Review Paper https://doi.org/10.24867/GRID-2026-p47

Human by Design: Graphic Design and Design Thinking in the Age of AI

ABSTRACT

This paper examines the intersection of graphic design, human-centered design thinking, and generative AI technologies. It highlights how AI can accelerate tasks such as ideation, prototyping, image generation, typography exploration, and brand experimentation while simultaneously raising important questions about originality, ethics, authorship, and visual culture. Drawing on existing research, this paper demonstrates how designers can use generative AI as a collaborative tool rather than viewing it solely as a replacement for human creativity.Central to the discussion is the argument that design thinking becomes even more valuable in an AI-driven world. While AI excels at producing rapid outputs and identifying patterns, human designers remain essential for empathy, storytelling, critical judgment, cultural understanding, and meaningful communication. The paper emphasizes that the future of graphic design will depend not only on mastering new technologies but also on preserving the human qualities that make design impactful and socially relevant. Ultimately, this paper invites audiences to reconsider the evolving identity of the designer and to envision a future in which creativity, strategy, and technology coexist within a more intentional and collaborative design ecosystem.

Charles T. Weiss

Graphic Communications,
Clemson University, Clemson, USA

KEY WORDS
Graphic design, design thinking, artificial intelligence, generative AI, human-centered design

1. Introduction

Generative artificial intelligence (AI) is transforming the world of graphic design, but this transformation is only the latest major change in the field. Graphic design has always been centered on human interaction, but generative AI threatens to remove the human element from the graphic design process. Fortunately, the human elements that make design more impactful and socially relevant will continue to play a major role in graphic design. Generative AI will simply be another technological change that not only changes the graphic design process but also makes it even more important for humans to remain part of that process. This human-centered approach can be seen in the use of design thinking, which can strengthen the graphic design process while allowing designers to benefit from generative artificial intelligence.

2. History of graphic design

Graphic design is not new. It can be traced to the beginnings of modern civilization. The cave paintings found in the caves at Lascaux, France, provide one example of very early graphic design dating to approximately 10,000 BCE (Meggs, 2025). These paintings are some of the oldest known graphic artifacts, and they demonstrate the ability to tell stories through graphics and the early development of visual communication. A major subsequent stage in graphic design occurred when writing, paper, and printing transformed the written and graphic world. This period culminated in the invention of movable type by Johannes Gutenberg in Germany around 1450 (Meggs, 2025). Movable type transformed the world in many ways because books and documents could be reproduced by machine rather than written by a scribe one letter at a time. Following Gutenberg, design continued to flourish, and the beginnings of modern typography can be seen in the ways books and

documents were reproduced. The Industrial Revolution brought further advancements, including steam-powered printing presses, the ability to create decorative type, the invention of the Linotype press in 1886—the first keyboard typesetting machine—and Eastman Kodak's widely available photographic technology.

The early 1900s were marked by major design shifts and the founding of the Bauhaus in 1919. By the mid-1900s, the Polaroid camera had been invented, and the first Xerox copying machine was introduced. In the 1950s, the first computers were developed, and designers continued to create new visual trends, including Andy Warhol's Campbell's Soup Cans in 1962. Graphic designers continued to push the boundaries of visual communication, and the world experienced a vast array of modern visual design elements.

In 1976, the Apple computer was first introduced and made computers available to more people. This household computer helped create the conditions that led to the development of Photoshop in 1990, one of the first software applications that allowed users to manipulate and edit digital images directly on a computer. In 1993, the first web browser, Mosaic, was launched, and by 1994, 33% of U.S. households had computers. The Internet continued to grow, and by 2005 there were more than 800 million Internet users globally, including 200 million in the United States. Apple also introduced the iPhone in 2007 and the iPad in 2010. In 2015, OpenAI was founded as an artificial intelligence research organization.

All of these changes have had a direct effect on the creation of new graphic design themes and movements. These changes caught many people off guard, but great graphic designers took advantage of new technology and ushered in a new world of graphic design. In many ways, this is the world of graphic design today. Generative AI has brought a new chapter to graphic design, but, as in the past, this chapter will be led by humans with the help of computers and digital processors. If designers do not figure out how to take advantage of AI tools in their workflows, they may be left behind.

3. Human-centered design thinking and graphic design

At the core of the historical transitions in graphic design is the idea that the best designs will continue to be human-centered. For instance, when the printing press was first invented, human graphic designers were still essential to producing worthwhile designs. When the first Apple computer made it possible to create designs at home, a human was still driving the process. Printing presses and computers changed graphic design processes, but humans remained responsible for the outcomes. Traditional graphic designers work with clients to solve design problems. This will continue to be the case as generative AI becomes more readily available, but human designers will still be needed to develop worthwhile solutions that work for clients. Generative AI will become another valuable tool in the graphic designer's toolbox.

One way to examine this transition to generative AI is to consider how design thinking continues to change the way problems are addressed and solved. Design thinking is not a new concept, but it is well suited to combining human-centered thinking with artificial intelligence. Design thinking is also a problem-solving method that emphasizes the user. Through a problem-solving process, designers discover appropriate solutions to the challenges brought before them (Patria et al., 2024).

The idea of design thinking is based on several processes that are carried out in an iterative and flexible manner rather than through a strictly linear process. One definition of design thinking describes it as a discipline that uses the methods and sensibilities of the designer to match the needs of people with technologically feasible and viable business strategies that can be converted into customer value and clear market opportunities (Martin, 2009). While this definition of design thinking was created before the advent of generative AI, it still holds true today. A good designer uses their skills to create what the client wants, even when using generative AI.

Design thinking is a technique that can be adopted by anyone. It is a problem-solving method that can be applied to small or large problems, including graphic design problems. Design has a purpose and intent: to solve a problem. Design thinking provides a framework for designers to solve problems more effectively. This framework is built on five phases: empathy, definition, ideation, prototyping, and testing. Each phase builds upon the others and allows crossover and interaction among the phases. The framework is also centered on people. Design thinking should be used to solve a problem by truly understanding the needs of the people who need a solution, whether the problem involves graphic design or a service. People should remain the focus of the entire process. This approach allows for continual feedback and reflection between phases and gives designers the chance to revisit earlier phases as they move forward. The final solution should be people-centered (Stackowiak & Kelly, 2020).

Creativity is often seen as a core element of design thinking. Designers need to be creative when finding solutions, and design thinking provides a framework for solving problems creatively. Design thinking can also be compared to a toolbox. Each phase is part of the solution, but designers must be familiar with the tools and knowledgeable about how to use them efficiently and properly (Johansson-Sköldberg, Woodilla & Çetinkaya, 2013).

Artificial intelligence and design thinking can also work together to produce more unique and innovative solutions. By proactively incorporating AI, design thinking can transform the design process, stimulate creativity, improve user experience, and benefit society (Sreenivasan & Suresh, 2024).

4. Generative artificial intelligence

Artificial intelligence refers to the ability of machines to perform tasks in ways that mimic aspects of human intelligence (Chang & Tsai, 2024). AI has quickly spread to almost every aspect of life and will continue to grow in ways that have yet to be seen. AI can be encountered when opening a web browser, reading an email, conducting an online search, or playing a game. Artificial intelligence has become a constant presence in everyday life and will continue to expand.

Generative AI is a branch of artificial intelligence focused on generating pixels, text, and ideas. It can quickly generate many possible concepts from a short written prompt. These concepts can include initial ideation, prototyping, image generation, image editing, typography, layout, and branding. The quality of these creations can vary greatly, and the best AI-generated elements are generally produced through well-thought-out and carefully constructed prompts from human users (Kaplan, 2024).

In the world of graphic design, generative AI can create high-quality text, imagery, and other content based on the data and instructions provided to it. The input may consist of user prompts or visual examples that the system uses to create new elements. Generative AI holds enormous potential to create new design opportunities, but its use must be considered within the constraints of intellectual property law, privacy, and copyright (Martineau, 2023).

The various AI tools available, including ChatGPT, DALL-E, Figma, Stable Diffusion, Midjourney, Firefly, and Claude, have been used for visual image generation, iteration, and refinement. They can also facilitate creativity and support decision-making while reducing the time required for design processes. Although these tools have been widely adopted, their role in design is still evolving, and their long-term impact remains to be determined (Choudhury, Eisenbart & Kuys, 2025).

The use of generative AI is also transforming the way graphic design is taught in higher education. Design educators are now being tasked with preparing students to use generative AI as part of the design process. Educators must guide students in understanding the appropriate use of generative AI within the classroom, studio, and professional practice. Generative AI can be seen as a change agent, but graphic design students must still possess strong design skills and creative problem-solving abilities while developing new skills, such as the use of AI. Design students must also cultivate a critical eye to question the authenticity of AI-generated material and view AI as a collaborative tool rather than as a manufacturing system for final products (Fleischmann, 2024).

5. How generative artificial intelligence is changing graphic design

The use of artificial intelligence in graphic design (AIGD) reveals two distinct phases in the evolution of AI and graphic design. The early phase focused on decomposing design tasks into individual components, such as typography generation, layout optimization, and color-palette recommendations. The second phase has expanded these applications into generative models capable of producing typography, images, vector shapes, layouts, and colors. This phase also includes the ability of AI to create holistic systems that bridge human instruction and final artwork. Generative tasks are now a significant part of contemporary design practice. AI can create design elements with transparent backgrounds and can also create vector shapes (Zou, Zhang & Zhao, 2025).

Because of these changes, Generative AI continues to change graphic design in a multitude of ways. These include speed and efficiency in creating ideas, expanding the exploration boundaries, improved communication between designers and clients, greater accessibility to designers who may not have a strong background in graphic design, and providing more time for designers to focus on strategic work like research, storytelling, and strategic decision making.

As an example, generative AI allows designers to quickly develop a multitude of ideas. Just as designers once used pencil and paper to draw thumbnails, generative AI can now be used to produce initial ideas rapidly. This changes the ideation stage to take advantage of AI tools without removing humans from the process. The creation of mood boards is an especially powerful application of AI because it allows designers to explore alternative solutions and move quickly past creative roadblocks. This expedited approach to initial ideation allows designers to spend more time focusing on their solutions (Chen et al., 2025).

AI can also create prototypes quickly and efficiently. These rough initial versions can be used to show potential layouts, package mock-ups, website mock-ups, and social media posts to clients. AI can also shorten the time it takes designers to move from an

abstract idea to something that can be shown to a client and discussed (Furtado, Soares & Furtado, 2024).

Designers can also use generative AI to create backgrounds and illustrations, produce photographs based on prompts, remove or replace objects, expand images to include additional elements, create alternate versions, and quickly test differing visual styles, (Huang et al., 2025).

Typography is another area in which generative AI can assist designers. AI can quickly suggest type pairings, letter styles, color systems, grid layouts, and typographic styles. Unfortunately, typography remains challenging for AI because lettering requires precision, consistency, readability, and cultural awareness (Bosheah & Bilicki, 2025).

Branding concepts are also a useful application of generative AI because various concepts can be created quickly, including alternate imagery, different logos, product visualizations, color combinations, and layout variations. When using generative AI for branding concepts, it is important to remember that a brand is more than a logo, design, or color. For this reason, human-centered judgment in the use of generative AI is more important than ever (Gual-Ortí et al., 2025).

6. The continuing importance of human-centered design

AI can produce patterns and outputs, but human designers provide prompts, experience, and emotion. Humans inherently work with empathy and emotions, whereas AI operates through computational models and user-provided prompts. From a human standpoint, empathy can be developed through interviews, observation, personal experience, and emotional responses.

AI can identify patterns and produce outputs, but human designers study people's experiences and emotions. This human interaction can include one-on-one or group interviews, observation, testing, emotional responses, and lived experiences. These are activities to which generative AI has limited direct access. Generative AI can learn from information derived from human interaction, but it does not process that information in the same embodied and experiential way that humans do. Designers have the human ability to connect visual elements into narratives that create the basis for a story. Humans can interpret what a design and its message communicate, respond emotionally to a design, and relate it to a larger cultural story. These experiences are human-based and cannot be reduced solely to AI (Zhu & Luo, 2024).

Humans can also exercise critical judgment when evaluating a design. For instance, they can assess whether a design is appropriate, accurate, ethical, culturally appropriate, or aligned with a client's goals. AI can produce many options, but it cannot reliably determine which option is appropriate without human-defined criteria and contextual oversight.

Generative AI can also struggle to understand cultural context. AI-generated outputs may fail to account for the background of certain symbols, historical references in designs, cultural and societal representation, stereotypes, regional differences, power relationships, and inclusivity.

Human designers can also better connect a design with its intended message. This includes understanding who the audience is, what message the audience may perceive, how the message will be shared, the context and purpose of the message, and its tone. Generative AI can produce many of these elements, but it may not reliably connect the design to the intended message.

7. How the designer's role is changing

As in past technological innovations, graphic designers must learn to use the tools available to them. The invention of the computer and the Internet transformed graphic design, and designers who did not adopt these technologies were left behind. Generative AI provides even more opportunities to help designers, but designers must learn to use these tools appropriately. Graphic designers may not need to draw countless thumbnails anymore, but they must still be able to generate creative solutions quickly, and generative AI can help with that.

The integration of generative AI into graphic design can be seen as more than a revolution; it can be viewed as an era-defining transformational wave that is changing how creative work is produced. Generative AI provides designers with the ability to automate repetitive tasks while also allowing them to discover new possibilities. AI can significantly boost creativity. Designers who incorporate AI as an aid to their work can take on new roles as the industry moves into uncharted territory. AI does not mean that graphic designers are no longer needed; rather, it offers designers new ways to flourish and grow (Alkahteeb et al., 2025).

In a review by Kumar, Tu and Zallio (2025), the findings indicated that the use of generative AI is undergoing rapid transition. While the use of generative AI in user-experience design is expanding, its implementation remains uneven across design-process stages and practitioner communities. The review found that most applications of generative AI remain exploratory and are limited by the constraints of commercially available tools. Generative AI has found a place

in mid- and late-stage design activities but remains underused in the early stages of design. The integration of generative AI into user experience and design represents a paradigm shift that is continuing to evolve.

8. Responsible use of generative ai

Responsible use of AI and generative AI requires treating the AI component as a collaborative tool rather than a replacement for human-centered design. Designers must remain involved in the process, including evaluating outputs, addressing cultural and ethical concerns, protecting authorship and copyright, and ensuring that generative AI visuals support the intended communication goals. AI can enhance production but may lack intentionality and cultural awareness (Chen & He, 2026).

Through a comprehensive review of 33 papers, a 2024 study identified four paradigms for the use of AI in graphic design: artificial intelligence-driven design automation and generation (AIDAG), artificial intelligence-assisted graphic design and image processing (AGDIP), artificial intelligence in art and creative design processes (AACDP), and artificial intelligence-enhanced visual attention and emotional response modeling (AVERM). These paradigms illustrate the multidimensional role of AI in design, ranging from automation to emotional interaction. The findings suggest that AI serves both as a design tool and as a medium for innovation. AI can enhance the automation and efficiency of the design process while also fostering designers' creative thinking and understanding of users' emotional needs (Li et al., 2024).

Graphic designers must understand both the benefits and the limitations of generative AI. AI should be treated as a tool in the designer's toolbox, but designers will need to determine the most responsible ways to use these tools and learn how to apply AI intentionally in service of a design's purpose and intent.

9. Conclusion

Generative AI will continue to change the world of graphic design. This may scare some designers while exciting others. Designers who embrace generative AI as another tool in their toolbox will continue to grow and build on their design skills, while those who do not embrace it may face a more difficult professional environment as generative AI continues to affect the field.

The tools provided by generative AI should be seen as collaborators rather than final solutions. Human-centered design remains necessary for creating effective graphic design because AI is not yet able to reliably act in the ways humans do. The world of generative AI is still built around human commands and prompts. The power of AI continues to grow rapidly, but generative AI must be used intentionally and within the boundaries of cultural and societal norms.

Graphic design has faced many major changes throughout its history. AI and generative AI are simply another major shift in the field. Just as the printing press and the computer revolutionized graphic design, AI will also transform it. As humans, we can choose to collaborate with AI and continue to grow, or we can fail to adapt to changes in the field. The choice is ours.

10. References

Alkahteeb, S.S., Almomani, I.G., Zoubi, M.K., Issa, M.M., Al Smadi, M.A., Jaradat, H.A. and Abualhumos, T.M. (2025) 'Artificial intelligence in graphic design processes: The impact analysis and challenges', *Mutah Journal of Humanities and Social Sciences*, 40(1), pp. 35–52. DOI: 10.35682/mjhss.v40i1.1084

Bosheah, Z. and Bilicki, V. (2025) 'Challenges in generating accurate text in images: A benchmark for text-to-image models on specialized content', *Applied Sciences*, 15(5), 2274.

Chang, Y. and Tsai, M. (2024) 'Effects of design thinking on artificial intelligence learning and creativity', *Educational Studies*, 50(5), pp. 763–780. DOI: 10.1080/03055698.2021.1999213

Chen, L., Song, Y., Guo, J., Sun, L., Childs, P. and Yin, Y. (2025) 'How generative AI supports human in conceptual design', *Design Science*, 11.

Chen, Z. and He, Y. (2026) 'Ethical dilemmas in artificial intelligence-generated art: Authorship, ownership, and the blurring of creative boundaries', *Digital Scholarship in the Humanities*, 41(2), pp. 647–661.

Choudhury, M.M., Eisenbart, B. and Kuys, B. (2025) 'Artificial intelligence (AI) in the design process – a review and analysis on generative AI perspectives', *Proceedings of the Design Society*, 5, pp. 631–640.

Fleischmann, K. (2024) 'Generative Artificial Intelligence in Graphic Design Education: A Student Perspective', *Canadian Journal of Learning and Technology*, 50(1), pp. 1–17.

Furtado, L.S., Soares, J.B. and Furtado, V. (2024) 'A task-oriented framework for generative AI in design', *Journal of Creativity*, 34(2), 100086.

Gual-Ortí, J., Martínez Moya, J.A., Amat, J. and Felip Miralles, F. (2025) 'The future of logo design: Considering generative AI-assisted designs', *International Journal of Visual Design*, 19(1), pp. 109–123.

Huang, Y., Huang, J., Liu, Y., Yan, M., Lv, J., Liu, J., Xiong, W., Zhang, H., Cao, L. and Chen, S. (2025) 'Diffusion model-based image editing: A survey', *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 47(6), pp. 4409–4437.

Johansson-Sköldberg, U., Woodilla, J. and Çetinkaya, M. (2013) 'Design thinking: Past, present and possible futures', *Creativity and Innovation Management*, 22(2), pp. 121–146.
Kaplan, J. (2024) *Generative Artificial Intelligence*. 1st ed. New York, NY: Oxford University Press.
Kumar, T., Tu, X. and Zallio, M. (2025) 'How generative AI is reshaping UI/UX design workflows: A systematic review'. In: *AHFE International*.
Li, H., Xue, T., Zhang, A., Luo, X., Kong, L. and Huang, G. (2024) 'The application and impact of artificial intelligence technology in graphic design: A critical interpretive synthesis', *Heliyon*, 10(21), e40037.
Martin, R.L. (2009) *The Design of Business*. Boston, MA: Harvard Business Press.
Martineau, K. (2023) *What is Generative AI?*. IBM Research.
Meggs, P.B. (2025) *Meggs' History of Graphic Design*. 7th ed. Newark: John Wiley & Sons Ltd.
Patria, A.S., Ekohariadi, E., Sutiadiningsih, A., Kristiana, N. and Prihadi, K.D. (2024) 'Instrument development of design thinking test for graphic design students', *IJORER: International Journal of Recent Educational Research*, 5(4), pp. 796–807.
Sreenivasan, A. and Suresh, M. (2024) 'Design thinking and artificial intelligence: A systematic literature review exploring synergies', *International Journal of Innovation Studies*, 8(3), pp. 297–312.
Stackowiak, R. and Kelly, T. (2020) *Design Thinking in Software and AI Projects: Proving Ideas Through Rapid Prototyping*. 1st ed. Berkeley, CA: Apress.
Zhu, Q. and Luo, J. (2024) 'Toward artificial empathy for human-centered design', *Journal of Mechanical Design*, 146(6).
Zou, X., Zhang, W. and Zhao, N. (2025) 'From fragment to one piece: A review on AI-driven graphic design', *Journal of Imaging*, 11(9), 289.



© 2026 Authors. Published by the University of Novi Sad, Faculty of Technical Sciences, Department of Graphic Engineering and Design. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license 4.0 Serbia (https://creativecommons.org/licenses/by/4.0/deed.en).