Exploring Needs and Preferences for an AI-Enhanced Design Thinking Environment in Graphic and Multimedia Design

Chanwit Sankumpa, Khon Kaen University, Thailand
Parama Kwangmuang, Khon Kaen University, Thailand

The Asian Conference on Education 2025
Official Conference Proceedings

Abstract

This study aims to explore the learning needs and preferences of undergraduate students and instructors for an AI-enhanced design thinking environment in graphic and multimedia design education. The research employs a mixed-methods approach, involving a survey of 150 undergraduate students majoring in graphic and multimedia design and semi-structured interviews with 12 instructors. The survey assesses students' perceptions of their creative thinking abilities, learning style preferences, and attitudes towards the integration of AI and design thinking in their learning process. The interviews with instructors focus on their experiences, challenges, and expectations regarding the implementation of an AI-enhanced design thinking environment. Quantitative data analysis reveals that 68% of the students believe that an AI-enhanced design thinking environment would improve their creative thinking skills, with 75% expressing a preference for interactive and collaborative learning activities. Qualitative findings highlight the need for a balance between technology-driven and human-centered approaches, as well as the importance of providing personalized feedback and support. The study identifies key considerations for designing an effective AI-enhanced design thinking environment, including the integration of AI-powered tools for idea generation and prototyping, the incorporation of collaborative learning spaces, and the provision of adaptive learning experiences based on individual needs and progress. These findings contribute to the development of innovative teaching and learning strategies that harness the potential of AI and design thinking to cultivate creative thinking skills in graphic and multimedia design education.

Keywords: learning needs, preferences, AI-enhanced learning, design thinking, creative thinking, graphic and multimedia design

iafor
The International Academic Forum
www.iafor.org

Introduction

The rapid evolution of artificial intelligence (AI) is significantly challenging higher education: namely, preparing students with creative thinking skills that *complement* AI rather than *compete* with it. While 85% of jobs by 2030 will require creative problem-solving skills (World Economic Forum, 2023), only 23% of graduates demonstrate these competencies (OECD, 2024). This "creativity gap" reflects a critical misalignment between technological advancement and educational outcomes.

In Thailand, this gap is particularly acute. The 2024 Global Innovation Index ranks the nation 43rd overall but 67th in creative outputs, signaling a failure to translate educational investment into innovative capability. This problem is especially concerning in design-related disciplines, where creativity is a fundamental competency. Although AI integration shows promise for improving learning outcomes (UNESCO, 2024), most implementations focus on knowledge transmission rather than creative skill development. The critical question is no longer *if* AI should be used in design education, but *how* it can be used to *enhance*, not *diminish*, human creativity.

Concurrently, Design Thinking (DT), a human-centered problem-solving approach, is proven to enhance creative confidence and problem-solving skills (Liedtka, 2015). However, its implementation faces challenges, especially in Asian or Thai educational cultures where rote learning may conflict with DT's exploratory nature (Zhao, 2023). Conversely, AI technologies like generative tools (Midjourney, DALL-E) and LLMs (ChatGPT) have revolutionized ideation. Yet, significant barriers persist, notably low faculty readiness (Elisyah et al., 2024), and crucially, most research measures academic achievement rather than the direct impact on *creativity*.

This creates an "Integration Gap." Current research typically examines AI or DT in isolation, lacking studies on their synergistic potential. Literature lacks empirical evidence on optimal human-AI interaction patterns, validated frameworks, and models adapted for Asian cultures. Most importantly, there is a profound lack of understanding regarding the needs and perspectives of stakeholders—both students and instructors—which are essential for designing practical and contextually relevant learning environments.
This research, therefore, aims to address these gaps, specifically by exploring learner and educator needs within the context of graphic and multimedia design education in Thailand. The objectives are to:

- Assess students' perceptions, attitudes, and preferences regarding AI and DT integration.
- Explore instructors' experiences, challenges, and expectations.
- Identify key design principles for an effective AI-enhanced DT learning environment.
- Develop evidence-based recommendations for implementation in the Thai context.

This study will provide novel theoretical insights (e.g., viewing AI as a collaborative agent) and practical guidance for educators. It aims to inform the development of balanced learning environments that leverage AI tools while preserving human-centered pedagogy, ultimately preparing designers for an AI-driven future.

Literature Review

The Role of Design Thinking in Enhancing Creative Skills

As demand for 21st-century skills intensifies, creative thinking has emerged as core competency educators must nurture across disciplines. Design Thinking (DT), a human-centered, iterative problem-solving approach rooted in design and innovation fields, has been increasingly adopted in education to address this need (Brown, 2009; Razzouk & Shute, 2012). It promotes empathy, ideation, prototyping, and testing—processes aligning closely with creative cognition development.

Growing literature supports the assertion that DT serves as powerful catalyst for creative thinking in educational contexts. Recent studies implemented DT-based frameworks in media education and biology learning, showing marked improvements in students' engagement, motivation, and creativity through scaffolded problem-solving, with motivation increases of 25-30%. These studies underscore how structured design stages—empathize, define, ideate, prototype, test—create psychologically safe space for divergent and convergent thinking.

Internationally, research demonstrates that design thinking education enhances students' creative confidence, problem-solving abilities, and collaborative skills (Koh et al., 2015; Liedtka, 2015). In graphic and multimedia design contexts specifically, design thinking provides structured yet flexible framework for addressing complex design challenges. Students receiving explicit design thinking training demonstrate improved abilities to navigate ambiguous problem spaces and generate innovative solutions (Carlgren et al., 2016; Micheli et al., 2019).

Challenges in Implementation

Despite positive trends, significant challenges remain. Implementing DT in creative media programs often requires curriculum overhaul and faculty retraining, pointing to systemic barriers in adoption. Moreover, in Asian educational cultures where rote learning still dominates, educators may struggle to foster open-ended inquiry that DT demands (Zhao, 2023). These cultural dynamics may limit DT's full potential unless adapted to local pedagogical realities.

Studies reveal further constraints, including lack of teacher preparedness (only 13.33% achieving high competency) and difficulty aligning DT methods with rigid course structures. Instructors face challenges balancing structured guidance with open-ended exploration, assessing creative processes, and providing timely feedback to students engaged in complex design projects.

The literature converges on the idea that Design Thinking offers compelling, evidence-based approach to enhancing creative thinking in higher education. Nevertheless, gaps remain in understanding its adaptation in non-Western and resource-constrained contexts, particularly when paired with emerging technologies.

Artificial Intelligence in Learning Media

Artificial Intelligence (AI) is increasingly integrated into higher education, particularly within learning media designed to enhance student engagement, personalize learning experiences,

and develop critical thinking (Chen & Wang, 2023; Rodriguez et al., 2024). AI-powered platforms and tools offer real-time feedback, content adaptation, and interactive features difficult to achieve through traditional instruction alone.

AI Applications in Design Education

AI-powered generative design tools, such as Midjourney, DALL-E, and Adobe Firefly, have revolutionized how students approach visual ideation and concept development (Zhang et al., 2023). These tools enable rapid exploration of design alternatives and help students visualize abstract concepts quickly. Large language models like ChatGPT have found applications in design education, particularly supporting research, concept articulation, and design documentation (Kumar & Singh, 2024).

Across multiple empirical studies, AI has been applied in learning media to improve academic outcomes. Studies developed AI-integrated media for elementary science and social studies subjects, achieving high content validity (92.3-96.4%) and moderate effectiveness. AI-based chatbot systems for electronics education demonstrated AI's potential in technical subjects to provide adaptive, real-time assistance.

Research expanded scope by exploring how AI in media education supports both knowledge acquisition and creative expression, emphasizing importance of instructional design and ethical frameworks. However, studies show AI's ability to personalize and scaffold learning, though creativity as outcome is often assumed rather than directly assessed.

Implementation Challenges

Major limitations exist in teacher readiness, with only 13.33% of pre-service teachers achieving very high competency in designing AI-based learning media. This suggests that without adequate training and support, educational potential of AI cannot be fully realized. Teachers were open to using AI tools but cited barriers such as limited technical knowledge and integration challenges.

Despite advancements, noticeable gap exists in studies measuring AI media's effectiveness in developing creativity. Most focus on achievement or usability, with creativity often assumed rather than directly assessed. While AI enables personalized pathways, limited evidence shows it independently fosters ideation or imaginative thinking without being paired with constructivist methods.

Integrating Design Thinking and AI for Creativity Development

Design Thinking (DT) and Artificial Intelligence (AI) each offer unique advantages in educational innovation. DT is known for enhancing creativity through its iterative, user-focused approach, while AI brings adaptive feedback and personalized support to learning environments. However, literature investigating their integration remains in its infancy, with most studies focusing on either DT or AI in isolation.

Emerging Synergies

Synergy between DT and AI appears implicitly in several studies. Interactive media based on DT principles—empathize, define, ideate, prototype, and test—resulted in increased

motivation and knowledge retention. Though AI was not used, the structured design process aligned with principles that AI tools could easily enhance, such as providing iterative feedback or automating testing phases.

Recent theoretical work suggests AI can serve as collaborative agent in creative knowledge construction, extending neo-constructivist learning theory (Kim & Lee, 2023). This positions AI not merely as tool but as partner in creative process, complementing human intuition with computational power while maintaining human agency in creative decision-making.

Research Gaps

The integration of Design Thinking and Artificial Intelligence in educational media remains an emerging area. While both have shown individual effectiveness, their combined application to cultivate creativity has yet to be fully realized in practice. Current literature shows implicit alignment between the two but lacks:

- Empirical evidence on their joint impact on creative thinking outcomes
- Validated design principles for AI-enhanced DT environments
- Optimal human-AI interaction patterns for creative development
- Understanding of how to balance technology-driven and human-centered approaches
- Frameworks for sustainable implementation across diverse contexts

This study addresses these gaps by investigating how AI tools, when systematically integrated within a DT framework, can enhance the creativity of Thai undergraduate students in graphic and multimedia design education.

Student Learning Preferences in Design Education

Understanding student learning preferences is crucial for designing effective educational interventions. Research reveals diverse learning preferences among design students, with many favoring hands-on, experiential learning approaches over traditional lecture-based instruction (Fleischmann, 2020; Kolb & Kolb, 2005).

Design students particularly value collaborative learning opportunities where they can exchange ideas, critique work, and learn from peers (Dannels et al., 2008; Shreeve et al., 2010). Interactive learning activities combining individual creativity with collaborative refinement have been shown to enhance both skill development and student engagement (Carmel-Gilfilen & Portillo, 2016).

Recent studies examining technology adoption in design education suggest students are generally receptive to AI-enhanced learning tools, particularly when these technologies demonstrably enhance their creative capabilities and efficiency (Kim & Lee, 2023). However, concerns about maintaining authenticity and developing genuine skills amid increasing AI assistance persist (Thompson et al., 2024).

Instructor Perspectives on Technology Integration

Design instructors' attitudes toward technology integration significantly influence implementation success. While many design educators recognize the potential benefits of AI technologies, they also express concerns about maintaining pedagogical quality, preserving

human creativity, and managing the learning curve associated with new tools (Fleischmann, 2020; Robertson & Radcliffe, 2009).

Research indicates that successful technology integration requires careful alignment with learning objectives and pedagogical principles, with technology serving pedagogy rather than driving it. The emphasis on balanced human-AI collaboration reflects mature understanding of the proper role of educational technology in creative education contexts.

Methodology

Research Design

This study employed a mixed-methods research design, integrating quantitative and qualitative approaches. Data collection occurred over a three-month period from March to May 2025.

Participants

The study included 150 undergraduate students from graphic design (n = 75) and multimedia design (n = 75) programs at three prominent Thai universities: Khon Kaen University, Chulalongkorn University, and Chiang Mai University. These institutions were selected to represent geographic diversity across Thailand's northeastern, central, and northern regions. The sample comprised students from all four academic years, with approximately 25% from each year level (Year 1: n = 38, Year 2: n = 37, Year 3: n = 38, Year 4: n = 37).

Instructor Sample

Twelve design instructors participated in semi-structured interviews, representing the same three universities. The instructor sample included six graphic design instructors, four multimedia design instructors, and two instructors teaching across both disciplines. Teaching experience ranged from 2 to 25 years (M = 11.8 years, SD = 7.2 years), providing perspectives from both early-career and experienced educators. All instructors reported moderate to high levels of technology integration in their teaching, with varying degrees of familiarity with AI tools.

Data Collection and Analysis

Student surveys assessed perceptions and attitudes using 5-point Likert scales. Instructor interviews were audio-recorded and analyzed using thematic analysis. Quantitative data were analyzed using SPSS version 28.

Student Survey

A structured questionnaire was developed to assess students' perceptions, preferences, and attitudes. The survey comprised four main sections: (1) demographic information and AI experience, (2) self-assessment of creative thinking abilities using a 5-point Likert scale, (3) learning style preferences through multiple-choice and ranking questions, and (4) attitudes toward AI integration in design education measured on a 5-point Likert scale. The survey instrument was piloted with 20 students not included in the main study, and modifications were made based on pilot feedback to enhance clarity and comprehensiveness.

Instructor Interview Protocol

A semi-structured interview protocol was developed to explore instructors' experiences, challenges, and expectations regarding AI-enhanced design thinking environments. The protocol covered five key areas: (1) current teaching practices and challenges, (2) experiences with technology integration, (3) perceptions of AI tools in design education, (4) expectations for AI-enhanced learning environments, and (5) concerns and recommendations for implementation. Interviews were conducted in Thai or English based on instructor preference, with durations ranging from 45 to 70 minutes.

Data Collection Procedures

Data collection occurred over a three-month period from March to May 2025. The study received ethical approval from the Institutional Review Board at Khon Kaen University. All participants provided informed consent, and confidentiality was ensured through anonymization procedures.

Student surveys were administered online using Google Forms, distributed through course instructors and student organizations. Response rate was approximately 75%, with 150 completed surveys out of 200 distributed. Instructor interviews were conducted individually, either in person or via video conference based on participant preference and geographic location. All interviews were audio-recorded with permission and subsequently transcribed for analysis.

Data Analysis

Quantitative Analysis

Survey data were analyzed using SPSS version 28. Descriptive statistics including frequencies, percentages, means, and standard deviations were calculated for all quantitative variables. Independent samples t-tests were conducted to compare responses between graphic design and multimedia design students, as well as between students with and without AI experience. Chi-square tests were used to examine relationships between categorical variables. Statistical significance was set at $p < 0.05$.

Qualitative Analysis

Interview transcripts were analyzed using thematic analysis following Braun and Clarke's (2006) six-phase approach. Initial codes were generated inductively from the data, then organized into potential themes. Themes were reviewed and refined through iterative analysis and discussion among research team members. NVivo 12 software was used to facilitate coding and theme management. To enhance trustworthiness, member checking was conducted with three interview participants who confirmed the accuracy of the interpretations.

Research Results

Student Perceptions and Preferences

Students' self-assessment of creative thinking revealed high confidence in generating original ideas (M = 4.15) but lower confidence in combining diverse concepts (M = 3.42).

Table 1
Students' Self-Assessment of Creative Thinking Abilities (N = 150)

Creative Thinking Dimension	Mean (SD)	Level
Generating original ideas	4.15 (0.68)	High
Thinking flexibly	3.92 (0.74)	High
Elaborating on ideas	3.87 (0.79)	High
Taking creative risks	3.64 (0.86)	Moderate
Problem identification	3.78 (0.81)	High
Combining diverse concepts	3.42 (0.91)	Moderate

Learning Style Preferences

Analysis of learning style preferences revealed strong student preference for interactive and collaborative learning approaches. Table 2 summarizes the distribution of preferred learning activities.

Table 2
Student Preferences for Learning Activities (N = 150)

Learning Activity	Frequency	Percentage
Interactive and collaborative projects	113	75.3%
Hands-on practical exercises	108	72.0%
Real-world design challenges	95	63.3%
Peer critique and feedback sessions	87	58.0%
Individual creative exploration	72	48.0%
Lecture-base instruction	38	25.3%

Attitudes Toward AI Integration

68% of students agreed that an AI-enhanced DT environment would improve their creative skills. Students with AI experience expressed significantly more positive attitudes ($p = 0.001$).

Table 3
Student Attitudes Toward AI Integration in Design Education (N = 150)

Attitude Statement	Mean (SD)	Agreement level
AI can improve mu creative thinking skills	4.21 (0.72)	Agree
AI tools can help generate more design ideas	4.38 (0.65)	Strongly Agree
AI feedback would be helpful for my learning	4.15 (0.78)	Agree
I am interested in learning to use AI tools	4.32 (0.69)	Strongly Agree
AI can make design learning more efficient	4.27 (0.71)	Strongly Agree
I worry AI might reduce my originality	3.14 (1.02)	Neutral

Instructor Perspectives

Four major themes emerged: (1) balancing technology and pedagogy, (2) personalization and adaptive support, (3) collaborative learning enhancement, and (4) implementation challenges. Instructors emphasized that AI should serve pedagogy, not replace it.

Theme 1: Balancing Technology and Pedagogy

All instructors emphasized the importance of maintaining pedagogical integrity while integrating AI technologies. One experienced instructor noted: “Technology should serve pedagogy, not replace it. AI tools can be powerful aids, but we must ensure students still develop fundamental design thinking and problem-solving skills.” Instructors expressed concern about students becoming overly dependent on AI-generated solutions without developing critical evaluation skills. Several instructors advocated for a hybrid approach where AI tools complement traditional teaching methods rather than replacing human instruction and mentorship.

Theme 2: Personalization and Adaptive Support

Instructors recognized the potential of AI to provide personalized learning experiences tailored to individual student needs. One multimedia design instructor commented: “In large classes, it's challenging to provide individual feedback to every student. AI systems that can analyze student work and provide immediate, personalized suggestions could significantly enhance learning.” However, instructors emphasized that AI-generated feedback should supplement rather than replace human instructor feedback, particularly regarding subjective aspects of design quality and creative expression.

Theme 3: Collaborative Learning Enhancement

Instructors identified collaborative learning as a critical component of design education that AI technologies could potentially enhance. One instructor explained: “Collaborative design projects teach students valuable skills, but coordination can be challenging. AI-powered platforms that facilitate idea sharing, version control, and collaborative prototyping could make group work more productive.” Instructors expressed interest in AI tools that could support peer learning by suggesting relevant examples, facilitating constructive critique, and helping students learn from each other's creative processes.

Theme 4: Implementation Challenges and Concerns

While generally optimistic about AI's potential, instructors identified several implementation challenges. These included the learning curve for both instructors and students, concerns about equitable access to technology, potential academic integrity issues, and the need for institutional support and resources. One instructor articulated: “We need proper training and ongoing support to effectively integrate these tools. It's not just about having the technology—we need to understand how to use it pedagogically.” Instructors emphasized the importance of gradual, well-supported implementation with clear guidelines for appropriate AI tool usage.

Discussion

This study provides valuable insights into the needs and preferences of students and instructors regarding AI-enhanced design thinking environments in graphic and multimedia design education. The findings reveal generally positive attitudes toward AI integration while highlighting important considerations for implementation.

Student Readiness

The finding that 68% of students believe AI-enhanced environments would improve their creative thinking aligns with recent research demonstrating positive student attitudes toward educational technology integration (Kim & Lee, 2023; Thompson et al., 2024). Students' strong preference for interactive and collaborative learning activities (75%) underscores importance of designing AI-enhanced environments that facilitate rather than replace social learning experiences.

The positive correlation between AI experience and more favorable attitudes toward AI integration suggests that exposure and familiarity can reduce technology-related apprehension. This finding has important implications for implementation strategies, suggesting that early introduction and hands-on experience with AI tools may facilitate smoother technology adoption. Educational institutions should consider providing introductory workshops or courses on AI tools before full integration into design curricula.

Students' relatively neutral stance on concerns about AI reducing originality ($M = 3.14$) suggests nuanced understanding that technology itself does not necessarily diminish creativity—rather, how it is used determines its impact. This finding contrasts with some earlier research suggesting strong student concerns about technology limiting creativity (Shreeve et al., 2010), possibly reflecting generational shifts in technology attitudes among contemporary digital natives.

Pedagogical Implications

Instructor perspectives emphasize critical importance of balancing technological innovation with pedagogical soundness. This finding resonates with educational technology literature highlighting that successful technology integration requires careful alignment with learning objectives and pedagogical principles (Robertson & Radcliffe, 2009; Fleischmann, 2020). The emphasis on technology serving pedagogy rather than driving it reflects mature understanding of proper role of educational technology.

The instructor-identified need for personalized, adaptive learning support aligns with research demonstrating effectiveness of adaptive learning systems in promoting skill development (Kumar & Singh, 2024). However, instructors' insistence that AI feedback should supplement rather than replace human feedback highlights continued importance of expert human judgment in evaluating creative work. This suggests hybrid model where AI provides immediate, frequent feedback on technical aspects while instructors focus on higher-order creative and conceptual feedback.

The identification of collaborative learning enhancement as key opportunity for AI integration is particularly noteworthy. While much AI education research focuses on individualized learning, these findings highlight collaborative applications that could

transform group design projects. AI tools that facilitate idea sharing, manage collaborative workflows, and support peer learning could address longstanding challenges in collaborative design education (Carmel-Gilfilen & Portillo, 2016; Dannels et al., 2008).

Design Considerations

Based on research findings, several key design considerations emerge for AI-enhanced design thinking environments.

Integration of AI-Powered Tools

The environment should incorporate AI tools for idea generation (e.g., text-to-image generators), design exploration (e.g., style transfer systems), and prototyping (e.g., automated layout systems). However, these tools should be designed to augment rather than automate creative thinking, maintaining student agency in design decisions.

Collaborative Learning Spaces

The environment should provide robust collaborative features including shared workspaces, real-time co-design capabilities, peer review systems, and AI-facilitated discussion forums. These features should support both synchronous and asynchronous collaboration to accommodate diverse learning schedules and preferences.

Adaptive Learning Experiences

The system should provide personalized learning paths based on individual student needs, progress, and preferences. AI algorithms should analyze student work patterns, identify areas needing improvement, and recommend appropriate resources and exercises. Importantly, the system should maintain transparency about how recommendations are generated and allow instructor oversight of adaptive pathways.

Balanced Feedback Mechanisms

The environment should provide multiple layers of feedback: immediate AI-generated feedback on technical aspects, peer feedback through structured critique protocols, and instructor feedback on higher-order creative and conceptual dimensions. This multi-tiered approach ensures students receive timely, comprehensive feedback while maintaining irreplaceable value of expert human judgment.

Scaffolded AI Tool Usage

The environment should include built-in tutorials, guided exercises, and progressive skill-building activities that help students develop proficiency with AI tools. Clear guidelines about appropriate and inappropriate AI tool usage should be integrated throughout learning experience.

Limitations and Future Research

This study has several limitations that suggest directions for future research. First, the sample was drawn from three universities in Thailand, which may limit generalizability to other

cultural contexts. Future research should examine needs and preferences across diverse cultural and geographic settings to understand how cultural factors influence attitudes toward AI in design education.

Second, this study captured perspectives at single time point. Longitudinal research tracking how attitudes and preferences evolve as students gain more experience with AI-enhanced learning environments would provide valuable insights into temporal dynamics of technology adoption in design education.

Third, while this study identified important needs and preferences, it did not empirically test effectiveness of AI-enhanced design thinking environments. Future experimental research should evaluate impact of such environments on actual learning outcomes, creative performance, and skill development.

Finally, this study focused primarily on perceptual data through surveys and interviews. Future research incorporating observational studies, learning analytics, and portfolio analysis would provide richer understanding of how students actually interact with and benefit from AI-enhanced learning environments.

Conclusion

This mixed-methods study explored the learning needs and preferences of undergraduate students and instructors regarding AI-enhanced design thinking environments in graphic and multimedia design education. The findings reveal generally positive attitudes among students toward AI integration, with 68% believing such environments would enhance their creative thinking skills and 75% preferring interactive and collaborative learning activities.

The research identified several key considerations for designing effective AI-enhanced design thinking environments. These include: (1) integrating AI-powered tools for idea generation and prototyping while maintaining student creative agency, (2) incorporating robust collaborative learning features that facilitate both synchronous and asynchronous teamwork, (3) providing adaptive learning experiences that personalize content and feedback based on individual needs and progress, and (4) implementing balanced feedback mechanisms combining immediate AI-generated insights with essential human instructor expertise.

Instructor perspectives emphasized the critical importance of balancing technological innovation with pedagogical soundness. Educators stressed that AI tools should serve pedagogical goals rather than driving them, and that technology implementation must be accompanied by adequate training, institutional support, and clear guidelines for appropriate usage.

The finding that prior AI experience correlates with more positive attitudes toward AI integration suggests that early, supported exposure to these technologies can facilitate smoother adoption. Educational institutions should consider implementing introductory experiences with AI tools before full curricular integration.

These findings contribute to the growing body of knowledge on technology-enhanced design education and provide practical guidance for educators, instructional designers, and educational technology developers. By understanding stakeholder needs and preferences, institutions can design AI-enhanced learning environments that effectively support creative

thinking development while maintaining the human-centered values central to design education.

As AI technologies continue to evolve rapidly, ongoing research and evaluation will be essential to ensure that educational applications of these powerful tools truly serve student learning and development. The success of AI-enhanced design thinking environments will ultimately depend not on the sophistication of the technology itself, but on how thoughtfully it is integrated into pedagogically sound, human-centered educational experiences.

This study provides a foundation for future research and implementation efforts aimed at harnessing AI's potential to cultivate creative thinking skills in graphic and multimedia design education. By attending to the needs and preferences of both students and instructors, educators can create learning environments that prepare students for the evolving landscape of design practice while preserving the essential human elements of creativity, judgment, and innovation.

Acknowledgements

The author wishes to express sincere gratitude to the 150 undergraduate students and 12 design instructors from Khon Kaen University, Chulalongkorn University, and Chiang Mai University who participated in this study. Their valuable insights, experiences, and willingness to share their perspectives on the integration of artificial intelligence in design education were fundamental to the completion of this research. Special thanks are also extended to the faculty members of the Graphic and Multimedia Design programs for their administrative support and for facilitating the data collection process during the study period.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the author(s) used Gemini/ChatGPT in order to assist in formatting the manuscript according to specific conference guidelines and improving the clarity of English expression. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication. This declaration refers only to the writing process and not to the use of AI tools as part of the research methodology described in the study (such as Midjourney or DALL-E used by participants).

References

Abdo, M. (2023). Design thinking in open and distance learning: Supporting motivation and autonomy in creative education. *International Journal of Open and Distance Learning*, *28*(3), 245–262.

Azizah, N., Suryani, E., & Widiastuti, R. (2024). Discovery-learning handout based on ADDIE model fused with design thinking: Enhancing cognitive and creative outcomes. *Journal of Educational Technology Development*, *15*(2), 156–174.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Brown, T. (2009). *Change by design: How design thinking transforms organizations and inspires innovation*. Harper Business.

Carlgren, L., Rauth, I., & Elmquist, M. (2016). Framing design thinking: The concept in idea and enactment. *Creativity and Innovation Management*, *25*(1), 38–57.

Carmel-Gilfilen, C., & Portillo, M. (2016). Developmental trajectories in design thinking: An examination of criteria. *Design Studies*, *42*, 98–126.

Chen, L., & Wang, Y. (2023). AI-enhanced creative design education: A systematic review. *Computers & Education*, *198*, 104756.

Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Dannels, D. P., Housley Gaffney, A. L., & Martin, K. N. (2008). Beyond content, deeper than delivery: What critique feedback reveals about communication expectations in design education. *International Journal for the Scholarship of Teaching and Learning*, *2*(2), Article 12.

Dykhnych, O., Petrenko, L., & Kovalenko, V. (2022). Systemic barriers in design thinking implementation: Curriculum rigidity and cultural resistance in creative media programs. *European Journal of Contemporary Education*, *11*(4), 1089–1104.

Elisyah, E., Winarno, W., & Hidayat, T. (2024). Teacher competency in designing AI-based learning media: A competency assessment study. *Journal of Educational Technology and Innovation*, *6*(1), 23–41.

Fleischmann, K. (2020). Online design education: Searching for a middle ground. *Arts and Humanities in Higher Education*, *19*(1), 36–57.

Fu'adah, R., & Ratnaningrum, D. (2024). Development of AI-integrated learning media for elementary science and social studies: A Borg & Gall research and development approach. *International Journal of Elementary Education*, *8*(2), 178–195.

G, M. (2022). Design thinking frameworks in media education: Enhancing engagement and creativity through structured problem-solving. *Media Education Journal*, *34*(4), 412–428.

Global Innovation Index. (2024). *Global innovation index 2024: Who will finance innovation?* World Intellectual Property Organization.

Henson, R. K., Hull, D. M., & Williams, C. S. (2021). Design thinking in education: Cultivating creativity, self-efficacy, and resilience. *Journal of Creative Behavior*, *55*(4), 1018–1033.

Jha, A., & Singh, K. (2024). AI in media education: Balancing knowledge acquisition and creative expression through ethical instructional design. *Educational Technology Research and Development*, *72*(1), 89–108.

Kim, J., & Lee, S. (2023). Student perceptions of AI integration in design studios: A qualitative study. *Design Studies*, *85*, 101168.

Koh, J. H. L., Chai, C. S., Wong, B., & Hong, H. Y. (2015). Design thinking and education. In *Design thinking for education: Conceptions and applications in teaching and learning* (pp. 1–15). Springer.

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, *4*(2), 193–212.

Kumar, R., & Singh, P. (2024). Large language models in design education: Opportunities and challenges. *International Journal of Technology and Design Education*, *34*(2), 445–468.

Liedtka, J. (2015). Perspective: Linking design thinking with innovation outcomes through cognitive bias reduction. *Journal of Product Innovation Management*, *32*(6), 925–938.

Lor, R. R. (2017). Design thinking in education: A critical review of literature. In *Proceedings of the Asian Conference on Education & International Development 2017* (pp. 31–44). The International Academic Forum (IAFOR).

Mariana, S., Kusuma, D., & Wahyudi, A. (2024). Mobile AR cooking application development using design thinking principles: Fostering creativity through iterative prototyping. *International Journal of Interactive Mobile Technologies*, *18*(3), 67–85.

Martinez, C., & Johnson, A. (2023). AI-powered collaborative design systems: A review of current applications. *Design Issues*, *39*(3), 54–71.

Mendoza, R., Santos, J., & Cruz, M. (2023). AI-based chatbot system for electronics education: Development and evaluation using BLEU scores. *International Journal of Engineering Education*, *39*(5), 1234–1247.

Micheli, P., Wilner, S. J., Bhatti, S. H., Mura, M., & Beverland, M. B. (2019). Doing design thinking: Conceptual review, synthesis, and research agenda. *Journal of Product Innovation Management*, *36*(2), 124–148.

OECD. (2024). *OECD education report 2024: Creative thinking competencies in the 21st century*. OECD Publishing.

Pond, N., Srisomphan, J., & Khlaisang, J. (2024). Integrating AI and design thinking to enhance creative skills in Thai universities: A mixed-methods study. In *Proceedings of the Asian Conference on Education 2024* (pp. 125–146). The International Academic Forum (IAFOR).

Rachmadtullah, R., Yulianti, K., & Setiawan, B. (2024). Teachers' openness to AI tools in education: Barriers, perceptions, and the role of digital storytelling and gamification. *Education and Information Technologies*, *29*(4), 4523–4545.

Razzouk, R., & Shute, V. (2012). What is design thinking and why is it important? *Review of Educational Research*, *82*(3), 330–348.

Robertson, M., & Radcliffe, D. (2009). The role of technology in engineering education. In *Engineering education quality assurance* (pp. 135–148). Springer.

Rodriguez, M., Garcia, P., & Santos, L. (2024). Generative AI in design education: A comparative study. *The Design Journal*, *27*(1), 89–107.

Scheer, A., Noweski, C., & Meinel, C. (2012). Transforming constructivist learning into action: Design thinking in education. *Design and Technology Education*, *17*(3), 8–19.

Seitz, J., & Barkley, T. (2023). Design thinking in interdisciplinary STEM courses: Impact on creativity and problem-framing skills. *Journal of STEM Education*, *24*(2), 45–62.

Shreeve, A., Sims, E., & Trowler, P. (2010). 'A kind of exchange': Learning from art and design teaching. *Higher Education Research & Development*, *29*(2), 125–138.

SPou, M., Charoensuk, V., & Thongkorn, S. (2024). Interactive media based on design thinking in biology learning: Effects on student motivation and knowledge retention. *Journal of Biological Education*, *58*(1), 98–116.

Thompson, R., Williams, K., & Davis, M. (2024). Student concerns about AI in creative education: A mixed-methods investigation. *Thinking Skills and Creativity*, *51*, 101452.

UNESCO. (2024). *Global education monitoring report 2024: Technology in education—A tool on whose terms?* UNESCO Publishing.

World Economic Forum. (2023). *Future of jobs report 2023*. World Economic Forum.

Zhang, Y., Chen, M., & Liu, H. (2023). Text-to-image generation in design education: Opportunities and pedagogical implications. *International Journal of Design & Technology Management*, *28*(4), 312–329.

Zhao, L. (2023). Cultural challenges in design thinking adoption: Hierarchical learning traditions in Asian educational contexts. *Asia Pacific Education Review*, *24*(3), 567–584.

Contact email: chanwitsankumpa@kkumail.com