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Integrating AI in the Creative Process: A Case Study in Interior Design Education

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Abstract

This study explores the integration of artificial intelligence (AI) in interior design education, examining how AI-powered tools such as MidJourney, Stable Diffusion, and DALL·E influence students' creative processes. The case study investigates AI's role as a co-creative partner, its impact on design thinking, and the pedagogical benefits and challenges associated with its use. Conducted in a senior-level interior design studio, this study employs a multi-phase approach involving precedent research, AI-assisted ideation, iterative refinement, and final project development. Findings indicate that AI expands students' creative boundaries, fosters iterative design thinking, and facilitates rapid visualization of diverse concepts. However, challenges include AI's lack of contextual awareness, output precision limitations, and ethical concerns regarding authorship. This study underscores the necessity of AI literacy, critical evaluation skills, and a balanced approach that integrates AI with traditional design methods, contributing to ongoing discussions on AI's evolving role in art and design education.

Keywords

Artificial Intelligence in Design, AI-Assisted Creativity, Interior Design Education, Generative AI, Design Thinking, Computational Design, MidJourney, Stable Diffusion, Interior Design

1. Introduction

The rapid advancement of artificial intelligence (AI) is transforming creative industries, challenging traditional notions of authorship, design workflows, and artistic exploration. While AI has been widely adopted in architecture, digital media, and industrial design, its role in design education—particularly in interior design pedagogy—remains underexplored. Existing research has primarily focused on

AI's applications in computational design (Oxman, 2008), generative modeling (Goel et al., 2009), and digital visualization (McLaren et al., 2015), but limited studies have examined its impact on student creativity, iterative design thinking, and authorship negotiation in educational settings.

This study fills that gap by investigating AI's role as a co-creative partner in a senior-level interior design studio (**Figure 1**). Through a structured methodology involving AI-assisted ideation, iterative refinement, and student reflections, this research explores how generative AI tools—such as MidJourney, Stable Diffusion, and DALL·E—shape students' conceptual development, critical engagement, and workflow adaptability. Unlike prior studies that position AI as a visualization aid, this research emphasizes its role in fostering reflective design practice, aligning with Schön's (1983) model of reflection-in-action and Kolb's (1984) experiential learning framework.

By analyzing student work and reflections, this study contributes to the ongoing discourse on AI in design education in three key ways: 1) demonstrating how AI influences iterative design workflows beyond traditional linear approaches, 2) evaluating AI's cognitive scaffolding potential in enhancing conceptual exploration, and 3) identifying pedagogical strategies that balance AI assistance with critical human intervention. These insights provide a roadmap for integrating AI into design curricula, ensuring that students harness AI's capabilities while maintaining creative agency.

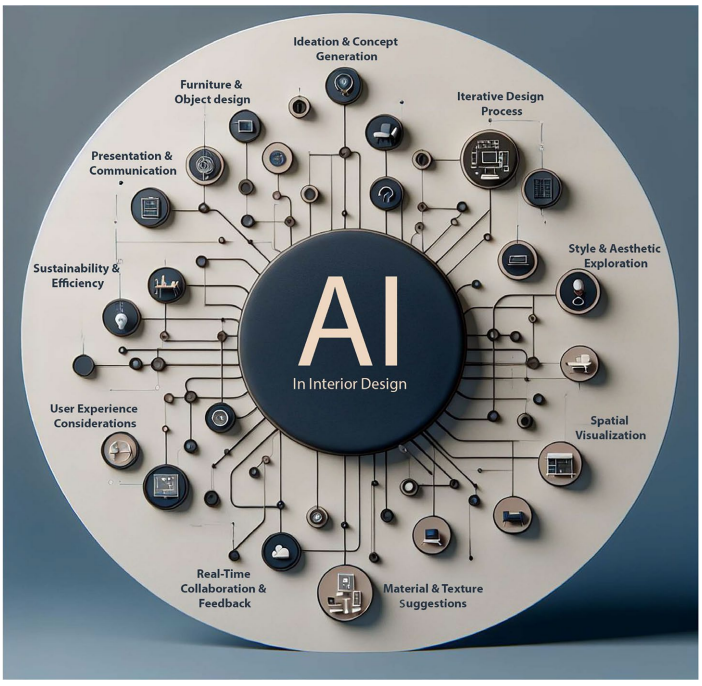

Figure 1. Intersection of AI and interior design.

2. AI's Impact on Design Thinking

The integration of AI tools significantly influenced students' design thinking,

shifting their process from linear to dynamic exploration. Traditionally, students would begin with hand sketches or digital renderings, gradually refining ideas through a sequential workflow (Figure 2). With AI, however, they engaged in a more iterative and non-linear process, where rapid prototyping allowed for continuous exploration of multiple design variations.

AI tools enabled students to test diverse stylistic interpretations within minutes, fostering a more experimental mindset. Instead of settling on one idea early in the design phase, students generated numerous AI-assisted concepts, compared them, and refined their selections based on key design principles such as spatial harmony, materiality, and user experience.

Moreover, As Celani (2012) describes, AI has transformed design from a purely intuitive process into a prescriptive one, where algorithmic models and drawings facilitate computational foresight, allowing students to iterate through AI-driven concepts dynamically. This process emphasized the importance of critical decision-making—understanding when to trust AI-generated outputs and when to intervene with manual refinements to align with their design intent.

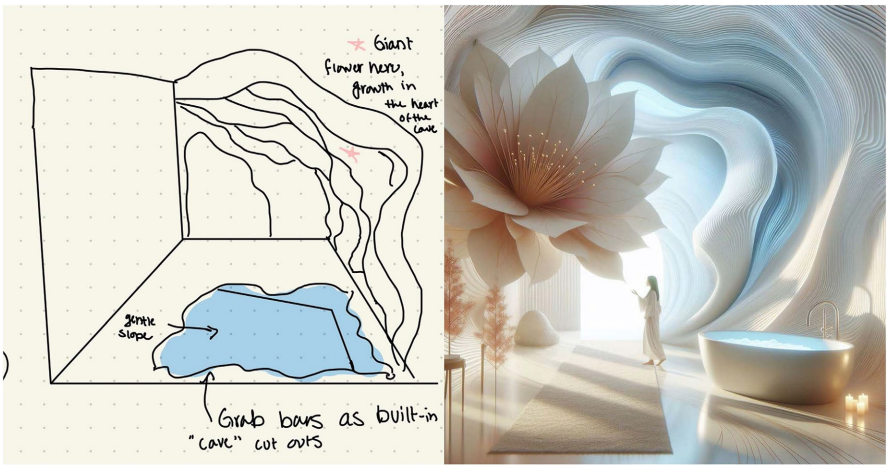

Figure 2. A visual comparison of a student's initial hand-drawn sketch versus AI-generated iterations.

3. Literature Review

3.1. AI in Design Education

As Oxman (2008) highlights, computational design tools should be deeply integrated into design education to ensure students develop the necessary skills for AI-driven workflows, reinforcing the shift toward algorithmic thinking in creative fields. Goel et al. (2009) explored how AI-driven generative models support iterative learning and broaden design possibilities. Similarly, Riberio (2023) discusses how AI assists students in developing visual experimentation skills, allowing them to explore diverse material palettes and spatial compositions without traditional time constraints.

According to McLaren et al. (2015), AI tools like MidJourney, Stable Diffusion,

and DALL·E are not merely visualization aids but can also function as cognitive scaffolding, enabling students to externalize abstract ideas and refine their conceptual thinking. However, researchers caution against over-reliance on AI-generated outputs, noting that it can sometimes lead to a superficial engagement with the design process (Nguyen & McLaren, 2023).

3.2. AI and Creativity in the Design Process

AI has been increasingly studied as a co-creative agent in design fields. Helms et al. (2009) and Bhatt et al. (2016) argue that AI-generated variations can stimulate divergent thinking, allowing students to break away from conventional design habits and explore unconventional yet structurally viable solutions. Boden (2004) distinguishes between exploratory and transformational creativity, highlighting how AI tools primarily facilitate exploratory creativity—helping students generate variations of existing ideas rather than fundamentally transforming design paradigms. This aligns with concerns about "aesthetic homogenization," where AI models trained on specific datasets may reinforce certain stylistic biases (Marymount University, n.d.).

Studies in computational creativity suggest that AI is most effective when used as a collaborative tool rather than a prescriptive generator. Nguyen & McLaren (2023) highlights the importance of prompt engineering, where students iteratively refine AI-generated outputs rather than passively accepting them. This reflects findings from Stanford d.school, which emphasize "reflective AI interaction"—encouraging students to critically analyze AI-generated concepts instead of treating them as final solutions (Stanford d.school, n.d.).

The integration of AI tools influenced student collaboration in both positive and challenging ways. AI-assisted workflows facilitated more dynamic peer discussions, as students frequently compared AI-generated outputs, critiqued variations, and exchanged strategies for refining prompts. This led to a more iterative and reflective critique process, where students evaluated design outcomes collectively rather than working in isolation. However, some students noted that AI also encouraged a more individualistic approach, as the rapid iteration process made it easier to work independently rather than engage in traditional group brainstorming. To counterbalance this, structured peer feedback sessions were integrated into the course, ensuring that AI-assisted ideation remained a collaborative and discursive process rather than a solitary one.

3.3. Pedagogical Approaches to AI Integration

As AI becomes embedded in design curricula, educators are experimenting with blended learning models that combine AI-assisted workflows with traditional design techniques (Riberio, 2023). Some frameworks emphasize human-AI collaboration, where students first generate AI-assisted concepts, then engage in manual refinement and critical evaluation (Adams, 2025).

Goel et al. (2009) propose a "structured AI integration model," advocating for

clear guidelines on when and how AI should be used in the creative process. This ensures that AI remains an assistive tool rather than a shortcut that bypasses deep engagement with design principles.

4. Project Background and Methodology

The project was implemented in a senior-level art and design studio course, where 16 students were tasked with designing sensory-rich environments using AI tools. The sample size was determined based on the availability of students enrolled in the course, ensuring a manageable group for in-depth observation and feedback. Participants ranged in age from 20 to 24 and had varying levels of prior experience with AI tools, from no exposure to intermediate proficiency. These factors were considered in the analysis, as differences in familiarity with AI could influence both engagement and outcomes. This initiative sought to explore the intersection of AI and human creativity by integrating AI-generated imagery into spatial design projects. Students were introduced to various AI-powered tools, including MidJourney, Stable Diffusion, and DALL·E, which allowed them to generate, iterate, and refine their concepts.

The project aimed to:

- Encourage students to critically engage with AI as a design tool.
- Foster a deeper understanding of sensory design principles.
- Explore the role of AI in augmenting traditional design processes.
- Analyze how AI-assisted creativity influences conceptual development.

Students followed a structured workflow, beginning with precedent research on sensory-rich environments, followed by AI explorations where they experimented with different spatial concepts using generative AI. They then refined their designs through a combination of AI-generated iterations and manual modifications, ultimately producing final presentations that showcased the integration of AI in their creative process.

This structured approach provided students with both the freedom to explore AI as an experimental tool and the critical framework to assess its strengths and limitations within the design process. The next section details the methodology used to guide students through this exploration.

4.1. Project Phases and AI Integration

To ensure a methodical and immersive experience, the project was divided into multiple phases, each lasting approximately one week. This structured timeline allowed students to engage with AI at different stages of the design process, from initial ideation to final refinement. The phases included:

- **Phase 1: Precedent Study (Week 1)**

Students conducted research on sensory-rich environments, examining case studies and precedents that informed their design approach. AI tools were introduced as a means to analyze visual and spatial trends.

- **Phase 2: AI Exploration (Week 2)**

Students experimented with MidJourney, Stable Diffusion, and DALL·E to generate conceptual imagery. This phase emphasized rapid ideation and exploration of multiple spatial styles and aesthetics.

- **Phase 3: AI-Generated Spa Spaces (Week 3)**

Using AI-generated outputs as a starting point, students refined their ideas by iterating on spatial arrangements, materials, and atmospheric qualities. AI served as both a brainstorming tool and a means of visualizing early-stage concepts.

- **Phase 4: Individual Relaxation Room (Week 4)**

Each student focused on designing a unique spa room that engaged all five senses. AI was used to test different compositions, lighting schemes, and material selections before finalizing the layout.

- **Phase 5: Communal Relaxation Areas (Week 5)**

Students designed larger shared spaces, integrating AI-generated elements into their sketches and 3D models. AI-assisted renderings helped in visualizing user flow, lighting variations, and textural contrasts.

- **Phase 6: Service Spaces (Week 6)**

Design work expanded to include service areas such as reception desks, tea bars, and massage rooms. AI was used to explore furnishing arrangements, material palettes, and the integration of biophilic elements.

- **Phase 7: Finalization and Presentation (Week 7)**

Students synthesized their AI-assisted explorations into a cohesive design proposal, refining layouts, material selections, and experiential qualities. Final presentations included AI-generated images alongside traditional hand sketches, 3D renderings and virtual reality walkthroughs.

By structuring the project in this manner, students were able to progressively build their understanding of AI as a design tool while maintaining creative control over their work (Figure 3). This phased approach also allowed for critical discussions at each stage, ensuring that AI was used as a complement rather than a replacement for human intuition.

Figure 3. A side-by-side comparison of the original sketch, AI-generated spa spaces and the manually refined final versions by student.

4.2. AI Tool Selection Rationale

AI was not used to replace traditional design skills but to support creative exploration, helping students test ideas and improve their designs more easily.

Much like BIM has revolutionized architectural workflows through AI-driven

data integration (Eastman et al., 2008), generative AI tools such as MidJourney, Stable Diffusion, and DALL·E similarly enable rapid exploration of diverse design aesthetics. Similarly, applications like Magicplan (Wikipedia, n.d.) have demonstrated how AI-driven spatial planning can streamline early design processes by automating layout generation and spatial visualization. These advancements highlight AI's growing role in expediting ideation and iteration within design education:

- MidJourney was great for creating artistic and atmospheric images, making it useful for setting the mood and exploring design ideas.
- Stable Diffusion gave students more control over the details of image generation, allowing them to fine-tune their designs.
- DALL·E balanced abstract ideas with realistic details, helping students refine architectural compositions.

By using these three AI tools together, students could experiment with different styles while staying in control of their design process. This approach also helped them understand the benefits and limitations of different AI tools in design.

4.3. Instructor Role and Guidance

The instructor's familiarity with AI tools was developed through independent research, prior experimentation with generative design models, and engagement with emerging literature on AI in creative fields. Additionally, the instructor has extensive experience with design technology and has been actively involved in AI initiatives across multiple institutions, presenting at conferences, participating in panel discussions, and contributing to discourse on AI's role in creative education. Insights from interdisciplinary collaborations and professional development workshops further refined the instructional strategies for AI integration. Rather than positioning AI as a prescriptive tool, the instructor emphasized a critical and exploratory approach, guiding students to iteratively refine AI-generated outputs and maintain authorship over their designs. This adaptive teaching approach ensured that AI was used as an augmentation to creativity rather than a replacement for traditional design methods.

To maximize the effectiveness of AI-assisted design, students received structured guidance on prompt engineering. This included workshops and hands-on exercises where students experimented with different prompt structures to refine AI-generated outputs. Instruction covered strategies such as adjusting specificity, layering descriptive and conceptual keywords, and iterating prompts to achieve more controlled results. Through these exercises, students developed a deeper understanding of how AI interprets language and how to craft precise prompts that align with their design intentions.

To ensure that AI was used as an assistive rather than a prescriptive tool, the instructor played an active role in guiding students through critical decision-making processes. The instructional approach emphasized:

- Balancing AI with Human Creativity: Students were encouraged to use AI for

initial ideation but required to refine and modify outputs manually to ensure thoughtful design development.

- Critical Engagement with AI Outputs: AI-generated visuals were analyzed for feasibility, spatial coherence, and alignment with project objectives. Students had to justify why they selected certain AI-generated elements over others.
- Iterative Process and Conceptual Refinement: Instead of accepting AI outputs as final designs, students were expected to engage in multiple iterations, layering in manual adjustments and custom refinements to maintain authorship over their work.
- Ethical Discussions on AI in Design: The class engaged in conversations about AI biases, originality, and ethical implications in creative fields, prompting students to reflect on their role as designers in an AI-driven landscape.

Through structured critiques and guided reflection, students gained a deeper understanding of AI as a collaborative rather than autonomous design tool.

4.4. Evaluation Criteria

Given the experimental nature of AI-assisted design, assessment methods were structured to ensure a balanced evaluation of both AI-generated and manually developed work. Projects were graded based on:

- Creativity and Originality: The extent to which students pushed creative boundaries while maintaining a clear conceptual vision.
- Integration of AI Tools: How effectively students used AI in combination with traditional design techniques to develop their final concepts.
- Engagement with Sensory Design Principles: The depth of exploration in creating spaces that catered to sight, sound, touch, smell, and taste.
- Iterative Process and Refinement: The degree to which students iterated on AI-generated ideas and refined them through manual adjustments.
- Critical Reflection: Student insights on AI's role in their process, challenges faced, and key takeaways regarding human-AI collaboration.

This rubric ensured that AI was not the sole determinant of success but rather a tool that complemented human creativity.

4.5. Data Collection and Analysis

To evaluate the impact of AI, students engagement with the tools were monitored and analyzed through:

1) Process Documentation: Students submitted AI-generated images alongside manual refinements to track design evolution.

2) Survey Responses: Students provided feedback on how AI influenced their creativity, workflow, and design decisions.

3) Critique Transcripts: Discussions from weekly critiques were analyzed for recurring themes on AI's role in the creative process.

4) Final Presentations: Student work was assessed on originality, depth of sensory engagement, and AI's integration into the design process.

The collected data was analyzed to identify:

- Patterns in AI usage: Did AI lead to more diverse or constrained design choices?
- Challenges and limitations: What difficulties did students face when integrating AI into their workflow?
- Perceptions of AI collaboration: How did students view AI: as a tool, a collaborator, or a potential crutch?

4.6. Ethical Considerations and Limitations

The study also considered ethical implications of AI in creative education:

- Authorship & Originality: Students critically examined issues of ownership in AI-generated designs.
- Bias in AI Models: Discussions explored how AI tools might reinforce stylistic biases, prompting students to reflect on diversity in design outputs.
- Dependence on AI: The study ensured that AI was used to complement human creativity, preventing over-reliance on automation.

5. Student Work and Analysis

By reviewing AI-generated outputs, manual refinements, and student reflections, this study provides insight into the evolving relationship between AI-assisted creativity and human intuition in design education (**Figure 4**).

Figure 4. Students had to independently analyze and address accessibility challenges, as AI consistently struggled to account for them effectively.

5.1. AI's Role in Enhancing Creativity

Throughout the project, students produced a diverse range of sensory-driven spatial designs, leveraging AI tools to generate conceptual imagery, refine spatial layouts, and enhance sensory engagement. Many students noted that AI facilitated a broader range of design iterations than traditional methods.

> "AI helped me visualize concepts I wouldn't have thought of on my own. It pushed me to explore more abstract and unconventional spatial layouts."—Student 1

Others emphasized the iterative nature of AI, which allowed them to rapidly test and refine ideas without committing to a single direction too soon.

"Normally, I'd spend hours sketching variations. AI let me visualize multiple directions in minutes, which I could then refine."—Student 2

5.2. Challenges and Limitations of AI in Design

Despite AI's advantages, students encountered challenges when integrating AI-generated content into their work. Some struggled with AI's unpredictability and found that it sometimes introduced elements that weren't fully functional.

"AI gave me beautiful atmospheric renderings, but when I analyzed them, I realized some spaces didn't make sense structurally. Walls would merge awkwardly, seating areas weren't placed where they would be most effective, and some designs just weren't feasible in real life."—Student 3

Others found it difficult to control the precision of AI-generated images, requiring them to experiment with prompts extensively to achieve the desired results.

"At first, I didn't realize how specific I had to be with my AI prompts. I would type 'a futuristic spa with warm lighting,' and the AI would generate something completely different from what I had in mind."—Student 4

5.3. Overcoming Skepticism: AI as a Creative Co-Pilot

Initially, some students were skeptical about AI's role in design, fearing that it might limit their creative control. However, as they became more comfortable with the tools, they realized that AI functioned more as an idea accelerator rather than a prescriptive generator.

"I thought AI would limit my creative control, but it actually helped me explore possibilities I wouldn't have imagined on my own. It gave me a broader visual vocabulary, which I could then refine and personalize."—Student 5

"I kept adjusting my prompts and tweaking the AI-generated outputs, and each time I did, it pushed my design in a new direction. It felt more like a conversation than a one-time tool."—Student 6

5.4. Balancing AI with Human Intuition

While AI accelerated ideation, students recognized the need for human intervention to refine and contextualize designs.

"AI is like an overenthusiastic collaborator—it gives you a lot of ideas, but not all of them make sense. It's up to the designer to filter out what works and what doesn't."—Student 7

"AI was great for exploring aesthetics, but I had to step in to make the spatial layouts functional."—Student 8

5.5. Lessons Learned and Ethical Considerations

Students also reflected on broader ethical concerns, including authorship and originality.

"It made me think about originality. If AI generates something beautiful, is it really my design? I realized that my role as a designer isn't just about making things look good—it's about making thoughtful decisions and giving meaning to the work."—Student 9

"After a while, I realized AI kept generating the same types of designs. I had to really push the prompts and mix different tools to get something unique."—Student 10

6. Applying These Insights to Design Education

The reflections gathered in this study provide valuable lessons for design educators and practitioners looking to integrate AI into their workflows effectively. AI is not merely a tool for generating images—it has the potential to shape how designers think, iterate, and push creative boundaries. However, these benefits are only realized when AI is used critically and thoughtfully.

A key takeaway from this study is the importance of balancing AI with traditional design processes. Students who engaged with AI iteratively—rather than treating it as a final solution—were able to develop more personalized and functional designs. This suggests that AI should be introduced in design curricula alongside foundational skills such as hand sketching, spatial reasoning, and material studies to ensure that students maintain creative agency.

In addition to balancing AI with traditional methods, the study highlights the need for AI literacy training. Many students initially struggled with prompting AI in a way that yielded useful results. Learning how to craft precise and intentional prompts is essential for maximizing AI's potential while maintaining control over the design outcome. By incorporating structured guidance on AI literacy and prompt engineering, educators can better prepare students to use AI as a tool for exploration rather than a replacement for creative decision-making.

Beyond technical proficiency, students must also engage with the ethical implications of AI in design. Issues such as authorship, originality, and AI bias should be openly discussed to ensure that future designers use AI responsibly. Case studies on AI ethics, intellectual property concerns, and real-world applications can provide students with a more holistic understanding of AI's role in creative industries. By fostering critical discussions alongside technical training, design education can equip students with both the skills and the ethical awareness necessary for working in an AI-integrated creative landscape.

7. Challenges and Lessons Learned

While AI provided students with powerful tools for ideation and visualization, it also introduced new challenges that required them to adapt, problem-solve, and critically evaluate their design choices. Throughout the Designing for the Senses project, students encountered both technical and conceptual hurdles, leading to key insights about the role of AI in the creative process and its limitations (**Figure 5**). AI-generated designs often struggle with recognizing physical surfaces, inter-

preting emotions as human-like figures, and inability to incorporate accessibility principles. These limitations required students to critically assess and refine AI-generated outputs rather than relying on them as final design solutions.

Figure 5. Examples of AI-generated design failures.

7.1. Challenge 1: AI's Lack of Contextual Awareness

One of the primary difficulties students faced was AI's inability to fully understand spatial functionality and user experience. While AI-generated images were often visually compelling, Sharma et al. (2017) caution that AI lacks an understanding of spatial functionality, frequently producing layouts that, though aesthetically engaging, fail to meet practical architectural constraints.

A student reflected on this limitation:

> "AI gave me beautiful atmospheric renderings, but when I analyzed them, I realized some spaces didn't make sense structurally. Walls would merge awkwardly, seating areas weren't placed where they would be most effective, and some designs just weren't feasible in real life."

This challenge reinforced the importance of human intervention in refining AI-generated concepts. Students learned that while AI can assist with visual exploration, it cannot replace a designer's understanding of space, usability, and human interaction.

7.2. Challenge 2: The Need for Precise Prompt Engineering

Another major learning curve was developing effective AI prompts. Many students found that small changes in wording could dramatically affect AI outputs, requiring multiple iterations to achieve the desired results.

"At first, I didn't realize how specific I had to be with my AI prompts," one student noted. "I would type 'a futuristic spa with warm lighting,' and the AI would generate something completely different from what I had in mind. I had to experiment with words, materials, and even composition cues to guide the AI properly."

This experience highlighted the need for strategic thinking when working with AI, teaching students how to refine their communication skills to achieve better results. The iterative nature of "prompt engineering" became an unexpected but valuable skill that students carried forward into other aspects of design.

7.3. Challenge 3: Ethical Considerations and Authenticity

As students became more comfortable using AI, discussions arose around authenticity, authorship, and ethical concerns in AI-assisted design. Some questioned whether AI-generated imagery could be considered their own work, while others reflected on the potential risks of over-reliance on AI in creative industries.

"It made me think about originality," one student admitted. "If AI generates something beautiful, is it really my design? I realized that my role as a designer isn't just about making things look good—it's about making thoughtful decisions and giving meaning to the work."

Another student raised concerns about bias in AI-generated imagery, noting that certain design elements—such as materials, color palettes, or stylistic choices—tended to repeat based on the data the AI had been trained on.

"I noticed that AI kept generating similar-looking spaces, which made me wonder if it was limiting my creativity instead of expanding it. I had to push myself to modify and reinterpret AI's outputs rather than just accepting them as final designs."

This reflection underscored an essential lesson: AI is a tool, not a replacement for human creativity. The most successful students were those who used AI as a springboard for inspiration but remained actively engaged in shaping and refining their final designs.

7.4. Key Lessons Learned

By overcoming these challenges, students gained valuable insights into the evolving relationship between AI and design:

- AI is best used as an idea generator, not a final design solution. It speeds up visualization but still requires human refinement.
- Prompt engineering is a critical skill. Being precise and intentional with AI prompts leads to better outcomes.
- Human intuition remains irreplaceable. AI can generate countless variations, but designers must apply critical thinking to filter and refine results.
- Ethical considerations matter. AI should enhance creativity, not replace it, and designers must remain mindful of originality and authorship.

Ultimately, the project helped students embrace AI as a creative collaborator, reinforcing that technology should empower designers rather than define them.

7.5. Addressing AI Bias and Its Impact on Creativity

The integration of AI into design education presents a significant opportunity for expanding creative boundaries. However, it also introduces challenges related to bias in AI-generated outputs, which can impact the diversity and originality of student work. AI-generated designs are inherently shaped by the datasets on which the models are trained, reflecting dominant aesthetic trends and cultural preferences. This often leads to biases such as overrepresentation of certain architectural styles, color palettes, and spatial arrangements, reinforcing mainstream

design trends while marginalizing alternative approaches. Many AI tools also prioritize Western design aesthetics, which can obscure culturally specific design principles, making it difficult for students to generate outputs that accurately reflect vernacular or regional traditions. Additionally, AI models primarily focus on visual coherence rather than spatial logic or user experience, resulting in interiors that may lack ergonomic considerations, functional layouts, or realistic material applications.

These biases have both expansive and restrictive implications for creativity. On the one hand, AI enables rapid ideation, exposing students to diverse design possibilities and encouraging unconventional thinking. On the other hand, overreliance on AI-generated outputs may cause students to unconsciously default to algorithmically preferred styles, leading to a narrowing of creative vision. Some students reported difficulties in achieving culturally diverse aesthetics, while others found that AI-generated designs often required significant manual refinement to be functional. As one student reflected, "AI helped influence my ideas a lot through this process. I started with a vague idea of what I wanted with hopes of it producing something that I wouldn't have thought of." Another noted, "Personally, I really liked some of the things that AI was able to visualize for me, but I was never able to get it to look the exact way that I had it imagined in my head."

Students also observed that AI-generated designs often contained impractical elements that required extensive modification. "Some of the spaces were not using materials that I wanted. Also, the floor plans were never correctly designed for my preference." Others found that AI struggled with understanding spatial relationships and fine details. "One of the first troubles I had was trying to have the AI open windows. For some reason, this was very difficult for it."

To mitigate these biases, design education must encourage critical engagement with AI-generated outputs. Teaching students how to craft precise, context-aware prompts can challenge AI biases and help generate more diverse outputs. Additionally, AI should be positioned as a tool for exploration rather than a definitive solution, with students encouraged to combine AI-generated concepts with hand sketches, digital modeling, and traditional design methodologies. Integrating AI literacy into the curriculum, along with discussions on the ethical implications of AI—such as authorship, originality, and cultural representation—empowers students to critically assess their work and maintain creative agency.

Through these strategies, students can develop a more nuanced understanding of AI's potential and limitations. Rather than allowing biases to dictate creative outcomes, they can harness AI as a collaborative tool that supports, rather than replaces, human intuition and innovation. By fostering critical engagement with AI-generated designs, educators can ensure that students remain active decision-makers in their creative processes, maintaining originality and depth in their work.

8. Discussion

The integration of AI into the design curriculum provided valuable insights into how generative tools influence creativity, workflow, and conceptual development.

While AI enhanced ideation and visualization, it also posed challenges that required careful pedagogical structuring to ensure students remained critically engaged. This section reflects on the broader implications of AI-assisted design, considering its benefits, limitations, and ethical considerations within art and design education. The following table highlights key differences between AI-assisted creativity and human intuition, emphasizing how a balanced approach can leverage the strengths of both (see Table 1).

Table 1. Balancing AI-assisted creativity and human intuition in design.

Aspect	AI-Assisted Creativity	Human Intuition	Balanced Approach
Ideation & Exploration	Rapidly generates multiple design variations	Draws from personal experience and intuition	AI for brainstorming, human for refinement
Style & Aesthetics	Offers diverse stylistic interpretations	Ensures originality and cultural relevance	AI suggests trends, humans curate unique visions
Spatial Visualization	Produces detailed conceptual renderings	Considers real-world scale, ergonomics, and function	AI assists in visualization, humans adjust for usability
Problem-Solving	Proposes algorithm-based solutions	Uses critical thinking and adaptability	AI for options, humans for decision-making
Ethical Considerations	Lacks awareness of biases, accessibility, and cultural context	Ethical reasoning guides responsible design choices	AI provides data, humans ensure fairness & inclusivity
Iterative Process	Enables quick modifications and experimentation	Allows deep reflection on design intent	AI aids speed, humans refine meaning and coherence
Client/User Experience	Generates ideas based on trends and datasets	Understands emotions, behavior, and user needs	AI predicts patterns, humans tailor for experience

8.1. AI as a Catalyst for Change in Design Education

This study demonstrates that AI has the potential to transform design education by fostering rapid ideation, expanding creative possibilities, and enabling students to explore new design aesthetics. As Bazalgette (2025) argues, technology should be viewed as an ally of the creative industries, enhancing rather than replacing human creativity. This aligns with my findings, where AI tools served as a catalyst for experimentation rather than as deterministic design generators. However, the implications of AI integration extend beyond individual classroom experiences. As AI tools become more sophisticated, design programs must adapt to ensure that students develop both technical proficiency and critical thinking skills necessary for working with AI-assisted workflows.

Existing research highlights similar trends. Goel et al. (2009) emphasize that AI-driven design can serve as a cognitive scaffold, enabling students to iterate faster and experiment with complex spatial compositions.

8.2. Future Trends and Potential Challenges

Looking ahead, several key trends are likely to shape the role of AI in design edu-

cation:

1) Hybrid AI-Human Workflows: The integration of AI into architectural and design software will enable seamless transitions between AI-generated concepts and manual refinements. This aligns with McLaren et al. (2015), who suggest that AI is most effective when used as an iterative tool rather than a replacement for human intuition.

2) Expanded AI Training for Design Students: As AI becomes embedded in professional design practices, students will need formal instruction in prompt engineering, AI literacy, and ethical considerations.

3) Interdisciplinary Collaboration: The use of AI in design is not limited to spatial composition. Future applications could include AI-driven sustainability analysis, biophilic design simulations, and user experience modeling, requiring collaboration between designers, engineers, and computer scientists.

Despite these opportunities, several challenges must be addressed:

- Bias and Homogenization: AI models are trained on specific datasets, often leading to repetitive aesthetic patterns. If not critically engaged, this could limit diversity in design solutions.
- Authorship and Intellectual Property: As AI-generated content becomes more prevalent, designers must navigate ethical questions surrounding ownership and originality.
- Balancing AI with Hands-on Design Skills: While AI enhances ideation, it should not replace traditional methods such as hand sketching, material studies, and physical modeling. Design programs must ensure that AI complements, rather than supplants, these essential skills.

8.3. Aligning with or Diverging from Existing Research

This study's findings both confirm and extend prior research on AI's role in design education. Consistent with McLaren et al. (2015), students reported that AI accelerated their workflow and expanded their creative boundaries. However, this expansion comes with a paradox. While AI facilitates rapid ideation and exploration, it also introduces the risk of aesthetic homogenization due to biases in its training datasets. These biases can subtly shape design outputs, leading to recurring stylistic patterns unless students actively push beyond AI-generated defaults. This study highlights the importance of integrating AI within a structured critical framework, aligning with Riberio's (2023) argument that human decision-making plays an essential role in refining AI outputs.

Unlike previous research that positions AI as a neutral tool, these findings emphasize that its impact is shaped by how it is implemented in the design process. Cockburn, Henderson, and Stern (2018) argue that AI's influence on innovation depends largely on how industries integrate it into workflows. My findings support this, as structured AI integration within the curriculum allowed students to use AI as a co-creative partner rather than a passive generator of ideas.

Moreover, while existing research often focuses on AI as a visual tool, this study

suggests that AI also influences conceptual design thinking, prompting students to shift from linear to dynamic ideation processes. The implications of this shift warrant further exploration, particularly in how AI might reshape professional design workflows.

To ensure that AI enhances, rather than limits, creativity in design education, the following recommendations emerge:

- Structured AI Integration: Educators should incorporate AI alongside traditional design methodologies, ensuring that students engage in both digital and analog design processes.
- AI Ethics and Literacy Training: Design curricula must address the ethical challenges of AI-generated content, including bias, authorship, and accountability.
- Interdisciplinary Collaboration: Future research should explore how AI can be leveraged in collaboration with other fields, such as sustainability, material science, and human-computer interaction, to expand its potential beyond visual generation.

9. Conclusion

This study explored the integration of AI-powered design tools—MidJourney, Stable Diffusion, and DALL·E—into a senior-level art and design course, revealing AI's ability to expand creative possibilities and enhance the iterative design process. Students leveraged AI to explore diverse spatial compositions, material palettes, and sensory-driven designs beyond their usual approaches, accelerating ideation and enabling multiple design variations in a fraction of the time required by traditional methods. On average, students generated three to five times more iterations using AI than they would have through traditional sketching and digital modeling alone. This increased iteration frequency allowed for deeper design exploration, enabling students to test a wider range of stylistic and conceptual possibilities before refining their final proposals. However, while AI facilitated rapid ideation, human intervention remained essential to critically evaluate and refine AI-generated outputs, ensuring the designs maintained functional, well-structured, and contextually relevant qualities. Comparisons with previous years and other design studios that did not integrate AI suggest that AI-assisted workflows resulted in a higher number of design iterations and broader stylistic exploration. However, human intervention remained essential in refining AI-generated outputs to ensure functional, well-structured, and contextually relevant designs. The project also fostered critical discussions on authorship, originality, and the ethical implications of AI-generated imagery, positioning AI as an assistive tool rather than a replacement for creative decision-making.

This study advances existing research on AI in design education by providing a structured framework for integrating AI tools into the creative process, emphasizing both technical applications and the critical engagement necessary for responsible AI use. While prior studies have demonstrated AI's potential in enhanc-

ing visualization, this research highlights its role in shaping design thinking, encouraging students to question the implications of AI-driven creativity. Additionally, by incorporating real student reflections, this study offers firsthand insights into how emerging designers perceive AI's role in their workflow, contributing to the ongoing discourse on the evolving relationship between technology and artistic agency.

While this study demonstrated AI's benefits in design education, several questions warrant further investigation. Future research could explore the long-term impact of AI on design thinking, particularly whether repeated exposure to AI tools enhances creativity or risks limiting independent problem-solving approaches. AI's potential applications beyond visualization, such as material performance analysis, spatial optimization, and sustainability-driven design, remain largely unexplored. Another critical area of study is the ethical framework for AI in creative education. As AI-generated content becomes more prevalent, design curricula must address issues of authorship, bias, and intellectual property, ensuring that students develop a critical awareness of the ethical implications of their work.

AI is not a replacement for human creativity but a powerful extension of it. When used thoughtfully, it allows designers to push boundaries, accelerate ideation, and redefine the creative process. However, its integration must be guided by critical engagement, ethical awareness, and a commitment to maintaining artistic authenticity. As AI continues to evolve, its role in art and design education must evolve with it—ensuring that future designers harness its potential without losing their creative agency.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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