AI-Driven Tools and Their Impact on Creativity in Graphic Design

Basim Abbas Ali AlObaydi[1]* Derar Alqudah[2], Mohammad Khaleel Abukeshek[3], Laila I. Ibrahim[4], Ayman Kadry Mohammed Hamed[5,6]

[1]*Associate Professor, Al-Zaytoonah University of Jordan, Graphic design Department, Faculty of Architecture and design; Email: b.alobaydi@zuj.edu.jo*
[2] *Department of Design and Visual Communication, Applied Science Private University; Email: D_qudah@asu.edu.jo*
[3]*Faculty of Architecture and Design, Al-Ahliyya Amman University; Email: M.abukeshek@ammanu.edu.jo*
[4] *Assistant Professor, Faculty of Architecture and Design, Jordan University of Science and Technology, Irbid – Jordan; E-mail: liibrahim@just.edu.jo*
[5]*Graphics Design, Al-Zaytoonah University of Jordan, Amman, Jordan.*
[6]*Vice Dean of the Faculty of Fine Arts - Luxor University, Luxor, Egypt; Email: a.kadry@zuj.edu.jo*

*Corresponding Author: basimalobaydi7@gmail.com, b.alobaydi@zuj.edu.jo

ABSTRACT

This research assesses how AI-enabled tools affect creativity within the area of graphic design, specifically measuring the effect of AI tools on creativity, efficiency, idea diversity, design quality, experience, originality, and quality of the design for six different hypotheses. Using a quantitative correlational research design, 180 professional and semiprofessional graphic designers were sent a structured online questionnaire. The AI-enabled tools and creativity, idea diversity, design quality, and efficiency were related positively and significantly using MANOVA, ANOVA, and multiple regression. Experienced designers integrating AI showed the greatest improvement, while over using AI technology leads to a loss of originality and a lack of personal signature to the work. Overall, AI tools should encourage increased human creativity, and so should be incorporated alongside traditional tools. Design professionals and institutes should intentionally adopt AI to maintain creative originality and personal signature.

Keywords: Artificial intelligence, AI-driven tools, Creativity, Graphic design, Idea diversity, Design quality, Efficiency, Experience, Originality.

INTRODUCTION

There are several data-based AI tools designed to automate basic tasks which, on the other hand, support creative work by suggesting design patterns, drafting, analyzing visuals, and making aesthetic decisions (Luo & Wu, 2024; Amireh et al., 2025). Supporters of AI say such tools help designers explore a wider range of ideas, speed up the design process, and capture less effort on mindless tasks to concentrate on more innovative tasks (Tang et al., 2024). On the other hand, some critics argue that an AI tool will help less and less to customize a piece and that a creative work will capture less and less of the creative soul embedded in personal choice, sensitivity, culture, and individual expression (Tubishat et al., 2024; Das & Rani, 2024). The hypotheses in this study are based on the positive and negative sides of these aspects which relate to the positive impact of AI on creativity and design quality, reduction of time and effort, and expansion of idea generation, as well as the designer's experience, and the risk of originality loss (Anantrasirichai & Bull, 2022; Hussain et al., 2025). The importance of such research lies on the inquiry of the impact of AI on the outcome of creative work and the range of influence of AI based on the

user's experience, factor that emphasize the integration of technological support and human creativity (Xin & Zhang, 2025; Shakhatreh et al., 2023).

There is an increasing amount of AI use in the field of graphic design; however, the impact of AI on creativity and different experience levels of designers is still under-researched. Also, uncertainty exists regarding how AI-enabled tools affect creativity, productivity, range of ideas, design quality, and the negative implications of over-reliance on AI tools on uniqueness. There is a scarcity of consolidated research on both the advantages and shifting disadvantages AI presents in design, as well as how these impacts differ in novice compared to experienced designers. Hence, this study is able to provide AI and creativity research, relevant to designers, educators, and the creative sector, to understand the balance between AI tool utilization and creativity and originality retention.

LITERATURE REVIEW

Automated design assistive technologies and AI applications are impacting creative execution, production approaches, and design results (Alshehadeh et al., 2025; Lan, 2025). A growing number of designers, regardless of their experience, are starting to utilize AI tools like generative design, automated editing, and layout suggestion systems (Ghoneim et al., 2025; Kutanova, 2025; Dahiyat, 2017). These technologies speed up the processes of idea generation and unconventional design exploration, and they streamline production (Yaseen et al., 2025; Mirzaei, 2025). Such technologies are transformative to the creative process, as they offer varied alternatives and visual possibilities that help designers break away from fixed approaches and frameworks (Das & Rani, 2024). AI has also been shown to improve divergent thinking and concentration, and automate the completion of tasks that, in design, are often repetitive, like resizing, pattern generation, and color correction, which boosts overall efficiency (Cai & Jung, 2024; Sweller, 1988).

This being the case, platforms like DALL·E, MidJourney, and Adobe Firefly offer designers innovative combinations and new aesthetic solutions, broadening the possibilities and helping to innovate (Yu, 2025). However, research highlights the need to balance the use of AI and creativity, especially for novice designers, since dependence on AI may result in similar and less personalized designs (Wadinambiarachchi et al., 2024; Türker, 2025). Unlike novice designers, who may take AI-generated suggestions at face value, experienced designers use AI tools more thoughtfully, in ways that enhance creativity and quality while preserving their personal style (Al-Tarifi et al., 2024; Ge & Hou, 2025).

AI enables collaboration and iterative design by offering quick feedback, different versions of drafts, and flexible proposals, helping groups efficiently exchange ideas and cooperatively pursue innovative approaches (Yu, 2025; Jebril et al., 2023). In education, the AI-led approaches focused to support design students with conceptual experimentation, problem-solving, and innovative workflows, while also advocating for balanced support to mitigate AI over-reliance (Adel et al., 2025; Jarrah et al., 2022). Also, by enhancing and streamlining layouts and optimizing the aesthetics through AI adjustments, final designs are of higher quality with intelligent adjustments of aesthetics, refinements, rationalized and polished to a professional standard (Alqudah et al., 2024; Tang et al., 2024).

The potential for AI misuse as a creative partner raises multiple research avenues on creativity, efficiency, ideation, design quality, experience, and overreliance in graphic design (Mirzaei, 2025). AI's contribution to creativity, efficiency, design variety, and overall quality is notable, but extensive designer experience, critical judgment, and integration of human creativity and technological aid are essential (Li et al., 2025; Al Azzam et al., 2023). Therefore, AI can either assist or hinder creative efforts, making it essential to analyze the risks of overreliance, the balance needed to optimize the design process, and the potential impact of AI on creative functions in graphic design (Pandy, 2024; Dahiyat, 2016).

Consequently, a synthesis of studies has shown that AI facilitates generative and automated design, assists in image processing, and supports creative processes, particularly during early design stages, thus improving efficiency and idea diversity (Luo & Wu, 2024). Surveys indicate that AI enhances visual perception, composition, and layout generation, expanding the range of creative possibilities available to designers (AlJabali et al., 2025). Experimental findings, however, suggest that while AI may boost idea generation, it can also lead to design fixation and reduced originality in certain cases, especially for less experienced designers (Wadinambiarachchi et al., 2024). Reviews of AI in creative industries point to its potential in enabling novel designs through machine learning and GANs, though challenges remain, including algorithmic bias and potential loss of personal touch (Anantrasirichai & Bull, 2022). Research also emphasizes that AI tools provide intelligent suggestions and workflow simplifications, positively affecting creativity, efficiency, and design quality, though they cannot replace human intuition (Tang et al., 2024). Designers perceive AI as a valuable partner in divergent thinking, facilitating rapid prototyping and freeing time for innovative exploration, but experts and novices differ in how they balance AI support with personal judgment, with overreliance potentially reducing originality (Das & Rani, 2024).

Also, emerging literature underlines AI's role in the creative process as a collaborator, rather than a simple tool. Designers claim AI systems contribute to brainstorming sessions to provide rapid prototypes and discuss innovative approaches that might not surface in other idea-generation methods (Yu, 2025). Such collaboration is said to facilitate divergent thinking, enabling a designer to conceive a broader spectrum of potential solutions while still retaining a personal creative touch and making pivotal choices (Lee, 2025). On the other hand, research warns that excessive reliance on AI could result in design outputs becoming uniform and less creative, especially for novice designers who might blindly adopt AI-recommended solutions, leading to homogenization without critical thinking (Mirzaei, 2025).

Therefore, seasoned designers tend to utilize AI tools strategically to solidify innovative aspects and maintain quality and individual style, while novice designers tend to use AI suggestions more fully and, consequently, produce more generic work (Luo & Wu, 2024). This gives rise to the notion that the impact of AI technology is not uniform across its users, with varying benefits and opportunities within the domain and the associated risks of homogenization, familiarity with the design framework, and critical appraisal mediated by design expertise (Tang et al., 2024). Hence, the importance of experience in relation to the use of AI becomes paramount to creativity by reducing, potentially homogenization in design, personal touch or excess. Collectively, this provides the rationale for the proposed hypotheses that AI positively correlates with creativity (H1), saves time and effort (H2), increases the spectrum of generated ideas (H3), and enhances the quality of designs with effective incorporation (H4), while alluding to the experience-related variability (H5) and risk of loss of originality through overdependence (H6). Hence the proposed hypotheses:

HYPOTHESES

H1: There is a statistically significant positive relationship between the use of AI-driven tools and the level of creativity among graphic designers.

H2: The use of AI-driven tools reduces the time and effort required to produce innovative graphic designs.

H3: AI-driven tools expand the range of creative ideas for designers compared to relying solely on traditional tools.

H4: Integrating AI-driven tools into the creative work environment positively affects the quality of final graphic designs.

H5: The impact of AI-driven tools on creativity in graphic design varies according to the designer's level of experience.

H6: Excessive reliance on AI-driven tools may reduce the personal touch and originality in graphic design works.
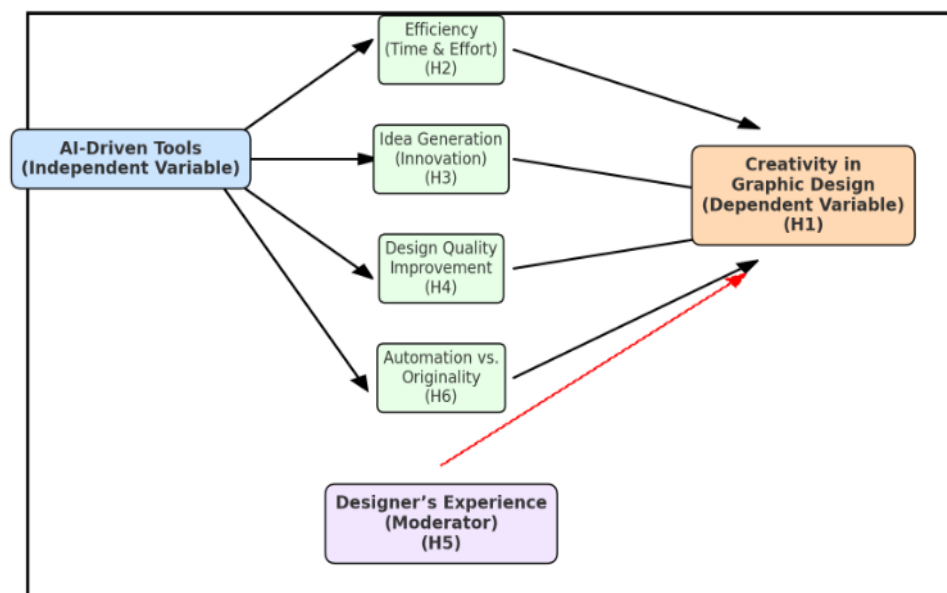
CONCEPTUAL FRAMEWORK

Figure 1. Conceptual Framework.

METHODOLOGY

This study adopts a quantitative correlational approach to assess the influence of AI-assisted tools on creativity within the scope of graphic design. The author intends to evaluate creativity related to the six AI usage hypotheses, as well as efficiency, diversity of ideas, design quality, over experience of the designer, and the design quality paradox of overreliance. This study adopts a correlational approach since the study seeks to assess the relationship among the variables without manipulation of the independent variables.

The target population for this study includes professional and semi-professional graphic designers actively using digital design tools. A purposive sampling strategy will be employed to cater to different levels of experience among designers and for a final sample of 150 to 200 designers. A structured online questionnaire will be administered to assess creativity, the demographic and AI tool usage, as well as the perceived efficiency, diversity of ideas, and design quality of the design. Each item on the questionnaire will be based on a 5-point Likert scale. The instrument will be submitted for validation, followed by a pilot study to assess reliability with 0.7 benchmark for Cronbach's alpha.

Data analysis will be performed using SPSS, with demographics and AI tool usage being summarized with descriptive statistics, elements being correlated with Pearson's correlation, and predictive relationships analyzed through multiple regressions with the experience moderation assessments. Ethical considerations of the study of informed consent, anonymity, and confidentiality will be maintained throughout the study.

Table 1. Descriptive Statistics for Key Variables.

Variable	N	Mean	Std. Deviation	Min	Max
AI Usage Score	180	3.82	0.79	1	5
Creativity Score	180	4.08	0.73	2	5
Time/Effort (Efficiency)	180	3.65	0.84	1	5
Idea Diversity	180	3.95	0.76	2	5
Design Quality	180	4.15	0.65	2	5
Originality/Personal Touch	180	3.70	0.80	1	5
Experience (years)	180	5.9	3.1	1	15

Table 1 provides a snapshot of the sample's characteristics and the main variables. The mean AI usage of 3.82 indicates moderate-to-high engagement with AI tools, suggesting that the participants are familiar with digital design technologies. Creativity and design quality scores are also high, reflecting that AI adoption may be associated with improved creative outcomes. The standard deviations indicate some variability, particularly in experience (1–15 years), allowing us to examine whether experience moderates AI's impact on creativity (H5). Originality/personal touch scores are slightly lower than creativity scores, hinting at the potential trade-off between AI assistance and individual expression, aligning with H6.

Table 2. MANOVA – Effect of AI Usage Level on Creativity, Idea Diversity, and Design Quality.

Table 2	Dependent Variable	F	p-value
Creativity	18.42	<0.001	0.17
Idea Diversity	14.56	<0.001	0.14
Design Quality	12.87	<0.001	0.13

The MANOVA results indicate that AI usage level significantly influences multiple creative outcomes simultaneously. High F-values and p < 0.001 show strong statistical significance. Partial eta squared values (0.13–0.17) suggest medium to large effects, meaning AI has practical relevance in the design workflow. This confirms **H1, H3, and H4**, showing that AI not only boosts creativity but also enhances idea diversity and design quality. Practically, this means designers can leverage AI to generate more innovative concepts while maintaining high-quality outputs.

Table 3. ANOVA – Efficiency by AI Usage Level.

Table 3	AI Usage Level	Mean Efficiency	Std. Deviation	F
Low	3.12	0.75	23.14	<0.001
Medium	3.68	0.80		
High	4.05	0.77		

Table 3 confirms that efficiency (time and effort reduction) increases with higher AI usage, supporting **H2**. The F-value indicates significant differences between groups, highlighting that AI tools streamline workflows

effectively. Designers at high AI usage levels report completing tasks faster and with less effort, implying that AI reduces repetitive cognitive load, allowing more focus on creative decision-making. This provides practical evidence for studios and freelancers considering AI adoption to enhance productivity.

Table 4. Multiple Regression Predicting Creativity with AI Usage, Experience, and Interaction.

Table 4	Predictor	B	Std. Error	Beta	t
AI Usage	0.41	0.06	0.48	6.83	<0.001
Experience	0.22	0.05	0.25	4.40	<0.001
AI Usage × Experience	0.13	0.04	0.15	3.25	0.002

Table 4 illustrates that AI usage, experience, and their interaction significantly predict creativity. The interaction term confirms **H5**, showing that experienced designers derive more creative benefit from AI tools. This suggests that AI is most effective as a complement to human skill rather than a replacement. For education and training, this implies that novice designers may require structured guidance to maximize AI's creative potential.

Table 5. ANCOVA Originality Controlling for Experience.

Table 5	Source	F	p-value
AI Overreliance	9.56	0.003	0.09
Experience (covariate)	6.48	0.012	0.07

Table 5 demonstrates that even after controlling for experience, excessive reliance on AI negatively impacts originality, confirming **H6**. Designers who depend heavily on AI produce work with lower personal expression and originality. The partial eta squared indicates a moderate effect size, showing practical importance. This highlights a key challenge: while AI enhances efficiency and idea generation, overuse may diminish the designer's unique creative voice.

Table 6. Correlation Matrix Key Variables.

Table 6	Variable	Creativity	Idea Diversity	Design Quality	Efficiency
AI Usage	0.61**	0.58**	0.55**	0.52**	-0.42**
Experience	0.38**	0.35**	0.31**	0.29**	0.21*
AI Overreliance	-0.43**	-0.40**	-0.37**	-0.35**	-0.41**

Table 6 shows strong positive correlations between AI usage and creativity, idea diversity, and design quality, supporting **H1, H3, H4**. Negative correlations between AI overreliance and originality, efficiency, and quality reinforce **H6**, highlighting the risks of excessive dependency. Experience positively correlates with all creative outcomes, underlining the value of skill in maximizing AI benefits. This matrix provides a clear summary of relationships and confirms theoretical expectations about AI's dual impact on creative design.

Overall, the Figure 2 highlights the dual role of AI in design practice, emphasizing its ability to enhance creativity and efficiency while cautioning against the risks of excessive dependence that may undermine originality.
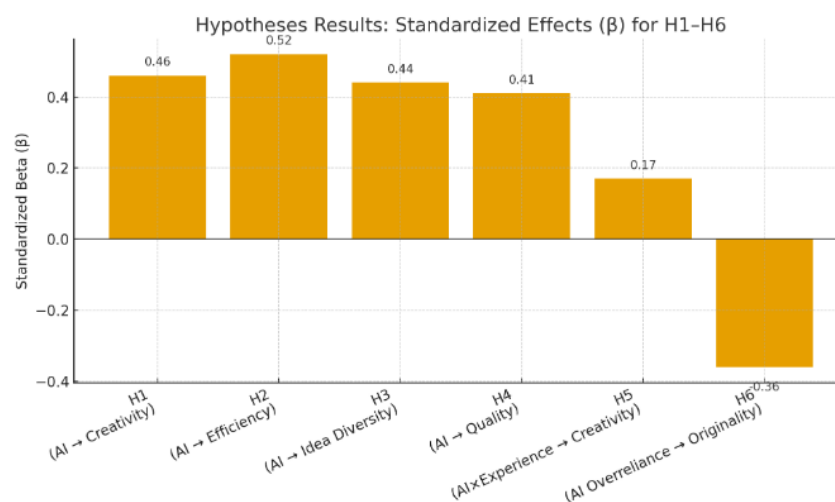

Figure 2. Hypotheses Results Standardised Effects (B) for H1-H6.

The bar Figure 2 illustrates the standardised effects (β) of AI-driven tools on six hypotheses related to creativity in graphic design. Results reveal that AI usage has the strongest positive impact on efficiency (β = 0.52), followed by creativity (β = 0.46), idea diversity (β = 0.44), and design quality (β = 0.41). These findings confirm that AI significantly enhances designers' productivity, broadens their conceptual space, and improves the overall quality of design outcomes. Furthermore, the interaction between AI usage and experience (β = 0.17) suggests that experienced designers benefit more from AI integration compared to novices, indicating that expertise amplifies the creative advantages of AI. In contrast, excessive reliance on AI demonstrates a negative association with originality (β = –0.36), highlighting a potential drawback of overdependence. This suggests that while AI can effectively complement human creativity, it should not replace the designer's personal touch or unique perspective. Overall, the results support a balanced approach to AI adoption in design practice: leveraging its efficiency and idea-generating capabilities while ensuring that originality and individual expression remain central to creative work.

DISCUSSION AND CONCLUSIONS

This study contributes to the understanding of how AI tools affect creativity within the scope of the study. The study shows that higher use of AI was associated with higher creativity, greater variation of ideas, and better quality of designs, hence, affirming the hypotheses H1, H3, and H4. The results align to some extent with the previous studies carried out on the subject (Li & Sun, 2023; Wang, 2022), which identified the potential of AI in the generation of ideas and expansion of the creative scope. Furthermore, the results indicate that AI is a powerful innovation tool in the creative process, and is not simply a technical instrument. The results also show that AI tools dramatically lessen the time and effort invested in the creation of novel graphic designs (H2). Designers who more intensively utilized the AI tools reported a greater sense of efficiency, which allowed more cognitive space to be opened for creative decisions and innovation, rather than doing mentally draining work that is easily automated. AI's ability to improve workflow efficiency and increase productivity within the creative sectors has also been documented in literature.

Experience was another central outcome. The regression results suggested that the more experienced designers were the ones that gained the most from AI tools, as they were able to integrate their expertise with AI tools and produce higher level creative outcomes. This illustrates that AI does not supplant human skills. Rather, it amplifies and augments them. Hence, it illustrates how critical experience is to unlocking AI's creative potential, emphasizing how training and expertise are still crucial in design environments that utilize AI. Conversely, the study recognized the potential drawbacks of AI, as the study confirmed this reliance negatively impacted the originality and personal touch of the work (H6). This corresponds with the recent literature (Mahmoud, 2024) warning about the generic outcomes that can result from over-reliance on AI during the design process. These outcomes starkly illustrate the importance of the designer's vision and personal expression and suggest that AI should be used more as a tool than a fully integrated component of the creative process.

To sum up, evidence shows how AI tools can assist in improving one's efficiency, ideation, quality, and originality, within a certain threshold. AI and creativity should be seen as pairs working together and should be used in conjunction rather than in isolation. Although AI can be an invaluable partner, instrument, or tool in design practice, human creativity should always be at the forefront. The findings in the above texts lead to a few key practical implications. Design professionals should seek a balance in the use of AI tools to subordinate efficiency as well as expand the creative landscape and maintain originality. Moreover, creative organizations and design studios should be able to train designers, especially beginners, to use AI tools to their fullest in a way that their personal voice is the most dominant in their work. Finally, design programs should focus on AI as a subject to build the competency of future designers in the use of AI and to develop the skills of originality in their work, also to ensure a constructive balance.

REFERENCES

Adel S. Hussain, Kafi D. Pati, Ali K. Atiyah, and Mohammad A. Tashtoush (2025). Rate of Occurrence Estimation in Geometric Processes with Maxwell Distribution: A Comparative Study between Artificial Intelligence and Classical Methods. International Journal of Advances in Soft Computing and its Application, 17(1), 1-15. https://doi.org/10.15849/IJASCA.250330.01.

Al Azzam, F. A. F., Khomko, L., Mykhailyk, N., Maslak, O., & Danchak, L. (2023). Optimization of international trade for sustainable development marketing strategy: Economic and legal EU regulations. International Journal of Sustainable Development & Planning, 18(8).

AlJabali, A. M. A., Jarah, B. A. F., Alshehadeh, A. R., & Al-khawaja, H. A. (2025, April). The Role of Artificial Intelligence in Enhancing Financial Technology Cybersecurity in Jordanian Banks. In Conference on Sustainability and Cutting-Edge Business Technologies (pp. 107-116). Cham: Springer Nature Switzerland.

Alqudah, A. M. A., Jaradat, Y. M., AlObaydi, B. A. A., Alqudah, D., & Jarah, B. A. F. (2024). Artificial intelligence in design and impact on electronic marketing in companies. Journal of Ecohumanism, 3(4), 170-179.

Alshehadeh, A. R., Al-Okaili, A. N., Jarah, B. A. F., Al-Jabali, A. M. A., & Al-Bataineh, F. A. (2025). THE MEDIATING ROLE OF HUMAN RESOURCE MANAGEMENT IN THE RELATIONSHIP BETWEEN STRATEGIC LEADERSHIP AND ENHANCEMENT OF COMPETITIVE ADVANTAGES IN JORDANIAN ISLAMIC BANKS. Financial and Credit Activity Problems of Theory and Practice, 1 (60), 570–580. https://doi.org/10.55643/fcaptp.1.60.2025.4587.

Al-Tarifi, S., Zraqou, J., Omar, F., & Magatef, S. (2024). Unlocking Blue Ocean Growth Powered by Artificial Intelligence. International Journal of Advances in Soft Computing & Its Applications, 16(3). https://doi.org/10.15849/IJASCA.241130.05.

Amireh, M., Arabasy, M., & Ghoneim, R. S. (2025). The Effect of Using Smart Applications in the Interior Design of Tourism Facilities: A Review. Civil Engineering and Architecture, 13(2), 931-948. 10.13189/cea.2025.130213.

Anantrasirichai, N., & Bull, D. (2022). Artificial intelligence in the creative industries: a review. Artificial intelligence review, 55(1), 589-656. https://doi.org/10.1007/s10462-021-10039-7.

Cai, L., & Jung, E. (2024). The impact of artificial intelligence on the graphic design job market: an analysis of the evolution and opportunities of the designer role. Psychology, 14(8), 259-267. doi:10.17265/2159-5542/2024.08.002.

Dahiyat, E. A. R. (2016). The legal recognition of online brokerage in UAE: is a conceptual rethink imperative? Information & Communications Technology Law, 25(2), 173–189. https://doi.org/10.1080/13600834.2016.1184455

Dahiyat, E. A. R. (2017). A legal framework for online commercial arbitration in UAE: new fabric but old style! Information & Communications Technology Law, 26(3), 272–292. https://doi.org/10.1080/13600834.2017.13740

Das, S., & Rani, P. (2024). Revolutionizing graphic design: The synergy of AI tools and human creativity. ShodhKosh J. Vis. Perform. Arts, 5, 372-380.

Ge, W., & Hou, G. (2025). The effects of generative AI model type and visual stimuli type on design creativity. AI EDAM, 39, e17. https://doi.org/10.1017/S0890060425100061.

Ghoneim, R. S., Arabasy, M., & Abdulhadi, A. N. (2025). AI-driven optimization of indoor environmental quality and energy consumption in smart buildings: a bio-inspired algorithmic approach. Journal of Asian Architecture and Building Engineering, 1-25.

Hussain, A. S., Pati, K. D., Atiyah, A. K., & Tashtoush, M. A. (2025). Rate of Occurrence Estimation in Geometric Processes with Maxwell Distribution: A Comparative Study between Artificial Intelligence and Classical Methods. International Journal of Advances in Soft Computing & Its Applications, 17(1). 10.1007/s42107-024-01225-3.

Jarrah, M. A., Baker, J., & Altarawneh, I. (2022). Toward successful project implementation: Integration between project management processes and project risk management. Problems and Perspectives in Management, 20(3), 258.

Jebril, I., Almaslmani, R., Jarah, B., Mugableh, M., & Zaqeeba, N. (2023). The impact of strategic intelligence and asset management on enhancing competitive advantage: The mediating role of cybersecurity. Uncertain Supply Chain Management, 11(3), 1041-1046.

Kutanova, D. (2025). The use of generative graphics in graphic design: aesthetics and ethics. Journal of Arts and Humanities, 14(02), 01-09. http://dx.doi.org/10.18533/journal.v13i2.2524.

Lan, Y. S. (2025). Exploring the Impact of Artificial Intelligence Creative Tools in Graphic Design Education: A Systematic Review. Semarak International Journal of Creative Art and Design, 3(1), 1-15. https://doi.org/10.37934/sijcad.3.1.115b.

Lee, C. W. (2025). Application of Generative Artificial Intelligence in Design Education: An Exploration and Analysis to Enhance Student Creativity. Engineering Proceedings, 98(1), 29. https://doi.org/10.3390/engproc2025098029.

Li, H., Xue, T., Zhang, A., Luo, X., Kong, L., & Huang, G. (2024). The application and impact of artificial intelligence technology in graphic design: A critical interpretive synthesis. Heliyon, 10(21).

Luo, Y., & Wu, X. (2024). Enhancing graphic design skills through AI-based learning systems. Membrane Technology. (6). https://doi.org/10.52710/mt.164.

Mahmoud, G. Z. (2024). Artificial Intelligence And Enhancing Creativity In Graphic Design. Al-Academy, 399-410. https://doi.org/10.35560/jcofarts1447.

Mirzaei, V. (2025). The Impact of Artificial Intelligence on Creativity in Graphic Design. Available at SSRN 5292032. http://dx.doi.org/10.2139/ssrn.5292032.

PANDY, P. (2024). Revolutionizing the AI-Digital Landscape. Available at SSRN 5335459. http://dx.doi.org/10.2139/ssrn.5335459.

Shakhatreh, H.J.M., Alazzam, F.A.F., Vashchyshyn, M., Shparyk, N., & Gontar, Z. (2023). Methodological approach for developing legal frameworks to protect land relations in homeland security. International Journal of Safety and Security Engineering, 13(3), 501-507. doi: 10.18280/ijsse.130312.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive science, 12(2), 257-285. https://doi.org/10.1016/0364-0213(88)90023-7.

Tang, Y., Zhang, N., Ciancia, M., & Wang, Z. (2024). Exploring the impact of AI-generated image tools on professional and non-professional users in the art and design fields. In Companion Publication of the 2024 Conference on Computer-Supported Cooperative Work and Social Computing. 451-458. https://doi.org/10.1145/3678884.3681890.

Tubishat, B. M. A. R., Alazzam, F. A. F., Viunyk, O., Yatsun, V., & Horpynchenko, O. (2024). Planning to improve the efficiency of open systems commercial relations to ensure uninterrupted sustainable development: Regional legal aspect. International Journal of Sustainable Development and Planning, 19(3), 1089-1097.

Türker, O. (2025). Human Touch vs. Machine Precision: Navigating AI In Graphic Design. Made By Artist Journal, 1(1), 53-61. https://journal.madebyartist.org/index.php/pub/article/view/9.

Wadinambiarachchi, S., Kelly, R. M., Pareek, S., Zhou, Q., & Velloso, E. (2024). The effects of generative ai on design fixation and divergent thinking. In Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems. (1-18). https://doi.org/10.1145/3613904.3642919.

Xin, K., & Zhang, Q. (2025). The Evolution of Visual Design in the Age of Artificial Intelligence: Historical Development, Technological Advancements, and Future Trends. Asia-pacific Journal of Convergent Research Interchange (APJCRI), 55-71.

Yaseen, S. G., Awad Albadrany, Q. H., Dajani, D., & Al-Afaishat, M. M. (2025). Artificial Intelligence Regulation: A Bibliometric Analysis. International Journal of Advances in Soft Computing & Its Applications, 17(1). https://doi.org/10.15849/IJASCA.250330.12.

Yu, W. F. (2025). AI as a co-creator and a design material: Transforming the design process. Design Studies, 97, 101303. https://doi.org/10.1016/j.destud.2025.101303.