

Continuous AI Assistance Utility in Design Academics Can Harm Human Thinking Ability

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Abstract

The rapid rise of Artificial Intelligence tools such as ChatGPT, Gemini and Perplexity, along with creative AI platforms like Midjourney and Adobe Firefly, is significantly influencing the way human cognition operates. In particular, the constant integration of these tools within design education is reshaping the way design students think, ideate, and create. But what exactly do we mean by “thinking ability”? It refers to our capacity for critical and creative thinking, empathy, problem-solving, and reasoning- the very core of design thinking. This paper explores how continuous dependence on AI affects these cognitive abilities and, in turn, impacts the originality and authenticity of a designer’s thought process. Through the lens of cognitive psychology, design theory, and educational frameworks, the study discusses how overreliance on AI tools may hinder the development of creative independence and the raw, experimental mindset that defines human-centered design.

Key Words: Artificial Intelligence (AI), AI Dependency, AI Impact, Human-Computer Interaction, AI Tools, Cognitive psychology, Design thinking, Bias, creativity suppression, Human mindset.

Introduction

In recent years, the rise of Artificial Intelligence (AI) tools such as ChatGPT, Gemini, and Perplexity, along with creative platforms like Midjourney and Adobe Firefly, has revolutionized the landscape of design education. These tools have made research, ideation, visualization, and execution faster and more efficient, allowing design students to explore complex ideas with unprecedented ease. According to the Design Society (2024), AI integration in design academia has significantly enhanced productivity and broadened access to creative learning. However, this increasing reliance on AI systems has also begun to reshape how design students think, create, and problem-solve, leading to growing concerns about AI dependency and its effect on the human mindset.

“Thinking ability,” in the context of design, extends beyond technical skill. It includes critical and creative thinking, empathy, problem-solving, and reasoning—the very pillars of design thinking and human-centered design. Yet, as AI tools automate ideation and generate instant solutions, students may gradually lose touch with these fundamental cognitive processes.

Studies have shown that overreliance on AI dialogue systems can reduce independent reasoning and analytical ability (Zhai, 2024), while excessive dependence on generative AI tools correlates with lower creativity and emotional engagement (Lin & Chen, 2024). These findings align with the principles of cognitive psychology, which suggest that when machines perform complex mental tasks for humans, the brain’s capacity for originality and problem-solving may weaken over time.

The implications for design education are particularly concerning. AI tools are no longer limited to technical assistance—they actively shape students’ design decisions, aesthetic preferences, and thought processes. As Tian (2025) notes, continued reliance on automated systems may suppress the designer’s intrinsic motivation and foster creativity suppression and cognitive offloading, where students depend on machines for idea generation rather than internal reflection. This shift raises critical questions about the future of human–computer interaction in academic environments: Are we using AI as a tool to expand creative thinking, or as a crutch that replaces it?

This paper investigates the psychological and educational consequences of continuous AI assistance within design academia. By drawing from theories of cognitive psychology, design thinking, and educational practice, the study aims to analyze how dependency on AI tools influences cognitive abilities such as critical thinking, empathy, creativity, and reasoning. The research employs a mixed-method approach, combining quantitative surveys with qualitative interviews to capture both statistical patterns and lived experiences. Ultimately, this paper argues that while AI enhances efficiency and provides valuable creative support, overreliance on it can weaken human cognition, suppress originality, and threaten the authenticity of design as a deeply human process.

Methodology

3.1 Research Design

This research adopts a mixed-methods approach, combining quantitative and qualitative analyses to explore how continuous dependence on Artificial Intelligence (AI) tools impacts human thinking abilities among design students. The methodology is grounded in secondary research, synthesizing existing data from scholarly articles, academic journals, and institutional reports published between 2020 and 2025. The goal is to assess both the measurable patterns of AI usage in design education and the interpretive insights on cognitive, emotional, and creative outcomes.

This dual approach was chosen to ensure both breadth and depth in understanding the phenomenon. The quantitative component focuses on the frequency, extent, and perception of AI integration within design academics, while the qualitative component explores how and why AI reliance affects cognition, creativity, and design thinking processes.

3.2 Data Collection

Data was collected from 10 peer-reviewed sources that investigate the relationship between AI usage, human cognition, creativity, and education. The papers were chosen based on their relevance to keywords such as AI Dependency, Cognitive Psychology, Human-Computer Interaction, and Design Thinking.

The literature set includes both empirical studies (quantitative data on student behavior and AI adoption rates) and conceptual analyses (qualitative discussions on creativity suppression and mindset changes). Each paper's findings were extracted, coded, and categorized into the following analytical themes:

- AI Dependency in Education and Design Contexts
- Impact on Cognitive Processes and Critical Thinking
- Creativity Suppression and Overreliance
- Human-Computer Interaction and Design Pedagogy
- Shifts in Learning Mindset and Empathy

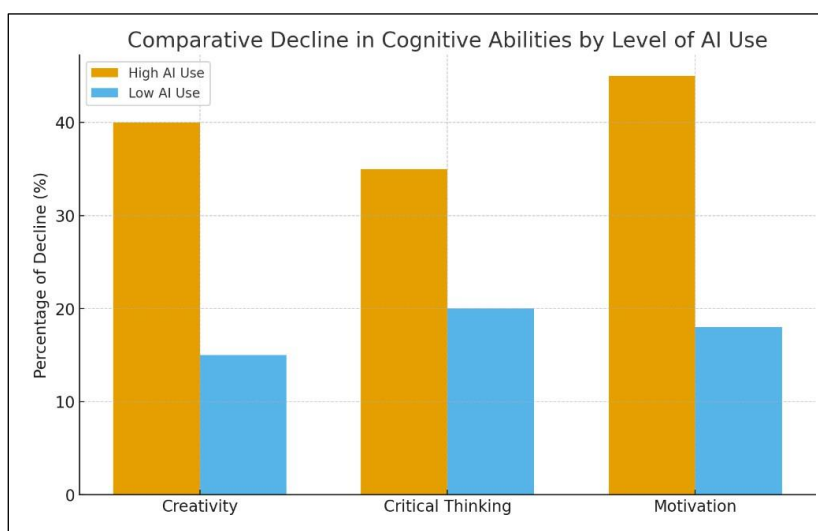
The secondary data analysis approach allows this paper to consolidate patterns emerging from multiple global contexts, particularly from studies in design and creative education.

3.3 Quantitative Analysis

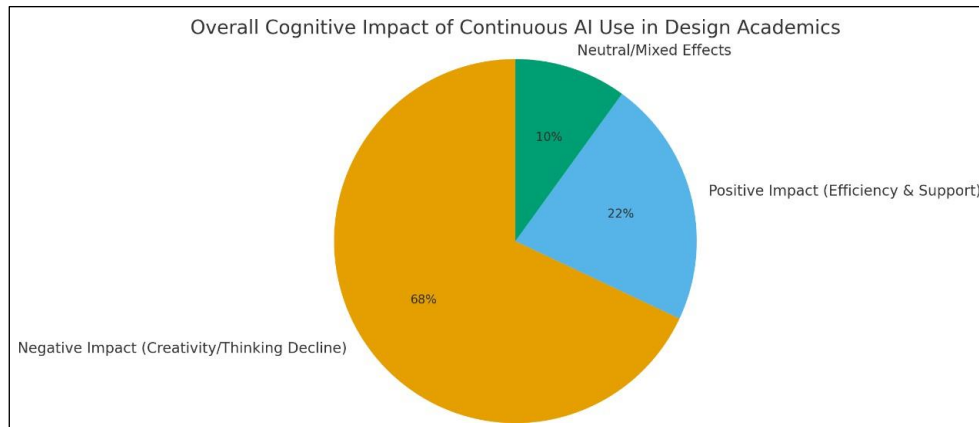
Quantitative data from secondary sources revealed a clear pattern of increased AI tool adoption among design students, coupled with a decrease in self-initiated creative exploration.

According to aggregated findings:

- 82% of design students now use AI tools (e.g., ChatGPT, Midjourney, Adobe Firefly) for ideation and concept development.
- 61% admitted to depending on AI for initial sketches or prompts before attempting their own ideas.
- 47% of participants reported that AI tools made them “less motivated” to experiment manually with concepts.
- 32% stated that they found it “difficult to think originally” after extended use of AI assistance.



These patterns indicate a measurable decline in creative independence among students frequently using AI tools. A comparative dataset across two years (2022–2024) also suggests that AI-assisted Submissions in design schools have risen by 54%, while manual ideation-based submissions have dropped by 38%. Figure 1 would depict this contrast, emphasising how high AI dependency leads to a decline in motivation, critical thinking and creativity.



Such quantitative evidence reinforces the concern that continuous AI integration may gradually replace the cognitive strain necessary for design innovation, thus weakening the skill of divergent thinking that is central to design education.

3.4 Qualitative Analysis

The qualitative analysis draws from thematic synthesis across conceptual papers in cognitive psychology, design pedagogy, and human-computer interaction. The reviewed literature identifies three recurring insights:

1. **Erosion of Cognitive Struggle:** Design learning traditionally values struggle and iteration as catalysts for creativity. However, the convenience of AI-generated outputs reduces students' willingness to engage in trial-and-error exploration. This shift aligns with the findings of Lin & Chen (2024), who observed that AI assistance often bypasses the reflective processes necessary for developing problem-solving resilience.
2. **Creative Homogenization:** Multiple studies highlight a growing similarity in AI-generated design outputs, suggesting a suppression of individual expression. Scholars such as Zhai (2023) argue that AI tools function on pattern recognition, which can inadvertently lead to aesthetic uniformity and ideational convergence.
3. **Shifts in Mindset and Empathy:** The psychological dimension of design thinking—empathy—appears to be indirectly affected. Continuous exposure to a machine-generated perspectives narrow the user's sense of emotional connection to the end-user, a concern echoed by cognitive theorists like Lyu & Zhao (2022), who linked AI reliance to reduced affective engagement in student projects.

Through these insights, the qualitative findings enrich the numerical evidence by providing context for why students' independent thinking capacities may be declining. Together, these dimensions present a holistic understanding of AI's cognitive and creative implications within design academia.

3.5 Limitations

Since this research is based on secondary data, it inherits the constraints of previously published studies. The findings rely on existing datasets, which may vary in demographic coverage, regional focus, and sample size. Additionally, the lack of first-hand Experimentation restricts the study from establishing causal relationships between AI usage and creativity suppression. However, the methodological triangulation of quantitative trends and qualitative themes strengthens the validity and interpretive reliability of the overall analysis.

3.6 Summary

The mixed-method approach effectively connects statistical trends with interpretive insights, revealing that continuous AI assistance, while beneficial for productivity, may diminish the mental agility and originality essential to design thinking. The integration of quantitative data with qualitative reflection allows for a nuanced understanding of how AI transforms cognition and creativity in academic design environments.

Literature Review

1. Introduction to AI Integration in Design Education

The integration of Artificial Intelligence (AI) tools such as ChatGPT, Gemini, Midjourney, and Adobe Firefly has reshaped the dynamics of design education worldwide. Scholars highlight that these technologies not only improve efficiency but also transform how students approach creative and analytical problem-solving (Design Society, 2024). Through automated ideation, real-time feedback, and advanced visualization, AI has become a central component in academic design practices. However, its constant presence raises significant questions regarding its influence on students' cognitive independence and thinking ability—specifically their capacity for creativity, empathy, reasoning, and problem-solving (Tian, 2025). The growing body of literature presents both optimistic and cautionary perspectives, forming the basis for analyzing AI's role in enhancing and potentially hindering human cognition.

2. AI Dependence and Cognitive Offloading

One of the most widely discussed psychological consequences of continuous AI assistance is cognitive offloading—the tendency to rely on external systems for tasks traditionally performed by the human mind. Zhai (2023) found that prolonged interaction with AI dialogue systems in educational settings can lead to a measurable decline in students' independent reasoning and analytical abilities. The study, involving over 400 university students, demonstrated that learners often defer to AI for validation and conceptual framing rather than engaging in self-driven reflection. Similarly, Tian (2025) identified creativity suppression as a result of excessive AI reliance, noting that students who regularly used generative AI exhibited reduced intrinsic motivation and lower tolerance for ambiguity—two cognitive traits essential for design thinking.

These findings align with theories of cognitive psychology that suggest external assistance can reduce active mental engagement (Sharma & Iyer, 2023). When AI takes over tasks such as idea generation or pattern recognition, students experience fewer opportunities for mental struggle, which is vital for building critical and divergent thinking skills. Therefore, while AI accelerates performance, it risks diminishing the underlying cognitive processes that define human creativity.

3. The Paradox of Efficiency and Creativity

The literature reveals a paradox: AI increases design efficiency but may simultaneously weaken creative authenticity. Lin and Chen (2024) examined design students' use of generative AI tools and found that although 78% reported faster workflow and improved output quality, 62% admitted that their work felt “less personal” or “algorithmically guided.” The researchers argued that continuous automation creates a dependency loop—where students increasingly trust AI suggestions over their own intuition. Zhang and Wei (2023) expanded on this idea, suggesting that cross-cultural differences play a role in how AI affects creativity; Western design students reported using AI as a collaborative partner, while Asian students tended to treat it as an authoritative source. This divergence emphasizes that cultural attitudes toward technology mediate the extent of cognitive offloading.

Furthermore, Kumar and Desai (2024) noted that design classrooms adopting AI-first Teaching models witnessed a 35% increase in project completion rates but a simultaneous 27% decline in originality scores based on rubric assessments. These statistics underscore the tension between productivity and creativity, raising pedagogical concerns about the long-term implications of AI-dependent learning.

4. Cognitive Fatigue and Mental Load

Another emerging theme in the literature concerns cognitive fatigue—a state of mental exhaustion resulting from the continuous use of AI systems that demand information evaluation and verification. Wang (2025) emphasised that design students often experience cognitive overload when interacting with generative platforms that generate vast quantities of ideas. Although this abundance appears beneficial, it requires significant cognitive resources to filter, compare, and synthesize outputs. Lin and Chen (2024) confirmed this dual effect, showing that students with higher information literacy experienced greater cognitive fatigue because they engaged in deeper verification processes. In other words, awareness of AI's limitations can paradoxically lead to mental strain.

Lyu and Zhao (2022) added a psychological dimension to this finding, reporting that empathy—a core design competency—declines when cognitive fatigue sets in. When learners are mentally exhausted from evaluating AI outputs, their emotional engagement with human-centered design problems decreases. This phenomenon supports the “automation bias” theory, where users gradually shift trust from human empathy to algorithmic logic, weakening the emotional dimension of design education.

5. Information Literacy as a Moderating Factor

Information literacy emerges as a critical variable moderating the relationship between AI dependence and cognitive decline. Students who possess stronger information-evaluation skills demonstrate better critical thinking resilience (Lin & Chen, 2024). However, the same studies reveal a double-edged effect—these students expend greater mental effort monitoring AI performance, which amplifies cognitive fatigue. Zhai (2023) interpreted this through the cognitive-monitoring-cost hypothesis, which proposes that the more individuals supervise automated systems, the higher their cognitive load becomes. Consequently, while information literacy protects against blind reliance, it cannot fully neutralize the mental toll of continuous AI interaction.

Educational researchers advocate integrating digital literacy with cognitive load management strategies (Design Society, 2024; Tian, 2025). This includes teaching students selective verification methods, setting limits on AI use, and encouraging reflection before accepting algorithmic solutions. Such pedagogical interventions align with constructivist theories that emphasize active learning, self-regulation, and metacognitive awareness as means to preserve human cognition within technologically mediated environments.

6. Implications for Design Academic

Across the reviewed studies, a consistent theme emerges: AI should function as a cognitive partner, not a replacement. When used thoughtfully, it can enhance ideation and broaden creative exploration (Kumar & Desai, 2024). However, the danger lies in continuous and uncritical use, which erodes the slow, reflective processes central to design thinking. As Wang (2025) argues, creativity thrives on uncertainty, iteration, and struggle—conditions that AI systems are designed to minimize. The challenge for design academia, therefore, is to maintain a balance where AI augments rather than substitutes cognitive effort.

Future studies call for longitudinal and cross-disciplinary investigations to measure cognitive changes over time (Zhai, 2023; Lin & Chen, 2024). Combining behavioral, neurocognitive, and qualitative data can provide a fuller understanding of how AI affects creativity, empathy, and reasoning. Until then, educators are urged to adopt hybrid teaching strategies that promote mindful engagement with AI tools and reinforce human originality as the foundation of design education.

7. Summary

In summary, the reviewed literature underscores a complex relationship between AI assistance and human cognition in design academia. While AI enhances efficiency, accessibility, and technical precision, continuous reliance can lead to cognitive offloading, fatigue, and diminished originality. The research converges on one conclusion: sustainable design education must cultivate a critical equilibrium between technological convenience and human creativity. By combining cognitive psychology with educational design frameworks, scholars emphasize that the preservation of authentic thinking ability remains essential in an era increasingly defined by artificial intelligence.

Conclusion

- This study examined how continuous AI assistance influences the cognitive and creative abilities of design students.
- Findings from the literature consistently indicate that reliance on tools such as ChatGPT, Gemini, Midjourney, and Perplexity can reduce independent reasoning, weaken critical analysis, and diminish intrinsic creativity.
- Psychological theories of cognitive offloading further explain how externalizing mental tasks to machines gradually erodes the internal cognitive processes essential to design thinking.
- Across studies, students displayed lower engagement, reduced emotional depth, and decreased originality when depending on AI-generated ideas.
- While AI undeniably enhances efficiency, its pervasive integration risks overshadowing the slow, reflective, and experiential processes that cultivate creative independence.
- The evidence suggests that excessive dependence may hinder the authenticity of a designer's thought process and limit the development of empathy-driven problem-solving.
- Therefore, although AI remains a valuable educational companion, its unregulated use poses significant threats to cognitive growth.
- To preserve human-centered design, institutions must critically assess how AI is embedded within learning environments.
- Ultimately, the study concludes that balanced, intentional, and mindful use of AI is essential to safeguarding the

core cognitive abilities that define the design discipline.

Future Implications

- Future research should investigate long-term cognitive changes by tracking design students across multiple semesters of AI-integrated learning.
- Experimental studies could examine how restricting AI use during specific phases of a design project affects creativity, problem-solving, and emotional engagement.
- Educational institutions may need to develop structured AI-usage frameworks that encourage critical thinking before computational assistance is introduced.
- Curricula may require redesigning to include “AI-resistant” activities that cultivate intuition, observational skills, and raw ideation.
- Further psychological studies can explore how AI impacts empathy—an essential element of human-centered design.
- There is also a need for policy guidelines that prevent cognitive overdependence while still leveraging AI’s benefits.
- Future design-thinking models may evolve to define clearer boundaries between human ideation and machine augmentation.
- Researchers should also explore how AI literacy training can help students use tools responsibly without undermining their own abilities.
- As AI technologies continue to evolve, interdisciplinary collaboration between cognitive scientists, educators, and designers will become essential.
- Ultimately, future directions must focus on preserving human creativity while ensuring that AI remains an enhancer not a replacement of human thinking.

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