Canadian Journal of Learning and Technology
Revue canadienne de l'apprentissage et de la technologie

CJLT RCAT
Canadian Journal of Learning and Technology
La Revue canadienne de l'apprentissage et de la technologie

Generative Artificial Intelligence in Graphic Design Education: A Student Perspective
L'intelligence artificielle générative dans l'enseignement du graphisme : le point de vue d'un étudiant

Katja Fleischmann

Volume 50, Number 1, Winter 2024

URI: https://id.erudit.org/iderudit/1113526ar
DOI: https://doi.org/10.21432/cjlt28618

See table of contents

Publisher(s)

The Canadian Network for Innovation in Education

ISSN

1499-6677 (print)
1499-6685 (digital)

Explore this journal

Cite this article

Fleischmann, K. (2024). Generative Artificial Intelligence in Graphic Design Education: A Student Perspective. *Canadian Journal of Learning and Technology / Revue canadienne de l'apprentissage et de la technologie*, *50*(1), 1–17. https://doi.org/10.21432/cjlt28618

Article abstract

Generative Artificial Intelligence (GenAI) is re-defining the way higher education design is taught and learned. The explosive growth of GenAI in design practice demands that design educators ensure students are prepared to enter the design profession with the knowledge and experience of using GenAI. To facilitate GenAI's introduction in a project-based context, it is suggested that design educators use critical engagement as a starting point to assure students understand the strengths and weakness of GenAI in the creative design process. There is little guidance on how to systematically integrate GenAI in design studio practice while maintaining a critical perspective of the ethical issues it has engendered. This research explores student attitudes toward GenAI, frequency of its use, and student perception of its impact on their future design careers. A survey of a representative cohort of graphic design students (n = 17) reveals a pragmatic acceptance that GenAI will change how design is practiced and a concurrent willingness to learn more on how to use it effectively and ethically. The survey validates the need for design educators to engage and guide students critically in their understanding and use of GenAI within studio and professional practice.

CJLT RCAT
Canadian Journal of Learning and Technology
La Revue canadienne de l'apprentissage et de la technologie

Volume 50 (1) Winter / Hiver 2024

Generative Artificial Intelligence in Graphic Design Education: A Student Perspective

L'intelligence artificielle générative dans l'enseignement du graphisme : Le point de vue d'un étudiant

Katja Fleischmann, Griffith University, Australia

Abstract

Generative Artificial Intelligence (GenAI) is re-defining the way higher education design is taught and learned. The explosive growth of GenAI in design practice demands that design educators ensure students are prepared to enter the design profession with the knowledge and experience of using GenAI. To facilitate GenAI's introduction in a project-based context, it is suggested that design educators use critical engagement as a starting point to assure students understand the strengths and weakness of GenAI in the creative design process. There is little guidance on how to systematically integrate GenAI in design studio practice while maintaining a critical perspective of the ethical issues it has engendered. This research explores student attitudes toward GenAI, frequency of its use, and student perception of its impact on their future design careers. A survey of a representative cohort of graphic design students (n = 17) reveals a pragmatic acceptance that GenAI will change how design is practiced and a concurrent willingness to learn more on how to use it effectively and ethically. The survey validates the need for design educators to engage and guide students critically in their understanding and use of GenAI within studio and professional practice.

Keywords: artificial intelligence, AI integration, design curriculum, generative AI, graphic design, graphic design education, student attitudes

Résumé

L'intelligence artificielle générative (GenAI) redéfinit la manière dont la conception de l'enseignement supérieur est enseignée et apprise. La croissance explosive de la GenAI dans la pratique de la conception graphique exige que les éducateurs s'assurent que les étudiants sont préparés à entrer dans la profession de concepteur graphique avec les connaissances et l'expérience de l'utilisation de la GenAI. Pour faciliter l'introduction de la GenAI dans un contexte de projet, il est suggéré que les éducateurs utilisent un engagement critique comme point de départ pour s'assurer que les étudiants

comprennent les forces et les faiblesses de cette intelligence dans le processus créatif de conception. Il y a peu de directives sur la manière de l''intégrer systématiquement dans la pratique du studio de conception tout en maintenant une perspective critique sur les questions éthiques qu'elle a engendrées. Cette recherche explore les attitudes des étudiants envers l'intelligence artificielle, la fréquence de son utilisation et la perception des étudiants de son impact sur leur future carrière de concepteur graphique. Une enquête auprès d'un groupe représentatif d'étudiants en conception graphique (n = 17) révèle une acceptation pragmatique du fait que la GenAI changera la manière dont la conception graphique est pratiquée et une volonté concomitante d'en apprendre davantage sur son utilisation efficace et éthique. L'enquête valide le besoin pour les éducateurs d'impliquer et de guider les étudiants de manière critique dans leur compréhension et utilisation de la GenAI au sein de la pratique en studio et en milieu professionnel.

Mots-clés: attitudes des étudiants, conception graphique, éducation en conception graphique, IA générative, intégration de l'IA, intelligence artificielle, programme de design

Introduction

Generative artificial intelligence (GenAI) is the latest technology to profoundly disrupt design practice and education. GenAI is viewed by some as the most disruptive technology ever introduced to society, business, and education (Pavaloaia & Necula, 2023). Given this reality, design educators need to discover ways to include GenAI in their curriculum based on changing roles within the design profession that will require less technical know-how in design domains such as graphic design and more collaboration and digital curator skills. Kauppinen and Sivula (2023) observe, "Universities have a role in both educating and being forerunners both for and with society" (p. 265).

The use of GenAI in design education is still in its early stages. Forward thinking design educators have begun implementing artificial intelligence (AI) platforms in a limited way and are beginning to formulate how to ethically incorporate GenAI's use in design education (e.g., Fleischmann, 2024; Huang et al., 2023; Yang, 2020). There are few guidelines about how to integrate this rapidly developing technology especially given its well-known ethical challenges of plagiarism, copyright infringements, and embedded bias in its programming that produces mistakes (DeBrusk, 2018; Solly 2019). Although universities have hastily assembled policies governing AI's general use and warned of its unaudited problems (e.g. Griffith University, 2023), design educators are confronting the need to integrate GenAI practice into their curriculum due to its rapid adoption in the design industry (Hommés Studio, 2023; Kaiko, 2023).

This is not the first time that technology has disrupted how design is practiced, taught, and learned (Fleischmann, 2013, 2015). Two relatively recent examples stand out. Manual tasks in the printing industry were replaced by digital processes when desktop publishing debuted, pioneered by word processors in the 1970s. Similarly, the Internet dramatically changed how people communicated, shopped, planned, and socialised, with designers constructing and facilitating these new forms of communication and interaction. Each new technology shift led to radical changes and specializations emerging in the design profession. For example, User Interface (UI) and User Experience (UX) design

emerged with the Internet while GenAI is introducing prompt engineering as a new design skill. The historical arc of design as a hands-on craft in the creation of visual works has co-evolved with digital technology into its current fluid state of interacting with hyper-fast databases which assume the role of creative iteration – once the sole provenance of graphic designers.

The challenge for design educators is to ensure that design students maintain and develop their creative mastery in the graphic design process while simultaneously educating design graduates to be conversant with GenAI processes demanded by the industry. Kauppinen and Sivula (2023) see that students and educators need to work *together* to "fully comprehend the changes currently taking place in the higher education sector" (p. 270). An attempt to help facilitate such collaboration between design educators and students in the use of GenAI is the purpose of this study. This research therefore aimed to explore graphic design student attitudes toward GenAI in the context of its rapidly expanding use in the design profession to help guide design educators towards its integration in the classroom. A pragmatic approach was integral to this study and included collecting quantitative and qualitative data from 17 undergraduate graphic design students through a survey. Findings showed that students have an open attitude towards the use of GenAI as part of their future careers.

Historical Context: Design Automation

Artificial intelligence is part of the historical trajectory of technology that transformed livelihoods, society, and subsequently fuelled suspicion and angst. Mechanophobia–the fear of machines–is a prime example of this resistance to technological change. Mechanophobia was born during the Industrial Revolution when machines took over manufacturing processes. In the 1830's, for example, the silk design textile industry was revolutionised in Lyon, France by the Jacquard loom, which was automated by a chain of punch cards, a precursor to the computer age (Wikipedia, 2024c). Artificial intelligence has assumed a similar role as the Industrial Revolution's Jacquard looms, which replaced people with automation. Artificial intelligence's omnipresence in society and education is tinged with a similar fear of its uncontrollable sweep which is raising some concerns that AI will replace people in some design jobs (Meron, 2022; Taylor, 2023) but will not dominate humankind as visualised in popular films and literature.

There are many definitions of AI, such as the one proposed by Monostori (2019) which defines AI as computer programs that behave like humans in their problem solving and adaptability. This idea that machines can mimic the human brain has been studied for decades. Machine learning and intelligence were put to the test in 1950 when British mathematician and computer researcher Alan Turing (1950) wrote his seminal paper, *Computing Machinery and Intelligence*. In that paper, Turing posed the question, "*Can machines think?"* To answer that question, Turing invented the *Imitation Game*, where a human had to determine if the answer to a question was generated by a machine or a person (Wikipedia, 2024a). Turing died in 1954 long before IBM's supercomputer, Deep Blue, beat world class chess champion Gary Kasparov in 1996 with its ability to calculate up to 21 moves (Wikipedia, 2024b). There is little doubt that Turing would have been astounded by the advancements in AI that have swept the world since the Imitation Game, particularly when a Large Language Model–ChatGPT–burst into public consciousness in November 2022. ChatGPT (developed by OpenAI) is

arguably the best-known GenAI platform that can seemingly answer any question posed instantaneously, although ChatGPT and its image-creating counterparts are often criticised for producing mistakes (Rees, 2023). How does GenAI fit within the broader definition of AI? Marr (2023) notes that GenAI has the ability to create independent outcomes such as images, text, and video rather than perform a discrete set of mathematical tasks. GenAI is trained to recognise patterns in user requests or prompts which trigger the platform to produce seemingly original and creative products.

As GenAI evolves, it is reshaping how design is practiced (Gibbons & Moran, 2024). Although GenAI is also being employed in other domains such as interior design and product design (Bartlett & Camba, 2024), it is particularly predominant in graphic design.

The central role of GenAI in the evolution of design practice centres on automated processes that signal an information age revolution analogous to the Jacquard loom. The truly revolutionary aspect of GenAI within design practice is its capacity to generate text and images from a simple text-chatbot interface. Image-generating platforms such as Midjourney and DALL-E produce artificial images, photographs, and design solutions based on a user written request (prompt) in a chatbot dialog format. These platforms can generate creative outputs which imitate any designer, any style period, or combined to create new outcomes. Text generating platforms such as ChatGPT (version 3.5) function in the same way but create text-based information/solutions (Guinness, 2023). GenAI platforms can also be engaged for tasks such as video synthesis, automated translation, code generation, scripting, etc. (e.g., Sun, 2024).

Critics of GenAI in design practice and education worry that its implementation in the design profession will render some roles–such as graphic designer–obsolete (Matthews et al., 2023; Meron, 2022). As Bearman et al. (2022) observe, “AI could have real impact upon labour markets and thus higher education. Therefore, AI is not just a matter for technological innovation but also represents a fundamental change in the relationship between higher education and broader socioeconomic interests” (p. 370).

That said, GenAI has its advocates in the educational sector such as Braue (2023) who states, “Students must be engaged in the normalisation of generative AI within schools and universities” (p. 1).

AI in Higher Education

The use of AI in education has been studied for almost four decades. Wenger (1987) explored the interaction between computational mechanisms and cognitive functions, emphasizing the role of AI and machine learning in facilitating knowledge transfer. Wenger already observed the importance of educator meditation when using AI programs, noting that AI programs largely ignored human expertise, an absence which is still being noted in GenAI (Zawacki-Richter et al., 2019). Zawacki-Richter et al. concurred with Wenger that AI needed guidance from tutors to make sure learning objectives were achieved to be implemented successfully. Pinkwart (2016) stressed that teachers need to be trained on how to use the new technology otherwise they are “less likely to use it” (p. 774).

Early research on GenAI in higher education focused more on generalised descriptions while specific prescriptions for its use are slowly emerging. In fact, initial literature reviews about the use of

AI in higher education found that the very term *artificial intelligence* is used in a vague and circular manner within higher education journals without in-depth discussion with its stakeholders. Bearman et al. (2022) addressed the dilemma by giving a working definition of AI's wide reach: "AI in higher education encompasses an assemblage of data, different kinds of software, bureaucracies and corporations that sometimes include and sometimes exclude teachers, students and administrators" (p. 381). Zawacki-Richter et al. (2019) identified four key areas of how GenAI's is currently used by administrators and educators which are (a) assessment and evaluation, (b) profiling and prediction, (c) intelligent tutoring systems, and (d) adaptive systems with personalization.

Several articles list how AI is changing the shape of higher education by simulating teachers through Intelligent Tutoring Systems (Schiff, 2021). Crompton and Burke (2023) found that AI was mainly used for student assessment, managing student learning, as well as automated tutoring which adjusts student activities and strategies based on their individual needs. Grassini (2023) envisions a bright future for AI in the classroom. She cites ChatGPT as a tool to help educators with assessments and lesson plans thus decreasing educator workload. Despite the potential pedagogical opportunities, in a wide-ranging assessment of the future of GenAI in education, the UNESCO report (Miao & Holmes, 2023) states that more studies need to be done on GenAI's psychological and social impact on students.

GenAI in Design Education

There is a big difference, however, between automated tutoring systems and GenAI used by designers. The latter can produce thousands of variations of images and designs through simple prompts which are written instructions or questions from users. Design educators anticipate that GenAI will reshape the designer's role, necessitating new skill sets in design graduates (Davis, 2023; Gilbert, 2023; Yeo, 2023). These new design skills broadly align with those identified in The Future of Jobs Report 2020 (World Economic Forum, 2020): analytical thinking, complex problem-solving, critical analysis and creativity, originality, and initiative. Specific to graphic design, Matthews et al. (2023) identified "a move…toward a deeper engagement with the human skills associated with negotiation, facilitation and judgement" (p. 2). The human-centric skills are central to design's studio pedagogy. This stance was corroborated by the student attitudes toward GenAI presented in this study. Design educators are also starting to recognize the importance of teaching skills aligned with GenAI, leading to discussions on integrating programming skills into design classes (Offenhuber & Mountford, 2023) as well as prompt engineering (Bamford, 2023; Dubberly & Pangaro, 2023). Others such as Cain and Pino (2023) advocate for the preservation of the human touch in design education amid the technological advancements. The question is how to introduce and integrate GenAI effectively.

The limited literature regarding AI utilization in design education offers minimal guidance on a systematic approach to teaching fundamental design studio concepts. Concerns related to issues such as plagiarism, copyright violations, and the perpetuation of racial stereotypes challenge the unbridled integration of GenAI (Auernhammer, 2020; Morrone, 2024; Ray, 2023). However, researchers recognize its potential as a transformative technology in design. Figoli et al. (2022) studied design students' reliance on AI tools in a project-based assignment, observing their interaction and trust in AI

platforms. The educators discovered that the majority of design students believed AI was valuable in initial brainstorming but not essential in the final design process.

In the course *Designing AI Products and Services*, Carnegie-Mellon University's syllabus (Yang, 2020) which is freely available, includes a basic understanding of how AI works as well as hands-on experience in its use as a "design material". The course, which was taught at the University's Human-Computer Interaction Institute, also addressed ethical issues using AI, such as discrimination. The Carnegie-Mellon course is the result of forward-thinking instructional design recognising the need to incorporate advanced technology in design education to introduce disruptive technology tools from a critical perspective.

The importance of a critical perspective in teaching GenAI cannot be overstated. Fleischmann (2024) introduced a systematic approach to incorporating the use of GenAI in an undergraduate design curriculum using a project-based assignment, which was undertaken after students discussed the ethical concerns of using GenAI in design. In her work, the author asked students to reflect on their experiences and found that many were sceptical about GenAI's creative abilities and expressed disappointment about its mediocre output. Fleischmann (2024) concluded that students who use GenAI may be sidestepping the quintessence of the creative process which involves grappling with conceptual challenges, experimenting with diverse ideas, and confronting obstacles in translating abstract concepts into tangible visual forms. In return, they may miss out on deeper learning experiences and lack the confidence that comes from navigating to find their creative voice.

Huang et al. (2023) propose an innovative approach to design education that goes beyond traditional AI concepts and practices. They advocate for an experiential exploration of AI knowledge and skills, fostering creative and aesthetic integration with AI in future scenarios. The emphasis is on combining personal and societal perspectives within course design to encourage a holistic understanding of designing with AI. On a practical level, they highlighted assessment as a challenge and suggested evaluating a blend of intuitive, forward-thinking creativity and a reflective, critical approach to understanding design iterations.

In the few previous studies, design educators viewed GenAI as an inevitable part of design curriculum that should be tempered by its limitations. As GenAI's use in society and the design profession becomes more widespread, its benefits and shortcomings are surfacing in academic discourse. Design educators in Germany, for example, are worried about GenAI replacing graphic designers (Fleischmann, 2023). In fact, job losses are a widely mentioned concern among design educators (Matthews et al., 2023; Meron, 2022). Some design educators, like Yeo (2023) take a pragmatic approach to introducing AI to students: "These digital buzzwords are here to stay whether we like it or not, so faculty members need to be digitally literate to provide capabilities beyond emerging technologies such as AI, the Internet of Things, and data science" (p. 229).

Automation vs. Creativity

One of the hallmarks of GenAI is automation, based on algorithms which translate user written prompts into visual or written results. GenAI models are trained on datasets, identifying patterns to generate new data that mimics the original training set (Marr, 2023). An example is logo design. Once a

paid-for service employing design professionals, it can now be undertaken using GenAI platforms–a process the majority of students in this study explored a trimester earlier. The logo design process can take minutes using GenAI, compared to hours if drawn by hand. GenAI logo makers operate by using a simple fill-in form:

Step 1: input the [business name] and [slogan] (Figure 1)

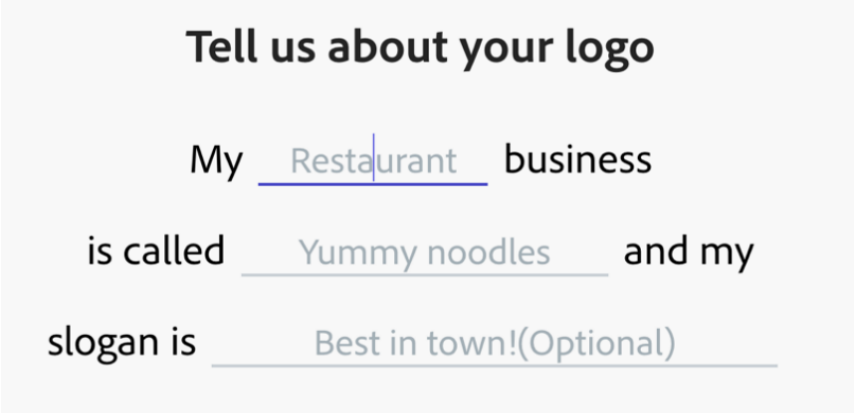
Step 2: select a 'style' such as 'elegant' or 'modern' (Figure 2)

Step 3: select a 'colour theme' (Figure 3)

Step 4: press 'create my logo' button which provides a multitude of logo designs

Figure 1

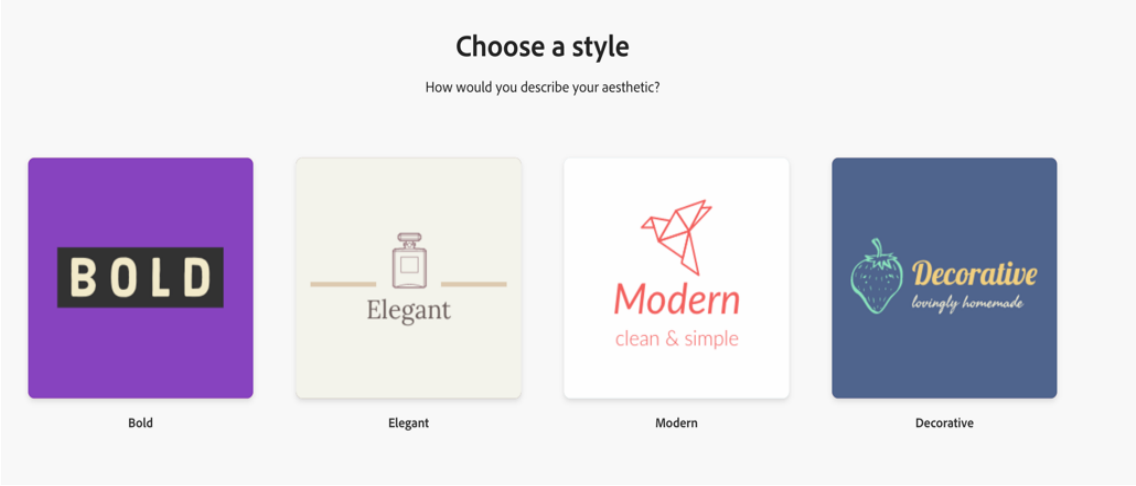
Input Prompts for Logo Design



Note. Adobe Express Logo Maker, https://www.adobe.com/express/create/logo

Figure 2

Logo Style Selector



Note. Adobe Express Logo Maker, https://www.adobe.com/express/create/logo

Figure 3

Colour Theme Selector

Note. Logo.com, https://app.logo.com

The ease and speed of logo generation via fill-in form and colour palettes essentially eliminates the rigorous and iterative process that students undergo during the creation of graphic design projects. While it is not guaranteed that the outcomes created by GenAI platforms are always usable (Fleischmann, 2024), it can be argued that they strip away one layer of uncertainty needed to develop student's creative potential. As Kelly (2023) and others (e.g., Orr & Shreeve, 2018) highlight, uncertainty and ambiguity are central pillars in design education, which is characterized by encouraging students to navigate anomalies, overcome design hurdles, and refine their ideas through continuous experimentation and critique.

Research Methods

This study followed a pragmatic research paradigm, recognizing that knowledge is socially constructed and rooted in interconnected experiences (Kelly & Cordeiro, 2020; Morgan, 2007). To gauge student responses to GenAI, the author surveyed undergraduate graphic design students, some of whom had previously discussed its strengths and weaknesses in a class setting before starting their projects. In this study, design students were asked to speculate on the future of GenAI in the design profession and its impact on their job prospects. A survey was used to explore the perceived strengths and challenges of using GenAI, and to measure the impact of an educator-guided overview of GenAI through classroom discussions.

To comprehend design student perspectives on the integration of GenAI into the curriculum, the researcher sought insights from 17 second-year undergraduate students majoring in graphic design as part of a Bachelor of Design program. Applying a pragmatic research paradigm enabled the researcher to select a method that suited the real-world practice nature of the situation (Creswell, 2008; Punch, 2009). Therefore, an online survey was deemed most suitable to collect data in an efficient manner (Wright, 2005). The survey, conducted through an online tool (Survey Monkey), gathered both quantitative and qualitative data. Survey questions delved into students' utilization of GenAI, its impact on the design profession, and the perceived advantages, challenges, or limitations thereof.

The researcher crafted the survey questions to first gather a broad overview or trend on the topic using closed-ended questions and then elicited more detailed insights with open-ended follow-up questions. This approach yielded data on measurable indicators (e.g., *How do you perceive the impact of AI tools on the design profession?* Answer choices: *Positive, Neutral, Negative*) and also provided deeper understanding of the studied phenomena through qualitative feedback (e.g., *Please explain your answer. Why do you feel positive/negative/neutral?*). Furthermore, answer options for the two multiple choice questions that inquired about the perceived advantages and disadvantages of GenAI in the design process, linked directly to industry practice realities reported in existing research (e.g., Gilbert, 2023; Huang et al., 2023; Meron, 2022). The specific survey questions are included in the Findings and Discussion section.

The general approach to data analysis was inductive and had an overall drive of exploration and discovery (Morse & Niehaus, 2009). For the analysis of the quantitative data, SurveyMonkey delivered basic statistical data including the tally of response totals, percentages, and response counts. Qualitative data analysis involved categorizing comments into two overarching themes (Kiger & Varpio, 2020), namely benefits and challenges. In presenting student perspectives, qualitative feedback was employed to enhance the quantitative findings, providing a deeper understanding of the situation (Fielding, 2012; Rossman & Wilson, 1985).

Although small by statistical standards, the participant numbers represent a sample size congruent with the size of design classes taught in a traditional design studio environment. The researcher is aware that the small sample size limits the generalisability of findings but rather presents real-time in-class perspectives on attitudes which reflect students' experience.

Findings and Discussion

Impact of GenAI on Design Careers

Survey responses clearly indicate that students do not view GenAI as a threat to their future career goals. The survey asked students to speculate about their future jobs in the design profession in five years' time. Fourteen students expressed a desire to be graphic designers, whether working as a freelancer in a creative studio, or by setting up their own business. Additionally, another student aspired to be a font designer while another aimed to merge their design skills with film and TV. One student was unsure but commented on a wish to do "something creative either producing digitally or physically". The students did not see GenAI threatening their hopes of becoming employed; a concern that some

design educators have expressed about the use of GenAI in the graphic design profession (Fleischmann, 2023; Matthews et al., 2023; Meron, 2022). Students seemed confident in their professional design future despite a large majority (82%) agreeing that GenAI will replace certain aspects of traditional design work. While 6% predicted this replacement will largely happen; the remaining students (12%) saw GenAI as complementary to traditional design work. This confidence that their job futures were not threatened by AI was also reflected in the student comments. One student remarked, "AI will not replace human designers. It will enhance the design process and maximise people's creativity."

Student Use of GenAI

The use of GenAI in the design profession has increased significantly since its pioneering inception. Companies are now employing GenAI, particularly in the iterative process (e.g., Wernersson & Persson, 2023), which indicates that students need to be familiar with its basic use. The survey asked students if they had ever used AI-powered design tools for university projects prior to the trimester. The majority (70%) had used GenAI occasionally, while roughly a quarter (24%) said they had never used AI but were interested in learning more about it. Only one student was not interested in using GenAI.

Advantages and Disadvantages of Using GenAI

Students were asked to identify the main advantages and disadvantages of using GenAI. More than three-quarters of the respondents (76%) cited *improved efficiency in design tasks* as the major advantage of AI and more than 80% said *AI enhances creativity and inspiration*. More than half of the students (53%) agreed that AI gave them *access to data analytics and insight*. Roughly a third (35%) cited *customization and personalization of designs* as an advantage. No student selected *I don't think there are advantages* from the survey.

When exploring the disadvantages, almost all survey participants (94%) agreed that ethical challenges were the main problem with using GenAI, particularly *stealing or copying work and creative styles*. Other considerable concerns cited by a majority of students (82%) were the *loss of the human touch and creativity* and AI's *limited ability to understand and interpret human emotions and aesthetics*. These responses from students who previously discussed GenAI's problems before using it concur with design educators who cite the same concerns about GenAI's inability to mimic creative approaches to design problems and its error-prone results (Fleischmann, 2024; Huang et al., 2023). Overall, those student responses–both pros and cons–reflect an awareness of the creative shortcomings of GenAI and how to use GenAI without crossing an ethical boundary. This reflects a key learning objective in raising awareness that students need to be responsible for their own actions, decisions, and initiatives during the creative process.

Pragmatic Acceptance – Future Integration

When exploring the openness of students to engage with GenAI technology as part of their design studies, 82% of survey respondents said they wanted to learn more about how to use GenAI tools in the design process, two students (12%) would need more information, and one student (6%) was not interested and preferred learning about traditional design methods only. These findings indicate firstly, an appetite among this design student cohort to learn more about using GenAI in the design process and

secondly, a pragmatic acceptance that GenAI will be part of their professional future and should be consequently in their design education. As this student expresses: "I believe that AI will be integrated into our daily lives and it has already to a degree, so the best we can do is accept it and try and be educated and learn about it."

A clear direction is given by this student for GenAI integration: "I believe that there will be a big emphasis on educating students regarding how they can use AI appropriately and ethically in design rather than just focusing on how they can utilise it for effective workflows." Another student sees GenAI as part of the future of the design profession but cautions against its overuse in learning the critical skills of design:

> As AI becomes integrated into design as a profession, it will subsequently become part of design education. The main reservation I have about this is if AI tools are too heavily relied on by new design students, they may not learn how to undertake certain processes without the aid of these tools.

Conclusion

GenAI is neither a dystopian nor utopian advancement in technology. Like all technology breakthroughs, it is a change agent particularly in higher design education. The findings reveal that students have open attitudes toward using GenAI, however they may have limited experience using GenAI platforms and require further training in its responsible use.

This study validates a critical approach to introducing GenAI as a potentially valuable technology tool that links students to current industry demands, while fostering their creative development. Given this approach, design educators have a responsibility to learn as much as they can about GenAI before teaching its basics from a critical standpoint. This is especially evident when approaching GenAI from an ethical standpoint and revealing its potential to generate inaccurate and discriminatory outcomes.

The central tenet of this approach is: Graphic design students must still possess strong design skills such as visual communication and creative problem-solving while also developing new skills, like prompt engineering. Design educators need to help students to cultivate a critical eye to question the authenticity of images and text generated by GenAI, and most importantly, view it as a digital collaboration tool, not a manufacturing hub for final products.

While the demand in industry will guide design curriculum development, higher education institutions will continue to update their GenAI policies and should take a proactive role in providing educators with opportunities to build this new technological knowledge. As economies increasingly turn to technologies like GenAI to increase efficiency, there will be an ongoing debate about its role in the creative process, which is essentially a human activity. Reconciling these two opposing viewpoints should be the subject of further discussion and research into GenAI's impact on design education.

References

Auernhammer, J. (2020, August 11-14). Human-centered AI: The role of human-centered design research in the development of AI. In *Synergy - DRS International Conference 2020*, Brisbane.

Bamford, A. (2023). How are university design courses adapting to incorporate AI? *Design Week.* https://tinyurl.com/yb8mncc2

Bartlett, K. A., & Camba, J. D. (2024). Generative artificial intelligence in product design education: Navigating concerns of originality and ethics. *International Journal of Interactive Multimedia and Artificial Intelligence, 8*(5), 55–64. https://doi.org/10.9781/ijimai.2024.02.006

Bearman, M., Ryan, J., & Ajjawi, R. (2023). Discourses of artificial intelligence in higher education: A critical literature review. *Higher Education, 86*, 369–385. https://doi.org/10.1007/s10734-022-00937-2

Braue, D. (2023). Educators must engage with students on GenAI policy. *ACS Information Age*. https://ia.acs.org.au/article/2023/educators-must-engage-with-students-on-gen-ai-policy.html

Cain, J., & Pino, Z. (2023). Navigating design, data, and decision in an age of uncertainty. *She ji - The Journal of Design, Economics, and Innovation, 9*(2), 197–212. https://doi.org/10.1016/j.sheji.2023.07.002

Creswell, J. W. (2008). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Sage.

Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education, 20*(22), 1–22. https://doi.org/10.1186/s41239-023-00392-8

Davis, Meredith (Editor). (2023). The future of design education: Rethinking design education for the 21st century. *She ji - The Journal of Design, Economics, and Innovation, 9*(2), 91–308. https://www.sciencedirect.com/journal/she-ji-the-journal-of-design-economics-and-innovation/vol/9/issue/2

DeBrusk, C. (2018). The risk of machine-learning bias (and How to Prevent It). *MIT Sloan Management Review*. https://sloanreview.mit.edu/article/the-risk-of-machine-learning-bias-and-how-to-prevent-it/

Dubberly, H., & Pangaro, P. (2023). How might we help designers understand systems. *She ji - The Journal of Design, Economics, and Innovation, 9*(2), 135–156. https://doi.org/10.1016/j.sheji.2023.05.003

Fleischmann, K. (2013). Big Bang technology: What's next in design education, radical innovation or incremental change? *Journal of Learning Design, Special Issue Design Education, 6*(3), 1–17. https://www.jld.edu.au/article/view/144.html

Fleischmann, K. (2015). Democratisation of design and design learning - How do we educate the next-generation designer. *International Journal of Arts & Sciences, 8*(6), 101–108. http://www.universitypublications.net/ijas/0806/pdf/B5R188.pdf

Fleischmann, K. (2023). German design educators' post-covid challenges: Online, artificial intelligence (AI) and government data restrictions. *Design and Technology Education: An International Journal 28*(1), 135–153. https://openjournals.ljmu.ac.uk/DATE/article/view/1176

Fleischmann, K. (2024). Making the case for introducing generative artificial intelligence (AI) into design curricula. *Art, Design & Communication in Higher Education*. https://doi.org/10.1386/adch_00088_1

Fielding, N. G. (2012). Triangulation and mixed methods designs: Data integration with new research technologies. *Journal of Mixed Methods Research, 6*(2), 124–136. https://doi.org/10.1177/1558689812437101

Figoli, F. A., Rampino, L., & Mattioli, F. (2022, June 25 - July 3). AI in design idea development: A workshop on creativity and human-AI collaboration. In *Proceedings of the Design Research Society Conference* (DRS2022), Bilbao, Spain.

Gibbons, S., & Moran, K. (2024). Design taste vs. technical skills in the era of AI. *Nielsen Norman Group*. https://www.nngroup.com/articles/taste-vs-technical-skills-ai/

Gilbert, T. (2023). "AI revolution" means design studios could look very different in three years. *Design Week*. https://www.designweek.co.uk/issues/20-february-24-february-2023/ai-design-studios-future-look/

Grassini, S. (2023). Shaping the future of education: Exploring the potential and consequences of AI and ChatGPT in educational settings. *Education Sciences, 13*(692), 1–13. https://doi.org/10.3390/educsci13070692

Griffith University. (2023). Artificial intelligence and research outputs. *Research Integrity Resource Sheets (RIRS)*. https://www.griffith.edu.au/__data/assets/pdf_file/0029/1763444/17_AI.pdf

Guinness, H. (2023). How does ChatGPT work? https://zapier.com/blog/how-does-chatgpt-work/

Hommés Studio. (2023). Interior design artificial intelligence and its amazing uses. *Interiors Special Projects*. https://tinyurl.com/4tf574uu

Huang, Y.-C. J., Wensveen, S., & Funk, M. (2023). Experiential speculation in vision-based AI design education: Designing conventional and progressive AI Futures. *International Journal of Design,* (2), 1–17. https://doi.org/10.57698/v17i2.01

Kauppinen, T., & Sivula, A. L. (2023). Conclusion. In M. J. Lehtonen, T. Kauppinen, & L. Sivula (Eds.), *Design education across disciplines: Transformative learning experiences for the 21st century* (pp. 261–271). Palgrave Macmillan. https://doi.org/10.1007/978-3-031-23152-0

Kaiko, N. (2023). The rise of artificial intelligence in interior design. https://www.kaikodesign.com.au/articles/the-rise-of-artificial-intelligence-in-interior-design

Kelly, L. M., & Cordeiro, M. (2020). Three principles of pragmatism for research on organizational processes. *Methodological Innovations, 13*(2), 1–10. https://doi.org/10.1177/2059799120937242

Kelly, V. (2023). Embracing a pedagogy of ambiguity in higher education. In M. J. Lehtonen, T. Kauppinen, & L. Sivula (Eds.), *Design Education Across Disciplines - Transformative Learning Experiences for the 21st Century* (pp. 71–89). Palgrave Macmillan. https://doi.org/10.1007/978-3-031-23152-0

Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical Teacher*, 1–10. https://doi.org/10.1080/0142159X.2020.1755030

Marr, B. (2023). The difference between GenAIand traditional AI: An easy explanation for anyone. *Forbes*. https://www.forbes.com/sites/bernardmarr/2023/07/24/the-difference-between-generative-ai-and-traditional-ai-an-easy-explanation-for-anyone/?sh=1213914b508a

Matthews, B., Shannon, B., & Roxburgh, M. (2023). Destroy all humans: The dematerialisation of the designer in an age of automation and its impact on graphic design—A literature review. *International Journal of Art & Design Education (iJADE)*, 1–17. https://doi.org/10.1111/jade.12460

Meron, Y. (2022, June 25 - July 3). Graphic design and artificial intelligence: Interdisciplinary challenges for designers in the search for research collaboration. In *Proceedings of the Design Research Society Conference* (DRS2022), Bilbao, Spain.

Miao, F., & Holmes, W. (2023). *Guidance for GenAI in education and research*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000386693

Monostori, L. (2019). Artificial Intelligence. In L. u. Laperrière & G. Reinhart (Eds.), *CIRP Encyclopaedia of Production Engineering*. Springer. https://doi.org/10.1007/978-3-642-20617-7_16703

Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research, 1*(1), 48–76. https://doi.org/DOI: 10.1177/2345678906292462

Morrone, M. (2024). Copyright law is AI's 2024 battlefield. *AXIOS*. https://www.axios.com/2024/01/02/copyright-law-violation-artificial-intelligence-courts

Morse, J. M., & Niehaus, L. (2009). *Mixed method design: Principles and procedures* (First Edition ed.). Routledge - Taylor and Francis Group. https://doi.org/10.4324/9781315424538

Offenhuber, D. E., & Mountford, J. (2023). Reconsidering representation in college design curricula. *She ji - The Journal of Design, Economics, and Innovation, 9*(2), 264–282. https://doi.org/10.1016/j.sheji.2023.04.005

Orr, S., & Shreeve, A. (2018). *Art and design pedagogy in higher education: Knowledge, values and ambiguity in the creative curriculum*. Routledge.

Pavaloaia, V.-D., & Necula, S.-C. (2023). Artificial intelligence as a disruptive technology—A systematic literature review. *Electronics, 12*(1102), 1–37. https://doi.org/10.3390/electronics12051102

Pinkwart, N. (2016). Another 25 years of AIED? Challenges and opportunities for intelligent educational technologies of the future. *International Journal of Artificial Intelligence in Education, 26*, 771–783. https://doi.org/10.1007/s40593-016-0099-7

Punch, K. (2009). *Introduction to research methods in education*. Sage.

Ray, P. P. (2023). ChatGPT: A comprehensive review on background, applications, key challenges, bias, ethics, limitations and future scope. *Internet of Things and Cyber-Physical Systems, 3*, 121–154. https://doi.org/10.1016/j.iotcps.2023.04.003

Rees, K. (2023). What is AI hallucination? Can ChatGPT hallucinate? How-To Geek. http://tinyurl.com/y6pe4mkr

Rossman, G. B., & Wilson, B. L. (1985). Numbers and words: Combining quantitative and qualitative methods in a single large-scale evaluation study. *Evaluation Review, 9*(5), 627–643. https://doi.org/10.1177/0193841X8500900505

Schiff, D. (2021). Out of the laboratory and into the classroom: The future of artificial intelligence in education. *AI & Society, 36*, 331–348. https://doi.org/10.1007/s00146-020-01033-8

Solly, M. (2019). Art project shows racial biases in artificial intelligence system. *Smithsonian Magazine.* https://www.smithsonianmag.com/smart-news/art-project-exposed-racial-biases-artificial-intelligence-system-180973207/

Sun, P. (2024). A study of artificial intelligence in the production of film. In *Proceedings of the 3rd International Conference on Public Art and Human Development (ICPAHD 2023), SHS Web of Conferences*. https://doi.org/10.1051/shsconf/202418303004

Taylor, J. (2023). Adobe to integrate AI into Photoshop amid fears of job losses and mass faking of images. *The Guardian*. https://www.theguardian.com/technology/2023/may/23/adobe-to-integrate-ai-into-photoshop-amid-fears-of-job-losses-and-mass-faking-of-images#:%7E:text=Ado%E2%80%A6

Turing, A. M. (1950). Computing machinery and intelligence. *Mind, 49*, 433–460. https://redirect.cs.umbc.edu/courses/471/papers/turing.pdf

Wenger, E. (1987). *Artificial intelligence and tutoring systems: Computational and cognitive approaches to the communication of knowledge*. Morgan Kaufman Publishers. https://doi.org/10.1016/C2013-0-07697-9

Wernersson, J., & Persson, R. (2023). *Exploring the potential impact of AI on the role of graphic content creators: Benefits, challenges, and collaborative opportunities.* Jönköping University. https://hj.diva-portal.org/smash/get/diva2:1788167/fulltext01.pdf

Wikipedia. (2024a). Turing test. https://en.wikipedia.org/wiki/Turing_test

Wikipedia. (2024b). Deep Blue (chess computer). https://en.wikipedia.org/wiki/Deep_Blue_(chess_computer)

Wikipedia. (2024c). https://en.wikipedia.org/wiki/Jacquard_machine

World Economic Forum. (2020). *The Future of Jobs Report 2020*. https://www.weforum.org/publications/the-future-of-jobs-report-2020/

Wright, K. B. (2005). Researching internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-Mediated Communication, 10*(3), 1–31. https://doi.org/10.1111/j.1083-6101.2005.tb00259.x

Yang, Q. (2020). Designing AI products and services: An annotated syllabus. *Medium*. https://medium.com/design-of-ai-products/design-of-ai-products-and-services-an-annotated-syllabus-25f9511292a1

Yeo, J. P.-H. (2023). Designing sustainable designs: Making designers future-ready. In M. J. Lehtonen, T. Kauppinen, & L. Sivula (Eds.), *Design Education Across Disciplines - Transformative Learning Experiences for the 21st Century* (pp. 221–234). Palgrave Macmillan. https://doi.org/10.1007/978-3-031-23152-0

Zawacki-Richter, O., Bond, M., Marín, V. I., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education - Where are the educators? *International Journal of Educational Technology in Higher Education, 16*(39). https://doi.org/10.1186/s41239-019-0171-0

Author

Katja Fleischmann is Associate Professor for Visual Communication Design at the Queensland College of Art and Design, Griffith University, Australia. She is an academic and researcher with extensive knowledge of global and national issues driving the design profession. Her research centres around two often interlinking areas, the future of design education and the role of design in social and economic innovation. Katja has published extensively in leading international journals and has co-authored the book *Women on the Walls: Women as Subjects in Street Art around the World* (2022) which examines depictions of women artistically, politically, and culturally across continents. Her recent studies focus on Generative Artificial Intelligence and how it impacts the design profession and design education. *Email*: k.fleischmann@griffith.edu.au *ORCID*: 0000-0002-0246-260X