

# The Intersection of Explored and Unexplored Design Processes with AI Image Generators in Three Design Studios

Jinoh Park<sup>1</sup>[0000-0003-1725-6435]

<sup>1</sup>The University of Arkansas, Fayetteville, USA

**ABSTRACT:** This study explores possibilities for the integration of artificial intelligence (AI) image generators into architectural education, examining the intersection of traditional design processes and emerging AI technologies. While practitioners increasingly adopt AI in architectural practice, its incorporation in educational settings remains relatively unexplored. The research addresses the question of how to offer students the opportunity to use AI image generators while maintaining essential traditional educational content. The methodology combines the lived experience and the exploratory case study approaches, spanning three semesters. Initial observations revealed student skepticism and resistance, with a controlled integration strategy allowing AI usage only after the initial 3D modeling. Subsequent semesters witnessed increased student acceptance and curiosity, showcasing improved 3D visualization quality while maintaining design integrity. Design charrettes utilizing AI underscored the importance of clear design goals, albeit with occasional deviations from the original concept. The discussion emphasizes the nuanced dynamics between AI-enhanced and traditional approaches, offering guidelines for AI integration. Prohibiting initial AI usage and strategic instructor guidance emerged as effective strategies. The study highlights the need for a balanced integration approach, empowering students with AI tools while preserving core architectural principles. The importance of fundamental visualization skills is underscored, positioning AI as a complementary enhancement rather than a replacement. In conclusion, this research contributes to the discourse on responsible AI integration in architectural education. The controlled integration approach demonstrates improved visualization quality without compromising design integrity. The study encourages educators, practitioners, and policymakers to envision a future where AI enhances foundational skills, fostering a collaborative dialogue on the evolving role of technology in architectural education.

**KEYWORDS:** AI, design education, architecture, interior architecture

## INTRODUCTION

This study explores possibilities for the integration of artificial intelligence (AI) image generators into architectural education, examining the intersection of traditional design processes and emerging AI technologies. The advancement of AI has emerged as a potential catalyst for the redefining of traditional design techniques (Figoli, Mattioli and Rampino 2022). But the potential catalyst in educational settings remains relatively unexplored. It is possible that, in December 2023, a search through a number of academic research portals such as ScienceDirect, MDPI, Sage Journals, Wiley Online Library, Taylor & Francis Online, and other academic research portals using the search phrases ("Interior Design" or "Interior Architecture") and "Design Process" along with ("AI" or "Artificial Intelligence") could provide a number of literature pieces that address the potential catalyst in general that can serve as a starting point for this research. In Hanafy (2023), user-centered AI platforms such as DALL-E 2, Midjourney, and Stable Diffusion are introduced. Additionally, the author notes that despite Stable Diffusion's fewer features than DALL-E, it has the fundamental advantage of running locally and providing more training data for the model. Due to these reasons, Stable Diffusion has the best outcomes when it comes to designing architectural cases (Hanafy 2023, 9). Further, the author outlined a number of potential use scenarios per purpose, including ideation, sketches, collages, image combinations, build variants, style variants, construction plans, exterior design, interior design, and creating textures. Among the scenarios outlined, the use cases are not well suited to the three platforms, with the exception of Ideation and Sketches, which are more focused on the early design phases (Hanafy 2023). Other papers also stated that the AI platforms possible uses in the early phase (Bolojan, Vermisso and Yousif 2022; Paananen, Oppenlaender and Visuri 2023; Ploennigs, and Berger 2023a; Ploennigs and Berger 2023b; Seneviratne et al. 2022; Yildirim 2022). It is noted in all of the papers above that the text-to-image process can be used to generate ideas based on text before a visual deliverable is developed. It appears that the notes are consistent with Hanafy's paper, which states that the use of AI in user scenarios is becoming less useful as the design advances. From the background of the notes, it is evident that they were developed based on an understanding of the scenario of each stage of the design process rather than the experience of engaging in the entire process. In other words, it is important to note that not enough research has been conducted on the use of AI throughout the existing entire design process scenarios from the onset to the conclusion of one project, such as evidence-based design (Nussbaumer 2009). Moreover, only one of them based its findings on the research participants, especially students (Paananen, Oppenlaender and Visuri 2023), rather than on the authors' self-study and understanding, which could be different from the users' perspectives in education and practice. In combination with the above, this research focuses on the way in which users, especially students, use AI with existing design processes rather than addressing it from a technology standpoint. It takes place throughout and after the entire design process, from Schematic Design through Construction Documentation, to determine how each user employs

AI. With the purpose, this research asks, “How can architectural education provide students the opportunity to leverage AI image generators based on the existing entire design process?” To address the question, this paper contributes to the ongoing discourse on the integration of AI in architectural education by documenting the experiences of introducing AI image generators into design studios. By combining theoretical frameworks with practical implementation, it aims to shed light on the challenges, successes, and potential future directions for incorporating AI in the educational landscape. As architecture stands at the crossroads of tradition and innovation, this study endeavors to provide insights that can inform educators, practitioners, and policymakers on navigating this dynamic intersection.

## 1.0 METHODOLOGY

This research is based on the exploratory case study method (Streb 2012). The literature review above indicates that little research has been conducted on how to utilize artificial intelligence, which was confirmed by users throughout the entire project process. An exploratory case study can be useful when precedents are lacking and hypotheses are to be generated empirically (Yin 2017). This exploratory case study examines three upper-level design studios. Constructionism, as developed by Papert (1993), provides the theoretical basis for this study. As per the constructionist perspective, knowledge can be gained more effectively when learners are actively involved in the learning process at every stage. Learning is not merely passively receiving knowledge; rather, it is the process of discovering one's own understanding of the subject matter. Based on Papert's conception of constructionism, learners are engaged in the active construction of learning during the process of making artifacts visible to the world. With constructionism, a study (Papavlasopoulou, Giannakos and Jaccheri 2019) explored children's learning experiences through design-based research (Anderson and Shattuck 2012; Reeves 2006), which is a strategic approach to understanding learning processes involving design, exploration, enactment, evaluation, and redesign.

### 1.1 Research design

The instructor instructs the students step-by-step to follow the instructions in order to produce results, and then they are asked to describe what they have learned from their experience about using the AI image generator tools as a result of their efforts. The study will be conducted in four steps: the first step will be to prepare and deliver teaching materials; the second step will be for students to implement the materials and submit the results; the third step will be to analyze the results, and the fourth step will be to explore how to utilize the results.

### 1.2 Material preparation

In this work, the author developed teaching materials based on the references (Bundela 2023), which introduce supportive AI tools in the architectural design process. Initially, developed teaching materials such as course slides for workshops introduced multiple AI software programs, such as Stable Diffusion Github, Midjourney, D5, and others. During this research, new tools have emerged, as well as convergence and integration with multiple Natural Language Processing (NLP) engines. With regard to the stream, the author reformulates the workshop format with the only AI tool "Fabrie." It is based on the Stable Bee NLP engine, which allows designers to have more accurate exploration than with other NLP-based tools (Hanafy 2023). Along with the workshop format course slides, the author also designed a set of templates for students to use. This template has designated areas for 1) original text and images, 2) explored outcomes which are the student's favorites after single or multiple explorations, and 3) prompts which were used for the final exploration. Finally, there was a space at the end of the template to record their experience, especially regarding the extent to which they understood and hypothesized how they would use it in their design process based on what they had learned and used in the previous semesters and activities.

### 1.3 Research participants

During the last four semesters, from the Fall of 2022 to the Spring of 2024, the workshop has been offered to third, fourth, fifth, and graduate-level students in Architecture, Interior Architecture and Design, and Design Studio programs at the author's school. It is the intention of the studio to be coordinated on the basis of the Evidence-based Design framework and to request students to be involved in the entire process, from predesign research to construction documentation. The author's students have been exposed to the evidence-based design process through the studio or prior to the studio. This is the traditional and existing design process that is taught at the author's school. As the studio moved forward, the author introduced AI tools that were appropriate for the specific phase of the evidence-based design process. For example, text-to-image tools for the research phase, image-to-image tools for design charrette (idea sketching) and physical model phases, both text-to-image and image-to-image tools for color, material, and lighting phases, and artificial intelligence rendering tools during the perspective phase. In addition, there were additional workshops before and after the semester to review and discuss other opportunities based on their previous work. Each time the workshop was introduced, students were asked to produce and submit their outcomes voluntarily in accordance with the workshop guidelines. It was not a grading assignment or material. This was a workshop-type experience.

### 1.4 Data collection

Following the workshop, the author compiled the students' outcomes into a book that was published afterward. Only the author has access to the contents of the book, which was shared voluntarily by the students with the author. Upon completion of the book, the author uploaded it to an online book publication portal to make it available to the students as well as the public as a form of open-source publishing. It consists of the contents of the book, as well as the original student deliverables, such as their original text and images, their exploration of outcomes and the prompt, and their written descriptions of their experience that were collected in the book. The collected data has

been sorted in order to avoid the possibility of identifying individuals from the data collected. In relation to the figures in this paper, they have been regenerated by the author so that they can be used as figures if needed.

### 1.5 Data analysis

The author collected both text-based and image-based data without disclosing any personal information. In order to analyze the collected data, the author conducted a thematic analysis (Fereday and Muir-Cochrane 2006), particularly in relation to the written student experiences. This led the author to identify themes that could be used to categorize the data. In accordance with the identified theme, the author coded the data and categorized the outcomes of the students. The author summarized the available ways of incorporating AI technology into the traditional design process and existing design process based on the perspectives of the students at the end of the coding. As a result, the author outlines a possible work process utilizing AI tools based on the existing evidence-based design process.

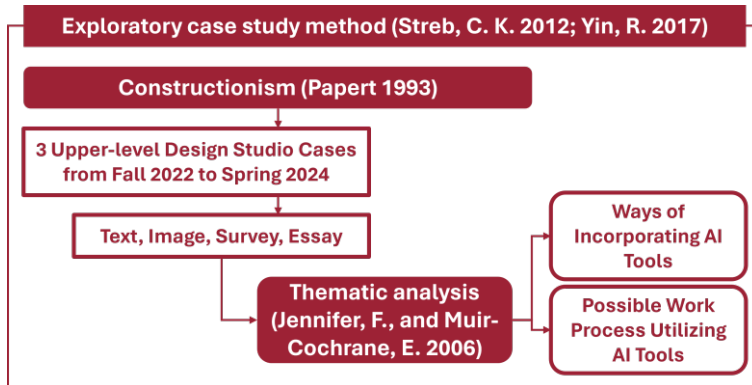


Figure 1: Conceptual Framework. Source: (Author)

## 2.0 FINDINGS

In the course of exploring AI image generators in architectural education over four semesters, a rich set of outcomes emerged, which shed light on the role of AI in student learning. The findings are organized into three main categories: 1) outcomes produced by students, 2) experience reflected in the outcomes, and 3) conceptualizing a possible design process for architectural education.

### 2.1 Documentation of the student outcomes

Throughout the past four semesters, AI tools have been introduced in four design studios through workshops. As a result, students from three studios produced and shared their explorations. Fall 2022 was the only semester in which students did not produce AI exploration outcomes. It was an early stage of AI tool development, with DALL-E 2 being released in April 2022 and Mid Journey being released in November 2022. Despite the fact that students explored functions through workshops, no architectural education-related content was explored. In total, 45 students shared their research results over three semesters, except for the semester. Students in the third, fourth, and fifth years of a) Architecture and b) Interior Architecture and Design are participating in this program. These are the results that they shared (Table 1). Student explorations were compiled into three books and published online for the use of students’ promotion and portfolios (Figure 2).

Table 1: Collected Students’ Explorations. Source: (Park 2023a; Park 2023b; Park 2024)

Data type	Number of Pieces
<i>Original Design Deliverables</i>	392 in total
Text	29
2D visualization (including graphic design, layout, logo, etc.)	19
Pictures of physical models, material boards, and reference images	100
Hand-sketches	92
3D visualization (perspectives)	152
<i>AI Generated Explorations</i>	642 in total
Based on the Text	42
Based on the 2D visualization	31
Based on the pictures	173
Based on the hand-sketches	152
Based on the Perspectives	244
Prompts	Used for the AI Generated Explorations
	278 in total
Essays	Describing their experience
	36 in total

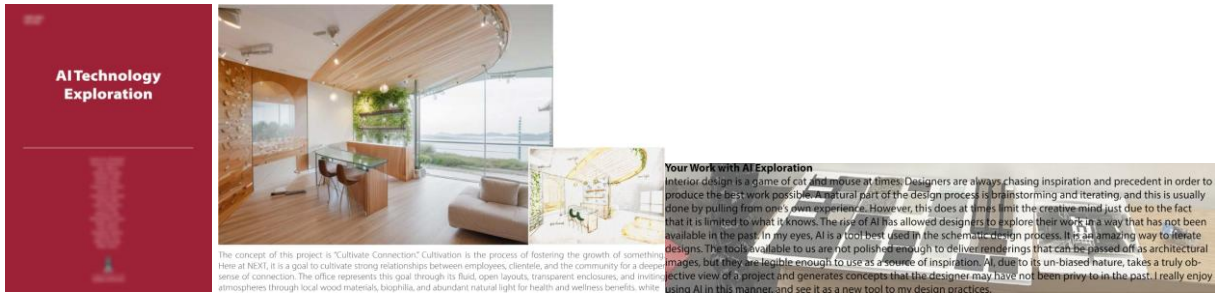


Figure 2: Book (Left) and Collected Data Sample Capture (Middle and Right). Source: (Park 2023b)

## 2.2 Analysis of the student experience

An analysis of the collected 36 student essays was conducted using the thematic analysis method. There are several recurring themes and perspectives in the essays on AI exploration in the context of design (Table 2).

Table 2: Collected Students' Explorations. Source: (Park 2023a; Park 2023b; Park 2024)

Themes	Summaries
Positive Impact on Design Process	<ul style="list-style-type: none"> <li>Many contributors express a positive impact of AI on the design process, emphasizing its usefulness in generating ideas, exploring materials, and providing quick iterations.</li> <li>AI is seen as a valuable tool for streamlining material selection, enhancing creativity, and offering unique design possibilities.</li> </ul>
Schematic Design Emphasis	<ul style="list-style-type: none"> <li>The majority of contributors highlight the effectiveness of AI in the schematic design phase. It is often described as a helpful tool for brainstorming, ideation, and exploring design options in the early stages.</li> </ul>
Limitations and Realism	<ul style="list-style-type: none"> <li>Several contributors acknowledge the limitations of AI, especially in terms of accurately rendering complex details, handling abstract geometry, and merging elements in the image.</li> <li>The need for post-processing and human touch is emphasized to refine AI-generated images and align them with the designer's vision.</li> </ul>
Material Exploration and Visualization	<ul style="list-style-type: none"> <li>AI is frequently mentioned as a tool for exploring materials, suggesting color palettes, and visualizing different design elements.</li> <li>Contributors appreciate AI's ability to assist in material and color palette decisions, providing inspiration for the overall design.</li> </ul>
Client Interaction and Collaboration	<ul style="list-style-type: none"> <li>The potential for using AI in client interactions is discussed, with suggestions that it can be used to present various design options and involve clients in the decision-making process.</li> </ul>
Educational and Learning Tool	<ul style="list-style-type: none"> <li>AI is recognized as a tool that can aid in learning and education, providing insights into design principles, spatial layouts, and material choices.</li> </ul>
Role in Future Design Practices	<ul style="list-style-type: none"> <li>The essays contemplate the future role of AI in design practices, with some contributors foreseeing its integration as a staple tool for architects and designers.</li> <li>The evolving nature of AI technology is acknowledged, and its potential impact on the design profession is discussed.</li> </ul>
Concerns and Considerations	<ul style="list-style-type: none"> <li>Some contributors express caution about relying too heavily on AI, emphasizing the importance of human creativity and design expertise.</li> <li>There are mentions of AI's current inability to fully understand and interpret complex design projects.</li> </ul>
Efficiency and Time-Saving	<ul style="list-style-type: none"> <li>AI is praised for its ability to speed up the design process, providing quick iterations and ideas in a time-efficient manner.</li> </ul>
Customization and Specificity	<ul style="list-style-type: none"> <li>Contributors highlight the importance of being specific in AI prompts to achieve desired results, and they suggest that customization is crucial for accurate outcomes.</li> </ul>
Artistic and Aesthetic Considerations	<ul style="list-style-type: none"> <li>Discussions include considerations of the aesthetic quality of AI-generated images, including the need for improved clarity in articulating visual elements and refining descriptions.</li> </ul>
Adaptation and Learning Curve	<ul style="list-style-type: none"> <li>Some contributors mention a learning curve when initially using AI tools but express eagerness to adapt and incorporate AI into their design processes.</li> </ul>

There is a strong consensus among students that AI can play a positive role in the design process, emphasizing its usefulness in generating ideas, exploring materials, and providing quick iterations. As a valuable tool for streamlining material selection, enhancing creativity, and offering unique design possibilities, AI can be considered as a valuable tool. A majority of students emphasize the effectiveness of AI during the schematic design phase. Early on in the design process, it is often described as a useful tool for brainstorming, ideation, and exploring design options. There are, however, several students who acknowledge the limitations of AI, especially when it comes to accurately rendering complex details, handling abstract geometry, and merging elements within an image. For AI-generated images to be refined and aligned with the designer's vision, post-processing and human touch are essential. Artificial intelligence is frequently referred to as a tool for experimenting with materials, suggesting color

palettes, and visualizing different design elements. As a result, students appreciate AI's ability to assist in material selection and color palette selection, providing inspiration for the overall design. The use of artificial intelligence in client interactions is discussed, with suggestions that it can be used to present various design options and engage clients in decision-making.

There is a discussion of the future role of AI in design practices in the essays, with some students foreseeing its integration as a staple tool for architects and designers. AI technology is acknowledged as an evolving technology, as well as its potential impact on the design profession. Some students express caution about relying too heavily on artificial intelligence, emphasizing the importance of human creativity and design expertise. There is a mention of AI's inability to fully understand and interpret complex design projects at present. With AI, the design process can be sped up, providing quick iterations and ideas in a timely manner. In order to achieve desired results, authors emphasize the importance of being specific in AI prompts, and they suggest that customization is crucial for obtaining accurate results. AI-generated images are discussed in terms of aesthetic quality, including the need for improved clarity in articulating visual elements and improving descriptions. Many students mention a learning curve when using AI tools, but they are eager to adapt and incorporate AI into their design processes. The essays revealed a variety of perspectives on the use of AI in design, including its potential benefits, limitations, and the evolving role it may play in the future of architecture and interior design.

### 2.3 Conceptualization of AI integration in the design process

In terms of using AI tools at the current technological level, there are four major phases that can be utilized, as shown in the students' explorations above (2.1) and their experience above (2.2). In the first phase of the project, a series of text-to-image visualizations are created based on the project description or concept statement to illustrate options for implementation (Figure 3). As a second step, you might be able to use a physical model or a reference image as a starting point for exploring possible options based on a model or reference image (Figure 4). On the basis of the hand sketches, you'll be able to explore possible outcomes in the third step (Figure 5). It is possible to explore possible tones of material, finish, color, and lighting during the process of perspective drawing in the fourth phase (Figure 6). As shown in the steps above, these are areas where students have clearly identified the benefits of implementing AI tools in their designs, as indicated in the steps above. Additionally, in cases where dimensional accuracy is required as part of a task, partially usable results are shown. If the above four possible ways of using AI tools are applied to an existing design process, such as evidence-based design, it becomes clear that there are parts that will be utilized from the predesign phase to the design development phase of the design process.



Figure 3: Collected Data Samples for Text to Image. Source: (Park 2024)



Figure 4: Collected Data Sample for Physical Model Picture to Image. Source: (Park 2024)



Figure 5: Collected Data Sample for Hand Sketch to Image. Source: (Park, J., 2023b)



**Figure 6:** Collected Data Sample for Perspective to Image. Source: (Park 2024)

### 3.0 DISCUSSION

The results of this study illuminate key insights into the intersection of AI image generators and architectural education, paving the way for a thoughtful discussion on their implications and potential directions.

#### 3.1 Overview of student processes and outcomes

The comparison between AI-enhanced and traditional approaches reveals nuanced dynamics. The controlled integration of AI post-initial 3D modeling demonstrated a notable improvement in visualization quality while maintaining the integrity of design elements. However, challenges surfaced as AI-generated images occasionally deviated from the original design concept, indicating the need for strategic guidance to align AI prompts with students' conceptual intents. During design charrettes, AI's role in exploring possible forms underscored its effectiveness when students defined clear design goals. Yet, it also highlighted the importance of fundamental visualization skills, as unsatisfactory outcomes were linked to potential deficiencies in physical and digital models.

#### 3.2 Suggestions for AI integration

Guidelines for incorporating AI in 3D visualization include a phased approach, restricting its use initially and emphasizing its role in enhancing, not dictating, design outcomes. Recommendations for utilizing AI in design charrettes advocate for a clear articulation of design goals and strategic instructor support to bridge the gap between AI-generated outputs and students' original concepts. The findings underscore the need for a balanced integration strategy that empowers students with AI tools while preserving the core principles of architectural education.

In the event that the tolerance range recognized by AI tools differs from the tolerance range recognized by humans, and the degree of understanding of errors differs based on these differences, the importance of basic skills must be reconsidered. The AI tool can, for example, understand and examine a student's work as it exists accurately regardless of whether the cutting skills of a model, the angle of a photograph, or the clarity of a sketch line were not intended, but rather resulted from a lack of basic skills. It appears from the photo below (Figure 7) that the AI, which recognized the result was different from what the student had intended, maintained the chair's form and produced it accordingly. The need for basic implementation capabilities has therefore become increasingly important.



**Figure 7:** Collected Data Sample. Source: (Park 2023b)

The use of AI tools during the ideation process is possible when using languages during the pre-design stage. A program description for "mind-scapes," for example, is available from the Interior Design Educator Council's Student Competition. As a result of using an AI tool, the following recommendations were made for the use of space based on movement: 1) Reclining or lying down, 2) Sitting in a circle, 3) Cross-legged or lotus positions, 4) Hugging or embracing, 5) Standing tall and open, and 6) Child Pose. Using AI tools, the text-to-image method provides a visual representation of how the actions of individuals would appear in a space. The visualizations are based on actions that correspond to existing typologies of built environments. In light of the author's experience in this process, which was in the preparation of teaching materials, he is confident that AI products will be helpful in the preparation of precedent studies for the analysis of programs.

Furthermore, AI could be directed towards achieving in-depth results when a user or student has a robust and consistent concept statement to his or her own creative works with detailed annotations for each individual design deliverable, as opposed to simply being a tool for exploring possibilities. For example, AI-enhanced 3D visualization

could improve the quality and detail of each image regardless of the prompt, except for human figures. But, it cannot be guaranteed that the improved images are aligned with the original design concept. In contrast, cases where the image was enhanced while maintaining the tone and manner of the space were also noticeable in the students' work (Figure 8). With this process in mind, it appears that when the user has a clear understanding of his or her work expressed in clear language, the existing visualization results may be helpful in determining better results with the assistance of AI.



**Figure 8:** Collected Data Sample. Source: (Park, J., 2023b)

### 3.3 Reflection on initial discoveries

The initial discoveries from three semesters of observation emphasize the importance of controlled integration and instructor guidance. Prohibiting AI usage at the outset and restricting it to rendering after 3D modeling emerged as a promising strategy for enhancing visualization without compromising design integrity. Additionally, the study underscores the need for instructors to guide students in effectively using AI prompts, especially during design charrettes, where the alignment of AI-generated outputs with students' design concepts is crucial.

## CONCLUSION

The findings and discussions presented in the research paper indicate that integrating AI image generators into architectural education can enhance the design process while preserving core architectural principles. Using AI image generators in three design studios over multiple semesters, this study explored the intersection of traditional design processes and emerging AI technologies.

This research demonstrated that controlled integration of AI, with AI used across all phases but in the development of core ideas itself, resulting in improved visualization quality while maintaining the integrity of the design. AI was initially viewed with skepticism and resistance by students, but over time, their acceptance and curiosity grew. The use of AI in design charrettes led to the identification of the importance of clearly defining design goals, even though some deviations were observed from the original concept.

It was recommended that AI be integrated into architectural education in a phased manner and with strategic instructor guidance. It was determined that prohibiting the use of AI for hand sketches and physical models at the beginning of the design charrettes and then allowing AI to explore possibilities at the end of the charrettes were effective strategies. Throughout this research, the importance of a balanced integration approach is stressed, emphasizing the importance of empowering students with AI tools while emphasizing the importance of basic visualization skills. As opposed to replacing traditional design processes with artificial intelligence, AI was positioned as a complement.

A major contribution of this research is the contribution to the discourse on responsible AI integration in architectural education. Controlled integration improved visualization quality without compromising the integrity of the design. This study encourages educators, practitioners, and policymakers to envision a future in which artificial intelligence enhances foundational skills and fosters a collaborative dialogue on the evolving role of technology in architectural education. In order to validate the optimized design process based on the results of this study, further research is required to explore the application of AI throughout the entire design process.

This paper presents a comprehensive exploration of the intersection between AI image generators and architectural education. The results highlight the potential benefits and challenges associated with the integration of AI tools in 3D visualization, design charrettes, and layout development. The controlled integration approach, observed over three semesters, demonstrated improvements in visualization quality while preserving essential design elements. However, the study also emphasizes the importance of fundamental visualization skills and the need for strategic guidance to maximize the benefits of AI in design education.

## ACKNOWLEDGEMENTS

The author's school's start-up fund supported this research to investigate the integration of advanced technology in STEM education.

## REFERENCES

- Anderson, T. and Shattuck, J. 2012. "Design-Based Research: A Decade of Progress in Education Research?" *Educational Researcher*, 41 (1): 16–25. <https://doi.org/10.3102/0013189X11428813>.
- Bolojan, D., E. Vermisso, and S. Yousif. 2022. "Is Language All We Need? A Query Into Architectural Semantics Using a Multimodal Generative Workflow." In *Proceedings of the 27th Conference on Computer Aided*

- Architectural Design Research in Asia (CAADRIA)*, vol. 1, 353–362.  
<https://doi.org/10.52842/conf.caadria.2022.1.353>.
- Bundela, V. S. 2023. *Artificial Intelligence Based Workflow Framework for Architectural Design*. LinkedIn, April 13, 2023. [https://www.linkedin.com/posts/vikramaditya-shah-bundela-5405a114b\\_ai-based-architecture-workflows-framework-activity-7068663423143747585-7tGU](https://www.linkedin.com/posts/vikramaditya-shah-bundela-5405a114b_ai-based-architecture-workflows-framework-activity-7068663423143747585-7tGU).
- Fereday J., and E. Muir-Cochrane. 2006. "Demonstrating Rigor Using Thematic Analysis: A hybrid Approach of Inductive and Deductive Coding and Theme Development." *International Journal of Qualitative Methods*, 5 (1), 80-92. <https://doi.org/10.1177/160940690600500107>.
- Figoli, F., A. Mattioli, F. and Rampino, L. 2022. *Artificial Intelligence in the Design Process | The Impact on Creativity and Team Collaboration*. Milano: FrancoAngeli Open Access.  
<https://re.public.polimi.it/bitstream/11311/1204154/6/Completo.pdf>.
- Hanafy, N. O. 2023. *Artificial intelligence's Effects on Design Process Creativity: "A study on Used A.I. Text-to-Image in architecture."* *Journal of Building Engineering*, 80(September).  
<https://doi.org/10.1016/j.jobbe.2023.107999>.
- Nussbaumer, L. L. 2009. *Evidence-Based Design for Interior Designers*. 1<sup>st</sup> ed. New York: Fairchild Books.
- Paananen, V., J. Oppenlaender, and A. Visuri. 2023. "Using Text-to-Image Generation for Architectural Design Ideation". *International Journal of Architectural Computing* 22 (3): 458-474.  
<https://doi.org/10.1177/14780771231222783>.
- Papavlasopoulou, S., M. N. Giannakos, and L. Jaccheri. 2019. "Exploring Children's Learning Experience in Constructionism-Based Coding Activities through Design-Based Research." *Computers in Human Behavior* 99, 415–427. <https://doi.org/10.1016/j.chb.2019.01.008>.
- Papert, S. 1993. *Mindstorms: Children, Computers, and Powerful Ideas*. 2<sup>nd</sup> ed. New York: Basic Books.  
<https://dl.acm.org/doi/pdf/10.5555/1095592>.
- Park, J. 2023a. S23\_IARD 4845 & ARCH 5016 & FJAD 6916 *Design + Business + Community*.  
[https://issuu.com/newnormalist/docs/230512\\_coursebook\\_iard4845\\_arch\\_5016\\_web](https://issuu.com/newnormalist/docs/230512_coursebook_iard4845_arch_5016_web)
- Park, J. 2023b. F23\_Workshop | *AI Exploration in Interior Architecture and Design*.  
[https://issuu.com/newnormalist/docs/231228\\_coursebook\\_seminar\\_ai\\_print](https://issuu.com/newnormalist/docs/231228_coursebook_seminar_ai_print)
- Park, J. 2024. S24\_Workshop | *AI Exploration in Interior Architecture and Design*.  
[https://issuu.com/newnormalist/docs/s24\\_coursebook\\_01\\_seminar\\_ai\\_fin](https://issuu.com/newnormalist/docs/s24_coursebook_01_seminar_ai_fin).
- Ploennigs, J. and M. Berger. 2023. "AI Art in Architecture." *AI in Civil Engineering*, 2 (1).  
<https://doi.org/10.1007/s43503-023-00018-y>.
- Ploennigs, J. and M. Berger. 2023. "Analysing the Usage of AI Art Tools for Architecture".  
*In Proceedings of the 2023 European Conference on Computing in Construction and the 40th International CIB W78 Conference, vol. 4, Heraklion, Greece. European Council on Computing in Construction.* <https://doi.org/10.35490/EC3.2023.253>
- Reeves, T. C. 2006. "Design research from a technology perspective." In *Educational Design Research*, 1st ed., 52–66. <https://doi.org/10.4324/9780203088364-13>.
- Seneviratne, S., D. Senanayake, S. Rasnayaka, R. Vidanaarachchi, and J. Thompson. 2022. "Dalle-Urban: Capturing the Urban Design Expertise of Large Text to Image Transformers." 2022 In *International Conference on Digital Image Computing: Techniques and Applications (DICTA 2022)*, 1–9.  
<https://doi.org/10.1109/DICTA56598.2022.10034603>
- Yildirim, E. 2022. "Text-to-Image Generation A . I . in Architecture." In *Art and Architecture: Theory, Practice and Experience*, edited by H. Hale Kozlu, 97–120. 1st ed. Chapter 8. Lyon: Livre de Lyon.
- Yin, R. 2017. *Case Study Research: Design and Methods*. 6th ed. Thousand Oaks: CA: SAGE Publications.