum Development: A substantial body of research has focused on how GenAI tools can be effectively incorporated into teaching practices. Van Brummelen and Lin (2020) describe teacher-led workshops that resulted in AI-integrated lesson plans for K–12 classrooms, asserting that "teachers of all subjects should feel empowered to teach AI" (Van Brummelen & Lin, 2020). In higher education, Holstein and Aleven (2022) demonstrate systems and approaches that foster teacher–AI collaboration, noting that "effective AI systems in education should complement human strengths rather than automate away valuable human interactions" (Holstein & Aleven, 2022). Kumar et al. (2024) highlight the potential role AI to create more effective and engaging learning environments. Chiu (2024) further advocates for AI literacy training to prepare students for AI-mediated learning environments. Collectively, these studies reinforce the need for curricula that merge traditional pedagogies with emerging AI tools, supported by targeted professional development for faculty and comprehensive AI literacy for students.

GenAI in Creative and Design Practices: GenAI has shown significant promise as a co-creative tool in design education and practice, but studies also warn about the risks associated

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with these technologies for creative practices. For instance, Hughes et al. (2021) note that while GenAI technologies offer new forms of ideation and visualization, their "black-box" nature limits user control, calling for more transparent and interactive interfaces. In architectural and web design education, Günaydin Donduran et al. (2024) and Lively et al. (2023) caution that AI should augment rather than replace traditional creative methods. Günaydin Donduran et al. (2024) state, "AI is transforming architectural design from a human monopoly into a joint product of artificial and human creativity," while Lively et al. (2023) emphasize that AI tools should enhance student creativity without replacing conventional teaching methods. Meron and Tekmen Araci (2023) observe that although LLMs (Large Language Models) can support brainstorming, its outputs require substantial human refinement to achieve discipline-specific depth. Fathoni (2023) further explores AI's role in fostering sustainable creativity and calls for clear institutional policies to balance innovation with academic integrity. Chen (2024) adds that as AI becomes a speculative co-creative partner, "ethical concerns surrounding authorship and originality must be carefully addressed" (Chen, 2024). Together, these studies support the view that thoughtful integration of GenAI can catalyze creative exploration as long as they are approached critically and carefully.

Ethical Considerations and Policy Frameworks: Research consistently emphasizes the need for robust ethical guidelines and adaptive policies to address concerns around authorship, equity, sustainability, and transparency. AI challenges traditional notions of ownership, as the division of authorship between designers and AI-generated content remains unclear (Crawford et al., 2024). Additionally, AI raises copyright and intellectual property concerns, with risks of plagiarism and inadequate attribution requiring structured academic integrity policies and AI literacy initiatives (Bartlett & Camba, 2024). Beyond intellectual property issues, AI's potential to democratize education is complicated by disparities in access to technology. Without equitable implementation, AI could widen educational gaps rather than bridge them (Günaydin Donduran et al., 2024). Environmental sustainability is another pressing concern, as GenAI's high energy and water consumption and carbon emissions production pose long-term ecological challenges (Bozkurt & Sharma, 2023). Bias and misinformation also present significant risks. AI models can reinforce societal inequities by propagating biased or misleading content (Tang & Su, 2023), making transparency and critical evaluation essential in AI education. Additionally, the hidden labor behind AI development raises ethical concerns about exploitative working conditions in AI training processes, calling for greater accountability from GenAI development organizations (Bartlett & Camba, 2024). The pedagogical implications of unregulated AI adoption are equally concerning. Ahmad et al. (2023) warn that unchecked AI use can weaken decision-making skills and disengage students from active learning. Institutions must therefore balance AI's benefits with risks to academic integrity and data privacy, ensuring responsible adoption through comprehensive AI literacy programs (Jin et al., 2024). Moreover, embedded algorithmic bias in educational tools (Tanksley, 2024) underscores the need for frameworks that prioritize fairness, transparency, and accountability in AI integration.

Future Direction in GenAI Research: Empirical studies reveal mixed perceptions among educators and students regarding GenAI integration. Ghimire *et al.* (2024) report that while many educators are optimistic about AI's potential, they remain cautious about issues such as plagiarism and overreliance; the authors emphasize that "AI literacy among educators is crucial to harness its potential while mitigating risks" (Ghimire et al., 2024). Saúde et al. (2024) find that

although students appreciate AI's ability to enhance productivity, concerns about academic integrity persist. Wood and Moss (2024) further highlight that responsible AI integration must balance efficiency with human oversight. Mulyani et al. (2025) confirm that GenAI can improve teaching performance through better content creation and adaptive learning but stress that "generative AI should complement human instruction rather than replace it" (Mulyani et al., 2025). Chiu (2024) calls for further empirical studies to refine assessment models, enhance interdisciplinary pedagogical frameworks, and guide the evolution of AI-enhanced learning environments. These insights point to a future research agenda focused on ethical governance, human-AI collaboration, and adaptive policy frameworks that will ensure GenAI serves as a meaningful and responsible addition to education.

These empirical studies demonstrate that integrating GenAI in academic settings requires balancing ethical, pedagogical, and creative considerations. Scholars consistently stress that robust policy frameworks, intentional AI literacy, and collaborative design approaches are essential to ensure AI tools enhance rather than undermine human decision-making and creative expression (Ahmad et al., 2023; Jin *et al*., 2024; Tanksley, 2024). At the same time, studies highlight that thoughtfully integrated AI can expand creative toolkits and transform traditional curricula through participatory design and interdisciplinary training (Holstein & Aleven, 2022; Kumar *et al*., 2024; Van Brummelen & Lin, 2020). These findings are instrumental to analyze the experiences described in the following pages and propose strategies and recommendations to explore AI's integration in design educational settings.

Description and Contextualization of Experiences

This section describes three experiences integrating GenAI into my teaching, research, and creative practice as a tenure-track faculty member at Appalachian State University, a public teaching institution in the southeastern United States, between 2022 and 2024.

Experience 1: Personal Explorations with Generative AI as a Designer and Educator

Context and Purpose: This experience involved my personal exploration of GenAI tools, focusing on satisfying my curiosity about them, and considering their integration into my creative and teaching practices. Initially, while completing my PhD in 2016, I experimented with AI tools for qualitative data analysis; unfortunately, those were difficult to understand, highly technical, and not directly beneficial to my research, which created frustration and a mental barrier about the use of AI in my work. However, in 2022, I revisited AI with an open mind, driven by the potential of new AI tools based on Large Language Models (LLMs), which promised a more intuitive and accessible approach compared to the previous tools I explored. The main objective of this exploration was to satisfy my curiosity about this new generation of tools and discover how these could unlock new possibilities for my creative and teaching practices as a design scholar. I aimed to understand how AI could enhance ideation, prototyping, and concept development, ultimately influencing my approach to design and pedagogy.

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Participants and Setting: This was an individual journey, centered on my personal exploration of these tools to understand how they worked and test their potential and limitations. The setting was informal and personal, where I engaged with GenAI tools and experimented with their capabilities in my creative workflow. It was a self-driven learning experience, not constrained by a formal setting. The personal nature of this exploration allowed for flexibility and experimentation without the pressure of specific deadlines or predefined outcomes, which helped in identifying the full potential of these tools.

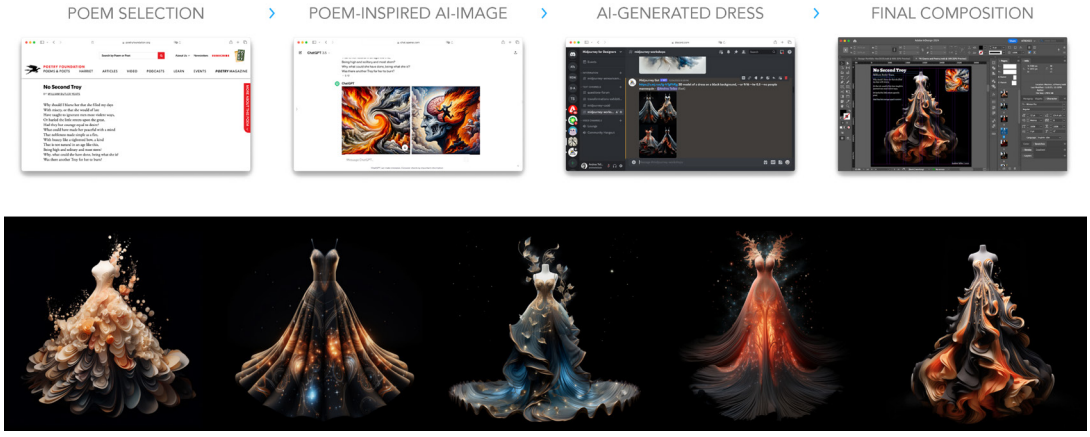
AI Tools and Methods Used: My exploration included text-generation tools (i.e., ChatGPT, Claude.ai, and Gemini), and image-generation tools (i.e., Midjourney, Adobe Firefly, DALL-E, Vizcom, and Krea.ai). I explored these tools by looking at examples of projects created by other artists and researchers, and by testing each tool to understand their capabilities. Once I had developed the confidence to use each tool, I started to explore a combined workflow in which the output of one tool could be used as the input of another.

This experimentation led to my AI+Poetry+Design project, in which I created a series of dresses inspired by poetry (Fig. 1). My creative process involved a playful exploration with GenAI tools, translating poetic verses into abstract artworks and subsequently into dress designs. Each dress began as a visual concept drawn from poems and texts that hold special meaning for my family and me. ChatGPT, DALL-E, and Midjourney were instrumental in transforming these verses into visual artworks. I began this process by entering a poem or a fragment of a poem into ChatGPT, prompting it to generate abstract visual representations inspired by the poem's themes, emotions, and imagery. Since ChatGPT integrates DALL-E for image generation, it provided both textual prompts and the resulting abstract images directly within the interface. These AI-generated abstractions served as a bridge between language and visual design, transforming poetic expressions into visual compositions. Next, I used the images generated by DALL-E as visual prompts in Midjourney, adding textual descriptions to refine the design direction. This involved specifying the type of dress, material qualities, and aesthetic details I wanted to achieve while ensuring that the visual essence of the abstract artwork was preserved.

The approach was highly iterative and subjective. I generated multiple abstract images using DALL-E and dress images in Midjourney, continuously refining the prompts and adjusting parameters. From these iterations, I carefully curated and selected the images that, in my judgment, best captured the mood and tone of each poem while maintaining a unique identity within a cohesive collection. This multi-stepped process allowed me to co-create design concepts that helped materialize complex, abstract ideas and reflected my artistic vision for each piece.

Throughout this journey, I reflected about authorship and copyright, trying to understand the ethical implications of using AI-generated content, and finding ways to balance the strengths of the technologies with the need for original and meaningful designs. This exploration helped me to better understand these tools' limitations and affordance, and how they could complement traditional design methods rather than replace them.

Fig. 1. Workflow of the AI+Poetry+Design Project, showcasing the use of ChatGPT, DALL-E, and Midjourney to transform poems into a series of dress designs.



Experience 2: Faculty Learning Community in Design and Technology

Context and Purpose: DigiFab is a faculty learning community at Appalachian State University, focused on exploring the professional and educational use of computer-aided design (CAD) and digital fabrication hardware used for three-dimensional design, visualization, and fabrication. DigiFab is an interdisciplinary group of faculty members from different creative fields, including art, graphic design, industrial design, apparel design, theater, and dance, among others. This experience involved collectively exploring image and 3D model-generation tools to understand their potential in creative practices. As a result of this exploration, the group created a collaborative digital piece that featured works created with GenAI by each group member and which was installed in a six-month exhibition at the Turchin Center for the Visual Arts in Boone, North Carolina (Fig. 2). This exhibition, alongside the group's participation in various events, helped to engage with faculty, students, and the larger community to share the group's findings and open conversations about technology and creativity.

Participants and Setting: The participants were 12-15 faculty members and staff from diverse academic backgrounds, who gathered monthly for DigiFab meetings. The group included visual artists, product designers, sculptors, graphic designers, and educators in theater and apparel design. The setting was collaborative, with an emphasis on open dialogue, hands-on experimentation, and collective learning. The interdisciplinary nature of the group facilitated different perspectives, with participants bringing their expertise and curiosity into the exploration of AI tools. The meetings provided a relaxed environment where experimentation and cross-disciplinary insights were encouraged, allowing participants to explore AI applications relevant to their respective fields without the pressure of formal academic constraints. The relaxed nature of these meetings fostered a supportive environment where even those unfamiliar with digital tools could comfortably engage and learn.

AI Tools and Methods Used: Midjourney was the primary AI tool explored by the group, chosen for its capacity to generate high-quality imagery from text prompts. The process began with a demonstration during one of the monthly sessions, which immediately piqued

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participants' interest. Midjourney's ability to quickly produce vivid and imaginative visuals allowed faculty members to see its potential applications across a wide spectrum of creative disciplines. Faculty members experimented with the tool according to their individual interests, focusing on different aspects such as material applications, unconventional forms, and mixed-media concepts. Visual artists used Midjourney to create 2D digital images, experimenting with different prompts to explore surreal and conceptual art. Sculptors and product designers leveraged the tool to visualize complex three-dimensional concepts, often focusing on unique material combinations and forms that would be challenging to conceptualize manually. Additionally, theater and apparel design faculty explored how Midjourney could assist in creating mood boards, visualizing costumes, and setting the atmosphere for stage productions. This exploration culminated in the creation of a collective piece for the "Transformations" exhibition, which helped to tie together individual contributions into a cohesive and visually compelling body of work. This collective piece started numerous conversations about GenAI (which was a relatively new technology at the time of the exhibition: November 2022-May 2023), and was the topic of several presentations and art talks that accompanied the exhibition.

Fig. 2. Left: Transformations exhibition featuring a collaborative piece created with GenAI.
Right: AI-generated artwork from the exhibition created by M. Nystrom with Midjourney.

Experience 3: Undergraduate Course in Digital Design

Context and Purpose: This experience took place in an undergraduate course in digital design intended to introduce first-year students to essential skills in digital illustration and visualization using Adobe InDesign, Photoshop, and Illustrator. Within this framework, students were introduced to image-generation tools and were invited to explore GenAI tools to support the ideation phase of the design process. The primary objectives of integrating AI tools were to expose students to these new technologies, expand their design skills by allowing them to generate multiple ideas rapidly, and overcome creative blocks often experienced in the early stages of design projects. The integration of AI was not intended to replace traditional skills, such as sketching or rendering, but to complement them and provide an expanded toolkit for students. The experience focused on bridging traditional design approaches with new digital tools, exploring their possibilities, limitations, and ethical implications.

Participants and Setting: The participants were first-year undergraduate students from Industrial, Interior, and Apparel Design programs enrolled in a required digital design course. At the time of writing, over 400 students had completed the course since the integration of GenAI tools. The learning environment emphasized exploration, experimentation, and collaboration through individual activities. Direct experimentation with the programs mentioned before was guided through a set of short assignments and long projects in which GenAI tools were used to support design ideation.

AI Tools and Methods Used: Students used multiple image-generation tools, including Midjourney, Adobe Firefly, and Vizcom, during the ideation stage of two projects: designing a new shoe, and inventing a new product of their preference. In preparation for the footwear design project (Fig. 3), students went through a workshop on GenAI where they were introduced to the use of AI image generators, the art of crafting effective prompts, and the ethical implications of these technologies. In this project, students started by sketching their ideas in paper and then used Vizcom to create AI-generated renderings of their sketches, which they later refined using Adobe Illustrator and Photoshop. For the new product design project, students used Midjourney and Firefly to generate diverse visual concepts, which served as starting points for further development using Adobe software.

These AI tools encouraged students to explore unexpected combinations and experiment with styles, textures, and forms that might have been challenging to conceptualize through traditional sketching alone. The generated images were sources of inspiration, rather than final solutions. Students went through an iterative process in which they combined traditional sketching, traditional digital illustration software, and new AI image generation tools. This iterative workflow allowed students to explore, refine, and enhance their concepts by combining the strengths of AI tools with traditional design skills.

This course is examined in greater detail from an empirical perspective in a separate research paper, "AI as a Tool for Beginning Design Students: Reflections from a Case Study on Generative AI in an Introductory Design Course" (Tellez & Parrish, in press) to be presented at the National Conference for Beginning Design Education (NCBDS). Based on survey responses and reflections collected from over 100 students across multiple semesters, the study found that AI tools significantly enhanced students' ability to generate and refine design ideas efficiently. Students noted that AI helped them overcome creative blocks and promoted iterative design thinking by enabling them to explore multiple conceptual directions before finalizing their designs. Nevertheless, the study also identified challenges, including an over-reliance on AI-generated outputs and initial difficulties in crafting effective prompts. In response, the course was adjusted to incorporate structured discussions on AI ethics, prompt engineering workshops, and reflective exercises in which students critically assessed AI's role in their creative process. These measures were implemented to ensure that AI serves as a support mechanism rather than a shortcut in the design process.

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Fig. 3. Examples of AI-generated images created by students in a digital design course using Midjourney, Adobe Firefly, and Vizcom.

Discussion and Implications for Design Teaching, Research, and Creative Practice

The findings from the experiences described before indicate that GenAI has immense potential to impact design education, research, and practice. In these experiences, the use of GenAI proved to be a powerful catalyst for creativity and innovation in design education, expanding access to creative tools and lowering barriers to participation. By complementing traditional design methods, GenAI facilitated ideation, representation, and exploration of new creative possibilities. This aligns with the broader trend of AI in education, where AI tools are increasingly seen as means to enhance learning opportunities and foster innovation (Mollick & Mollick, 2024). However, the adoption of AI in design education requires careful consideration of ethical, pedagogical, and cognitive implications. Ahmad et al. (2023) warn that AI adoption without adequate oversight may contribute to diminished human decision-making capabilities, increased cognitive laziness, and additional security concerns in educational settings. Furthermore, Wood and Moss (2024) highlight the need for critical and thoughtful AI integration to ensure that these technologies enhance rather than replace human cognition and creativity.

Paradoxically, the experiences discussed in this paper demonstrate that the implementation of GenAI contributed to expanding and strengthening individual and collective creative processes, countering concerns that AI-generated outputs may lead to standardization and reduce human agency in creative decision-making (Hughes et al., 2021). Rather than replacing existing skills, in my experience, AI served as a generative partner, stimulating new modes of ideation and accelerating the refinement of design concepts. This aligns with Chen's (2024) assertion that AI is evolving from a mere tool to a co-creative partner in artistic and design processes, challenging conventional notions of authorship and originality.

Although this testimonial article does not quantitatively measure creativity, anecdotal evidence and preliminary survey data (Tellez & Parrish, in press) suggest that GenAI broadens the range of ideational possibilities available to students. Many reported that AI-generated outputs introduced novel perspectives, facilitated experimentation, and enhanced their ability to

articulate ideas more efficiently. As Meron and Tekmen Araci (2023) note, while AI can serve as an efficient brainstorming partner, its outputs require human critical evaluation to be transformed into innovative design solutions. Consequently, GenAI has the potential to bolster creative output by supplementing traditional methods, lowering the threshold for idea generation, and enabling rapid iteration, while simultaneously challenging traditional notions of expertise by allowing students, educators, and practitioners to leverage advanced capabilities without requiring specialized technical skills.

Future research employing controlled experimental designs could clarify whether these improvements pertain to creativity itself or simply to enhanced skill levels in expressing creative ideas. Nonetheless, these findings support the idea that, when thoughtfully integrated, GenAI can enrich design education by empowering students to overcome creative blocks, refine their concepts more effectively, and engage in more exploratory, iterative design processes.

Connection to Theoretical Framework

These findings are consistent with existing learning theories such as constructivism and experiential learning, which was especially evident in how GenAI tools enabled me, my students, and colleagues to construct knowledge actively through direct engagement and experimentation. For instance, in Experience 1, my personal exploration with GenAI tools involved hands-on experimentation and reflection, embodying the constructivist principle of learning through active engagement with the environment and technology. This observation aligns with the core constructivist notion that knowledge is built through direct interaction and experience, rather than passive reception of information. This finding aligns with Vygotsky's (1978) emphasis on learning through experience and social interaction. The undergraduate course provided a socially mediated environment where students interacted with their peers, their instructor, and GenAI tools to construct their knowledge. The collaborative setting of the undergraduate course (Experience 3) reflects Vygotsky's theory, where social interaction and collaborative learning enhance individual understanding. Students engaged in discussions, shared their AI-generated designs, and learned from each other's experiences, demonstrating the social construction of knowledge. Similarly, the faculty learning community (Experience 2) fostered a collaborative environment where knowledge about AI tools and their applications was constructed through shared experimentation and dialogue. This collaborative exploration allowed faculty to learn from each other's diverse perspectives and disciplinary expertise, further exemplifying the social dimension of constructivist learning.

Moreover, the iterative design process encouraged by GenAI tools, as observed in all three cases, reflects the constructivist emphasis on building knowledge through cycles of action, reflection, and modification. In Experience 1, I engaged in iterative cycles of prompt refinement and image generation, learning through experimentation and continuous adaptation. Similarly, in Experience 3, students iteratively refined their designs based on AI-generated outputs and feedback, actively constructing their understanding of design principles and AI capabilities. This iterative process of knowledge construction aligns with the constructivist view of learning as an ongoing, evolving process

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Kolb's (1984) experiential learning cycle was also present across the three cases. The personal exploration of GenAI and the iterative creative processes of students in the classroom were clear examples of engaging in concrete experience, reflecting on results, conceptualizing new ideas, and experimenting further. For example, in Experience 1, my initial exploration of GenAI tools (concrete experience) led to reflections on their potential applications in design (reflective observation). This, in turn, informed the conceptualization of the AI+Poetry+Design project (abstract conceptualization), which involved further experimentation with different AI tools and workflows (active experimentation).

This cyclical nature of learning through hands-on exploration reinforced the relevance of Kolb's model to GenAI integration in design education. The repeated cycles of experimentation, reflection, and revision helped deepen participants' understanding of how GenAI tools could be used effectively in personal and collaborative design contexts. For instance, in Experience 3, students engaged in concrete experiences by using AI tools for design ideation. They reflected on the AI-generated outputs, conceptualized new design ideas based on these outputs, and experimented further by refining their designs through an iterative process. This cyclical engagement with AI tools fostered deeper learning and a more nuanced understanding of AI's capabilities in design.

Furthermore, the collaborative nature of Experience 2, where faculty members from diverse disciplines engaged in hands-on experimentation with AI tools, also aligns with Kolb's experiential learning cycle. The shared experiences and reflections fostered a collective learning process, where participants iteratively explored AI applications in their respective fields, deepening their understanding of AI's potential in design education.

Schön's (1983) concept of reflective practice also significantly inspired this article and the reflections and conversations that took place at the faculty learning community. Reflection-in-action allowed me, my peers, and my students to make real-time adjustments in how they used GenAI tools, while reflection-on-action helped me refine my teaching and creative practices based on my experimentation with AI. For instance, in Experience 1, I continuously evaluated the AI-generated outputs and adjusted my prompts and parameters in real-time (reflection-in-action) to achieve the desired design outcomes. This ongoing reflection allowed me to adapt my approach and learn from the process itself.

This reflective process also enabled my peers in the faculty learning community to adapt their approach to using GenAI by participating in a group that fostered continuous and collaborative learning and improvement. For example, in Experience 3, students engaged in reflection-in-action by evaluating the AI-generated images and making adjustments to their designs based on these outputs and the feedback they received from their peers and instructor. In Experience 2, the collaborative discussions and knowledge sharing within the faculty learning community fostered reflection-on-action, where participants collectively analyzed their experiences with AI and refined their understanding of its potential applications in design education. This iterative workflow encouraged continuous reflection and adaptation, fostering a deeper understanding of the design process and the role of AI within it.

Moreover, the reflection-on-action component of Schön's framework is evident in the overall structure of this paper, where I critically analyze my experiences with GenAI and draw

implications for design education. This retrospective reflection allows for a deeper understanding of the challenges and opportunities associated with AI integration and informs the development of strategies for its effective use in pedagogical practice.

The integration of TPACK (Mishra & Koehler, 2006) was particularly evident in the undergraduate course, as it required a deliberate balance between technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) to create a meaningful learning experience. The course incorporated GenAI tools such as Adobe Firefly and Vizcom, alongside industry-standard software like Adobe Illustrator, Photoshop, and InDesign, allowing students to explore both traditional and emerging digital workflows. Pedagogically, project-based learning and iterative critique sessions encouraged students to engage in hands-on experimentation while refining their design decision-making processes. Interactive tutorials and prompt engineering workshops enhanced students' technological fluency, Students were guided to critically analyze AI-generated outputs, compare them with traditional design techniques, and evaluate their alignment with their expectations and project requirements. This holistic TPACK approach supported students in mastering both traditional and innovative design techniques and fostered critical engagement with emerging technologies, thus preparing them for the evolving demands of the design industry (Kumar *et al*., 2024; Zaim *et al*., 2024;)

The concept of democratization of creativity (Fleischmann, 2015) was clearly illustrated in all three cases. GenAI tools helped reduce barriers to creative exploration by providing individuals with the ability to visualize and iterate on complex design concepts easily. For example, in Experience 3, the use of AI image generators in the undergraduate design course allowed students with varying levels of artistic skill to participate in the design process. Students who might have struggled with traditional sketching methods were able to generate and explore visual ideas using AI, fostering a more inclusive and engaging learning environment. This observation aligns with the vision of "Intelligence Unleashed" proposed by Luckin et al. (2016), where AI is seen as a tool to democratize access to high-quality learning experiences. This level of accessibility is essential for making creative practices more inclusive, which is particularly important in public educational institutions where students come from diverse backgrounds. By giving students the ability to experiment with sophisticated design concepts, GenAI enabled them to participate more fully in creative processes, regardless of their prior experience or technical proficiency.

In Experience 2, the faculty learning community provided a platform for educators from diverse disciplines to experiment with AI tools and explore their potential applications in their respective fields. This democratized access to AI technology and knowledge, empowering faculty members to integrate AI into their teaching and creative practices, regardless of their prior experience with digital tools. Likewise, in the AI+Poetry+Design project (Experience 1) the democratization of creativity was also present, as it enabled me to explore a new form of artistic expression that was beyond my technical skills with traditional methods by combining AI tools with my personal interests in poetry and fashion design. This demonstrates how AI can empower individuals to engage in creative practices that might have been previously inaccessible due to technical or skill-based limitations.

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Implications for Design Education, Research, and Practice

The analysis and reflection of the experiences discussed in this article, inspire the following recommendations for design education, research, and practice. These insights aim to serve as an inspiration—rather than a prescription—to critically explore the potential of GenAI in academic settings.

1. *Fostering Inclusivity and Accessibility in Design:* GenAI tools have shown significant potential to democratize access to design education and creative practice. By lowering technical barriers, GenAI enables students from diverse backgrounds, including those without prior artistic experience, to actively participate in creative processes. This aligns with the findings of Lively et al. (2023), who observed that AI-assisted design tools help students with limited design experience engage more effectively in ideation and creative production. Similarly, Günaydin Donduran *et al*. (2024) highlight that AI is shifting design education from a human-dominated process to one of human-AI collaboration, allowing broader participation. This expanded access aligns with the observations across personal explorations, faculty collaborations, and student experiences, supporting the notion that GenAI can create more equitable and inclusive learning environments. However, while these tools can promote inclusivity, careful implementation is necessary to address ethical considerations, such as equitable access, data biases, and the responsible uses of AI. Ahmad et al. (2023) caution that unregulated AI adoption may exacerbate inequities, as many students—particularly those in underfunded institutions or underserved communities—lack access to paid AI tools, creating a digital divide in learning opportunities. Similarly, Jin et al. (2024) emphasize that AI policies in higher education must address equity concerns to ensure that AI technologies remain accessible to all students, not just those with financial or institutional advantages. Furthermore, Tanksley (2024) highlights how AI systems can reinforce algorithmic biases, particularly in marginalized communities, raising concerns about whose creative perspectives are prioritized and whose are excluded. These concerns underscore the importance of critically assessing AI's role in education to ensure that it serves as a tool for empowerment rather than an amplifier of existing disparities.

2. *Facilitating Interdisciplinary and Collaborative Learning Environments:* Integrating GenAI within faculty learning communities and classroom settings highlights its potential to foster interdisciplinary collaboration. By providing a shared technological platform, GenAI encourages participants from diverse fields to engage in collective exploration and creative production. This ability to bridge disciplinary boundaries enhances the richness of creative projects, promoting collaboration and interdisciplinary innovation. The experiences documented show that collaborative settings enable educators and students to learn from one another and adopt new technologies more effectively, emphasizing the importance of supportive, community-driven learning. However, as Hughes *et al*. (2021) caution, many AI tools operate as "black-box systems," limiting users' ability to fully understand or control the creative outputs. This limited transparency can hinder meaningful interdisciplinary exchange if users are unable to critically assess how AI-generated content is influencing their creative decisions and collaborative work. Addressing these challenges requires strategies that balance AI's collaborative potential with mechanisms for transparency, user control, and critical engagement with AI-generated content.

3. *Developing Traditional and New Design Skills:* Integrating GenAI tools in individual and classroom contexts demonstrates the value of blending traditional design techniques with emerging technologies. GenAI provides an environment where students engage in iterative processes that combine sketching, rendering, and prototyping with AI-generated ideation. This hybrid approach prepares students to meet industry demands that increasingly require proficiency in foundational design skills and AI-driven methods. As educators, it is essential to ensure that these tools are used to enhance rather than replace core design skills, emphasizing structured pedagogical approaches that foster both AI literacy and critical engagement with GenAI and AI-generated content (Chen et al., 2023). By implementing reflective design exercises and transparent AI methodologies, educators can encourage students to leverage AI as a complement to their creative practices and decision-making abilities (Meron & Tekmen Araci, 2023).

4. *Embedding AI Literacy into Design Education:* The experiences discussed in this paper emphasize the importance of embedding AI literacy into design education, as suggested by the UNESCO regarding the importance of such literacy for all learners (2024). However, AI literacy should go beyond basic technical proficiency to include critical engagement with AI-generated content, ethical considerations, and an understanding of AI's limitations (Holstein & Aleven, 2022). By fostering critical AI literacy, educators can equip students not only with the skills to use AI effectively but also with the capacity to interrogate its biases, ethical risks, and societal impacts (Chen et al., 2023). Additionally, the integration of GenAI prompts a shift in traditional roles as designers are no longer sole creators but have become facilitators and curators of creative processes. This redefinition allows designers to leverage AI for routine tasks, focusing more on strategic, conceptual, and reflective aspects of design work (Duggal, 2024).

5. *Augmenting Creative Practices:* The personal exploration and faculty learning community experiences reveal that GenAI tools can significantly augment the creative process by dramatically increasing the number and variety of creative outcomes that can be produced with them compared to traditional design approaches. GenAI tools have the potential to facilitate rapid experimentation, enabling the exploration of unconventional forms, materials, and concepts that might be less feasible through manual processes alone. Additionally, by integrating outputs from various AI systems, designers can overcome individual tool limitations and biases to generate more diverse and sophisticated design solutions. Consequently, as designers and educators, it's critical to approach GenAI as a technology that augments—rather than substitute—human creativity; by designing learning experiences that encourage students to critically engage with AI-generated content, we as educators can promote GenAI uses that expand human-guided creative explorations (Song et al., 2024).

6. *Navigating Ethical Challenges:* Integrating GenAI tools in design education and practice brings significant ethical considerations. Issues such as authorship, copyright, equitable access, environmental impacts, data biases, unregulated labor conditions, and potential misuses require careful attention to ensure the responsible AI use. Design educators should implement transparent guidelines to promote academic integrity, requiring proper attribution and critical engagement with AI-generated content (Bartlett & Camba, 2024; Jin et al., 2024). Additionally, AI literacy initiatives should emphasize transparency, bias mitigation, and ethical decision-making to prevent students from passively accepting AI-generated

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outputs, reinforcing the importance of critical evaluation (Tang & Su, 2023; Tanksley, 2024), while sustainability concerns related to AI's high energy and water consumption should be integrated into curriculum discussions (Bozkurt & Sharma, 2023). By addressing AI's these ethical, environmental, societal, and economic challenges in educational settings, students can be better prepared to use AI tools responsibly, ethically, and consciously.

7. *Adapting Pedagogy to Integrate AI Tools Effectively:* The experiences outlined in the paper illustrate how the introduction of GenAI required curricular and instructional adaptations. This adaptation included developing flexible pedagogical strategies incorporating manual and digital design techniques, ensuring students benefit from a more holistic learning experience. As Chiu (2024) highlights, the integration of AI in the classroom promotes the adaptation of existing teaching practices and the development of new approaches to curriculum design. As Sullivan et al. (2023) note, in the face of rapid social and technology changes, educators are called to continuously update their syllabi to reflect the evolving ethical and technical implications of AI integration. This approach is intended to prepare students for evolving professional needs and equip educators with strategies to navigate the complexities of incorporating new and disruptive technologies in the classroom.

8. *Fostering Critical and Creative Thinking:* The iterative nature of GenAI tools provides opportunities for fostering critical and creative thinking in design education. By enabling students to generate, evaluate, and refine multiple design iterations, GenAI affords a deeper engagement with the creative process. This iterative workflow has the potential to help students develop a more critical perspective, allowing them to explore different solutions and understand the strengths and weaknesses of their designs. Such an approach may support the development of more thoughtful and well-considered design outcomes and, more importantly, the development of high order thinking skills that can be applied to multiple life situations beyond design projects. However, while GenAI can enhance ideation, it also presents risks of over-reliance, potentially diminishing students' ability to think independently and critically evaluate their work (Li, 2024). Research suggests that students may default to AI-generated outputs instead of engaging in deeper problem-solving if no educational strategy is established to promote reflection and critical engagement (Meron & Tekmen Araci, 2023; Wood & Moss, 2024).

9. *Strengthening Faculty Professional Development:* The experiences of the faculty learning community demonstrate the value of collaborative professional development when integrating new technologies like GenAI. Faculty members benefit from shared learning experiences, where interdisciplinary collaboration and mutual support facilitate the adoption of AI tools in their teaching, research, and creative practices. This collaborative approach is instrumental in helping educators remain adaptable and effective in the face of new technologies and approaches, ultimately enhancing their ability to serve their students better. This aligns with broader trends in AI adoption, where institutional support, professional development, and structured training programs significantly impact AI integration success (Zaim et al., 2024). However, challenges remain, particularly regarding disparities in access to AI tools and the varying levels of AI literacy among faculty. As Batista *et al.* (2024) highlight, while AI has transformative potential, educators require specialized training to effectively integrate it into

pedagogical strategies. To support faculty in this transition, institutions should provide clear guidelines, resources, and structured learning communities, ensuring that AI adoption is not only technically feasible but also pedagogically sound (Li, 2024). Additionally, educators need to remain aware of AI's limitations, including potential biases in AI-generated content and its impact on student learning autonomy.

10. *Empowering Student Autonomy through AI Tools:* In the experiences described before, GenAI tools showed potential to empower student autonomy by enabling them to take greater control over their creative processes. By lowering technical barriers, these tools allow students to experiment independently, make informed creative decisions, and iterate on their work without needing extensive technical expertise. This empowerment fosters a sense of ownership over their projects and encourages proactive engagement with both traditional and AI-enhanced design practices. However, while may AI foster autonomy, these tools can have the opposite effect as well. Some studies suggest that students who consistently defer creative decision-making to AI may develop a passive approach to learning, diminishing their capacity for independent ideation (Gmeiner et al., 2023). As educators, we must therefore carefully design learning experiences that balance guidance with opportunities for independent exploration.

Conclusions

This paper aimed to share my experiences and reflections exploring the integration of generative artificial intelligence (GenAI) in design education, research, and practice. These experiences show that GenAI has the potential to expand accessibility, enhance experiential learning, and bridge traditional and emerging creative practices. Personal experimentation revealed opportunities for integrating AI in creative workflows; faculty collaboration demonstrated the role of community-driven learning in technology adoption; and student learning experiences highlighted how GenAI tools can empower novice designers, fostering inclusivity, creativity, and interdisciplinary collaboration. Theoretically, these experiences align with constructivist and experiential learning frameworks, illustrating how GenAI can serve as a tool for knowledge construction and active engagement in educational settings. The emphasis on reflective practice further underlines the importance of critical and iterative exploration when integrating new technologies into pedagogy.

This study also contributes to the growing body of empirical research on GenAI in education by contextualizing these experiences within recent findings. As discussed in the empirical perspectives section, studies have highlighted AI's role in democratizing creativity (Fleischmann, 2015), fostering interdisciplinary collaboration (Kumar et al., 2024), and supporting iterative learning (Chiu, 2024). The case studies in this paper align with these findings, demonstrating how GenAI facilitates rapid ideation, enhances design decision-making, and fosters a more exploratory learning process. However, this study also reinforces concerns raised in the literature regarding potential over-reliance on AI-generated outputs (Wood & Moss, 2024) and the risk of diminishing cognitive skills if AI is used uncritically (Ahmad et al., 2023).

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However, it is important to acknowledge the limitations of this study. The insights presented are drawn from specific experiences within the context of a public university in the southeastern United States, focusing on design education. As such, the applicability of these findings may vary across different disciplines, institutions, or educational levels. The reflective nature of this research also means that findings are inherently contextual and may not be universally applicable.

Ethical considerations remain central to the discourse on GenAI in education. This study reaffirms existing concerns about the authorship and originality of AI-generated content (Chen, 2024), the environmental impact of AI technologies (Bozkurt & Sharma, 2023), and the risks associated with algorithmic biases (Tanksley, 2024). The findings emphasize the need for structured AI literacy initiatives that equip students and educators with the critical skills to navigate these ethical complexities. Moreover, access to AI tools remains an equity issue, as students and educators in underfunded institutions and underserved communities may lack the resources to engage with these technologies effectively (Günaydin Donduran et al., 2024). Addressing these disparities will be essential in ensuring that AI serves as a tool for inclusion rather than exacerbating educational inequalities.

This paper also invites educators to experiment with GenAI tools across diverse educational contexts. By engaging with GenAI thoughtfully, educators can develop practices that balance traditional and AI-driven design methods, enriching student learning experiences and fostering innovative pedagogical approaches. However, such experimentation must be accompanied by structured reflection, ethical awareness, and critical engagement to ensure that AI enhances rather than undermines learning.

Ultimately, my explorations with GenAI allowed me to rethink my teaching, research, and creative practices; provided me invaluable experiences to offer the recommendations, reflections, and thoughts presented in these pages; and enabled me to open conversations with peers, students, administrators, and members of the community about the role and impacts of generative artificial intelligence in design education, and in society at large.

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