Architecture students and AI: exploring applications and perceptions in the class

Estudiantes de arquitectura e IA: explorando aplicaciones y percepciones en la clase

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Abstract

This study examines the perception of architecture students on text-to-image AI tools in architectural design, focusing on their impact on creativity, efficiency, and the design process. Conducted within a "Design Research Methods" course for third-year architecture students, the research explores how AI-assisted tools can complement traditional design methodologies, particularly in user-centered design projects. Students used AI technologies such as DALL-E and ChatGPT to create personas, mood boards, and customer journey maps, combining text-to-image and text generation capabilities to support various stages of the design process. Two surveys conducted during the course gauged students' familiarity with AI, their initial skepticism, and their evolving perspectives post-interaction with AI tools. Results indicate that students found AI tools beneficial in generating diverse design ideas, accelerating visualization, and enhancing ideation. Despite initial reservations, students recognized AI's potential in optimizing the design process, although challenges in technical accuracy and prompt interpretation were noted. While this study talks about the pros and cons of using AI in design education, it also suggests ways that AI could be better integrated into user-centered approaches. Findings underscore AI's role in fostering a forward-thinking approach to design education, preparing students for the evolving demands of the architectural field.

Resumen

Este estudio examina la percepción de los estudiantes de arquitectura sobre las herramientas de inteligencia artificial de texto a imagen en el diseño arquitectónico, enfocándose en su impacto en la creatividad, la eficiencia y el proceso de diseño. Realizado en el marco del curso "Métodos de Investigación en Diseño" para estudiantes de tercer año de arquitectura, la investigación explora cómo las herramientas asistidas por IA pueden complementar las metodologías de diseño tradicionales, particularmente en proyectos centrados en el usuario. Los estudiantes utilizaron tecnologías de IA como Midjourney, DALL-E, Canva y ChatGPT para crear personas, tableros de inspiración (mood boards) y mapas de experiencia del cliente, combinando capacidades de generación de imágenes y de texto para apoyar diversas etapas del proceso de diseño. Se realizaron dos encuestas durante el curso para evaluar el grado de familiaridad con la IA, el escepticismo inicial y las percepciones que evolucionaron tras la interacción con estas herramientas. Los resultados indican que los estudiantes encontraron útiles las herramientas de IA para generar ideas de diseño diversas, acelerar la visualización y mejorar la ideación. A pesar de las reservas iniciales, los estudiantes reconocieron el potencial de la IA para optimizar el proceso de diseño, aunque también se señalaron desafíos relacionados con la precisión técnica y la interpretación de los prompts. Si bien este estudio aborda las ventajas y desventajas del uso de la IA en la educación del diseño, también propone formas de integrar mejor estas herramientas en enfoques centrados en el usuario. Los hallazgos destacan el

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papel de la IA en la promoción de una educación en diseño con visión de futuro, preparando a los estudiantes para las demandas cambiantes del campo arquitectónico.

Keywords:

AI in design education; text-to-image tools; user-centered design

Palabras Clave:

IA en la educación del diseño; herramientas de texto a imagen; diseño centrado en el usuario

Introduction

In the field of architectural design education, a shift toward human-centered design strategies emphasizes creating environments that meet specific user needs and preferences. While the concept of user-centered design is a topic more widely adopted and identified with fields such as product design and user interface design (UX design), the transformation of the architecture and construction sectors has made user-centered design processes increasingly necessary for architectural design processes (Heylighen, Van der Linden & Dong, 2018). The digitalization of spaces with technological advancements (such as smart home systems), the development of production methods, and the increasing resemblance of buildings to products and their marketing as if they were products, along with the concepts of universal design and sustainable architecture, along with the increased focus on users in buildings, have made it increasingly necessary for architects to understand user-centered processes (Arabacıoğlu, 2008; Kocaoğlu & Demirkan, 2019).

Recent research in architectural education has demonstrated that user-centered and human-centered design frameworks can bridge the gap between architectural education and social responsibility. Scholars such as Heylighen, Van der Linden, and Dong (2018) emphasize that scenario-based and empathic design methods derived from interaction and industrial design can enhance how architecture students envision future users and translate their needs into spatial qualities. Similarly, Verhulst, Elsen, and Heylighen (2016) note that even in the absence of real users, architects project implicit user assumptions that shape design decisions. This study highlights the importance of teaching students to make user representations explicit through tools such as personas, user journey maps, and participatory storytelling. Integrating these tools within the design process enables students to move from an "expert-driven" paradigm toward a collaborative, reflective, and empathy-based design culture (Stevens, Petermans & Vanrie, 2019).

On the other hand, over the past two decades, digital technology and AI applications have profoundly influenced the design industry. Currently, AI is a dominant force across various fields, including architecture, where it simulates aspects of human cognition, such as reasoning, perception, and problem-solving (Samuel, Mahanta, & Vitug, 2022). AI was first discussed at the Dartmouth Conference in 1956. It includes cognitive abilities like reasoning logically, recognizing facts, and drawing conclusions, with the goal of finding solutions based on knowledge (Ergül, Malkoçoğlu, & Özgünler, 2022). This broad applicability has integrated AI into diverse sectors, including art, design, healthcare, and education (Bayrak, 2022), demonstrating its transformative potential in architecture.

With the rise of AI-powered generative design tools, students can try out creative prompts by turning textual inputs into visual outputs. This lets them explore design and come up with new ideas in more ways (Bölek, Tutal, and Özbaşaran, 2023). In particular, AI-powered generative tools such as DALL-E and Adobe Firefly let students enter textual constraints and parameters, which then produce a wide range of design options (Tan & Luhrs, 2023-52; Muslu & Gokhan, 2025). Using Building Information Modeling (BIM) and 3D modeling programs like Revit makes it

easier to make detailed models that are full of information. This makes difficult projects easier to handle and helps students learn more about how spaces relate to each other and how buildings are put together (Kristombu Baduge, 2022). These tools streamline design processes and enable students to visualize outcomes, helping them grasp concepts more effectively and make informed design decisions.

AI helps with construction automation using technologies like drones and robotics, which improves site monitoring and accuracy, as well as energy efficiency and safety during project execution (Szalai et al., 2023), along with visualizing design ideas. When students use text-to-image AI tools along with machine learning (ML) algorithms like reinforcement learning and unsupervised learning, they can try out generative design by seeing textual descriptions as visual prompts. This technology encourages students to refine their prompts, enhancing their skills in crafting precise textual descriptions that yield meaningful visual results.

Rather than advocating for a complete integration of AI into architectural education, this study focuses on the effects of a guided introduction to AI tools within a single course. In class, the iterative process—problem definition, concept development, and evaluation—intersects with AI. By leveraging tools like text-to-image AI, architecture students can efficiently generate diverse design ideas and visual representations that align with user preferences and environmental constraints. The introduction of artificial intelligence (AI) into design education extends this transformation by enabling architects to simulate and visualize user experiences more dynamically. AI tools can amplify empathy-driven processes through automated persona generation, environmental visualization, and the analysis of qualitative user data. In the context of user-centered design (UCD), AI thus acts as a mediating instrument—accelerating idea generation while maintaining the reflective ethos of human-centered thinking. By connecting the experiential depth of UCD with the computational affordances of AI, architectural education can foster new hybrid competencies that prepare students to engage with both social and technological dimensions of future design practice.

The study shows both the pros and cons of using AI tools in design learning by looking at how students answered surveys and what was seen in the classroom. The findings offer perspectives on how students engage with AI, their concerns about its accuracy and ethical implications, and their willingness to incorporate these technologies into their future design workflows. The research aims to assess students' initial thoughts, evolving perspectives, and reflections on the role of AI in their design process in the class. Therefore, we can list the following research questions:

What are students' perspectives regarding the utilization of AI tools in their design processes and educational experiences, and how might their perceptions of AI evolve with the deliberate integration of AI tools?

What are the benefits and potential difficulties associated with the deliberate integration of AI tools into the curriculum?

Finally, this study seeks to capture the state of perceptions among students and academics regarding artificial intelligence (AI), a rapidly evolving technology, as observed within the architectural education context in 2023.

Method

The primary data source for this study consisted of surveys administered to students throughout the course. One architecture department in Türkiye has offered this course as an elective to architecture students for years. Each year, the course teaches user-centered design processes and methods to at least thirty students. Students design spaces using user-centered design methods and processes. In the year the research was conducted, artificial intelligence tools were incorporated into the process, and the process was examined. The sample consisted of third-year architecture students over the age of 20. This survey, conducted in the spring of 2023, revealed that 45% of the students had used AI for the first time. Taking this elective course, which explores user-centered design, can suggest that they are prospective architects aiming to gain insight into user-centered approaches. To ensure accurate analysis of these surveys, the study also includes illustrations of the course process and course outcomes. Furthermore, the impact of the lecturer's opinions during the course significantly influenced the data in this study.

The Design Research Methodologies elective course conducts this exploration as part of an assignment. Thirty-three third-year

architecture department students who possessed prior knowledge and experience in design representation and digital tools successfully completed the assignment. The assignment has two steps:

(i) designing interiors with user-centered methods without using AI applications

(ii) designing interiors with user-centered methods using AI applications.

The course divided 33 students into 10 groups. This study resulted in the creation of 20 distinct spaces using both traditional techniques and artificial intelligence.

During this process, we administered two surveys to the students. We administered the first survey to students in the middle of the course, prior to the introduction of AI tools. The purpose of this survey was to measure students' familiarity with AI technologies and how they approach them. Twenty-one students participated in the survey. You can see a few sample survey questions below.

- What is artificial intelligence (AI)? What kinds of applications are implemented with AI today? Give examples.
- Do you believe AI can improve learning experiences? Why or why not?
- If you used artificial intelligence, how did you use it, and what tools did you use?

We conducted the second survey at the end of the course on the final day. This survey inquired about the students' opinions following their increased use of AI tools. They were asked if they were happy with how AI was integrated into the course and how they would use it later. Because of the fact that it was the final course of the class, all students (33) participated in this survey. Here are the same sample survey questions below.

- How has your perception of artificial intelligence (AI) changed after using it in this study?
- How well did the AI tools you used achieve the design you wanted? (Likert scale)
- Has using AI improved your ability to solve problems or complete tasks? Please elaborate.

In both surveys, the questions were mostly open-ended. There were also yes/no questions. While the questionnaires provided to the students appeared to be for qualitative data, the open-ended questions also aimed to collect quantitative data. These open-ended questions, synonyms, and sentences with similar meanings were grouped thematically and transferred to a digital environment to create graphs. For example, to the question, "If available, could you please address your concerns about using AI?" one student wrote, "We might have difficulty finding a job," while another responded, "AI could do the work we do, and we wouldn't need it." These two responses were summarized as "There might be a decrease in job opportunities" and plotted on the graph during the analysis process.

The survey was administered in a classroom environment, using paper rather than digitally. None of the students shared their personal information. No intervention was made in the students' responses. The university's ethics committee was contacted for the research.

Background Study

This study examines the integration of generative artificial intelligence (GAI) into design processes using "text-to-image" tools. Therefore, this section will briefly summarize some of the studies conducted on this topic. In recent years, we have witnessed the rapid adoption of text-to-image (such as Midjourney, Stable Diffusion, and DALL-E) and text-to-text (ChatGPT) artificial intelligence tools in design fields such as architecture, interior architecture, urban design, and landscape architecture (Carroll, 2024; Horvath & Pouliou, 2024; Li et al., 2025; Paananen, Oppenlaender, & Visuri, 2024; Ye et al., 2025).

Based on large language models (LLMs), GAI adds innovative opportunities to creative processes by enabling users to generate content through natural language prompts (Jin et al., 2024; Uusitalo, Salovaara, Jokela, & Salmimaa, 2024). GAI tools offer a speed advantage over manual methods by enabling the rapid visualization of ideas (Paananen et al., 2024; Ye et al., 2025). Generative systems support the discovery of unexpected ideas and an imaginative mindset (Paananen et al., 2024). By generating multiple visuals derived from large datasets, GAI significantly increases the multiplicity of alternatives during the exploration phase (Guridi et al., 2025; Ye et al., 2025). The aesthetic qualities of these outputs serve as unexpected stimuli that can trigger lateral thinking (Horvath & Pouliou, 2024).

Numerous studies can serve as evidence for this. For example, in Chandrasekera et al.'s study, students using GAI achieved better creativity. A study focusing on urban furniture design found

that the AI group scored significantly higher on creativity metrics such as Innovation, Solution, and Elaboration/Synthesis (Chandrasekera et al., 2025). Furthermore, exposure to AI-generated concepts can enrich students' creative thinking skills and create a lasting after-learning effect (Chandrasekera et al., 2025). In this study, it was also determined that students who used AI tools in visualization tasks experienced reduced cognitive load during the design process compared to the group that did not use AI tools. This freed up the working memory capacity which is necessary for divergent thinking in students who used AI (Chandrasekera et al., 2025).

Design processes begin with processes such as developing personas, defining the design, and creating a design brief, demonstrating the need for students to also develop analytical and descriptive skills. According to Tan and Luhrs, text-to-text AI tools can assist designers in performing these analytical and descriptive tasks. T2T generators serve as material for refining the design brief by creating "hybrid texts" that incorporate conceptual themes aligned with architectural discourse (Horvath & Pouliou, 2024; Uusitalo et al., 2024). These texts help distill a broad design problem into a more focused proposal (Horvath & Pouliou, 2024). When designers provide keywords that explore different scenarios, GAI performs "convergent interpretations" by transforming these words into a visual representation (Tan & Luhrs, 2024).

One of the first benefits of GAI that comes to mind is that it provides high work efficiency (Jin et al., 2024). More time can be spent on topics such as design alternatives and stakeholder requirements, as AI tools make labor-intensive processes such as drafting, sketching, and prototyping cheaper and less labor-intensive (Guridi et al., 2025; Ye et al., 2025).

Furthermore, AI tools have changed the cognitive skills required in early-stage ideation, shifting the focus from visual drawing ability to verbal expression and will continue to do so in the future (Horvath & Pouliou, 2024; Tan & Luhrs, 2024; Paananen et al., 2024).

Furthermore, AI tools will likely transform the capabilities of designers. GAI has already shifted the cognitive skills required in early-stage ideation, shifting the focus from visual drawing skills to verbal expression and will continue to do so in the future (Horvath & Pouliou, 2024; Tan & Luhrs, 2024; Paananen et al., 2024). GAI relies heavily on text prompts, meaning that user creativity depends on the ability to clearly express their intention, i.e., "prompt-crafting" (Paananen et al., 2024; Tan & Luhrs, 2024). To achieve effective results, students must develop their verbal creativity by using specific vocabulary and "prompt modifiers" beyond traditional architectural terms (Paananen et al., 2024). In an architectural context, designers must manage three layers of language: architectural discourse (natural language), programming languages (code behind the tools), and notations (training data labels) (Horvath & Pouliou, 2024).

Despite the benefits of GAI, students face challenges such as generating uncontrollable results (Jin et al., 2024). Especially with image generators like Midjourney, visual output can sometimes appear random, distorted, or "absurd," and it is difficult to precisely achieve the desired aesthetic or spatial logic (Horvath & Pouliou, 2024; Jin et al., 2024; Ye et al., 2025). A study in landscape architecture has shown that relying solely on prompts can produce unpredictable results that deviate from the desired scale or park classification (Ye et al., 2025). This requires the design student to continually iterate on the prompts (Horvath & Pouliou, 2024).

Process

In this part the course is explained in detail. The course lasted fourteen weeks. During the first seven weeks of the course, the user-centered design process was explained week by week, and students were encouraged to develop their own ideas. Upon completion of the course, students were tasked with creating commercial interiors using a hands-on approach. The demonstration of the user-centered design approach was as important as the idea creation phase of the process. We limited the explanation of the prototype and testing phases to the theoretical aspects of the process. In the last seven weeks of the course, the processes of understanding, research, and concept generation employed artificial intelligence technologies. Beginning of these seven week the AI technologies were showed to the students.

The first survey was administered in the eighth week, and students were given a presentation on how text-to-image AI tools are used in architecture. The second survey was administered in the final week of the course, the same week

as the final submission. Between the eighth and fourteenth weeks, students repeated the same processes they had implemented in the first seven weeks, this time using AI tools. Every week, the students received homework assignments and had to showcase their creations to their classmates during class.

User-centered Design and Its Process

In order to better explain the design process, the concept of user-centered design is explained in detail in this section. User-centered design is an approach that utilizes the processes and methodologies of design thinking. Design thinking is an iterative and adaptable process that includes the following stages: "Empathize," "define the problem/opportunity area," "generate an idea," "prototype," and "test" process, the utilization of different design methods facilitates the work of designers (Waidelich et al., 2018). Initially, we educated the students about the user-centered design approach and space. Next, we divided them into groups and assigned them the task of selecting various public spaces and commercial venues, like a polyclinic or a cargo branch. The primary objective for the students was to carry out observations and "small interviews" within these existing spaces, taking into account the potential users. We consistently reminded the students throughout this process that the users of commercial spaces encompass not only customers but also employees. Using a design methodology, we could refer to the first assignment as a "service safari" (SDT, n.d.). In the Figure 1, it is a poster that explains students' research data via service safari for pharmacies (Figure 1). Where students tried to experience of the spaces by their selves to have the initial observation.

After completing their initial observations, the students proceeded to conduct interviews with potential users. We delivered a presentation to the students, outlining the inquiries they would pose during these gatherings and the appropriate conduct they should exhibit. We provided students with recommendations on how they could maximize their understanding. Additionally, we provided them with guidance on documenting the discussions. Owing to the interviews, the students divided into groups and exchanged the data they had acquired from interview. In order to accomplish this, they engaged in a collaborative process of generating ideas and recording the challenges and possibilities they recalled on adhesive notes known as post-it notes. We analyzed the information using an "affinity map". Persona and user experience mapping (Endmann and Kessner, 2016) were taught to the students so that they could look at the data they had gathered and learn more about the users' experiences (Lucero, 2015). In the Figure 2, we see personas for libraries (see the next page).

Figure 1. The service safari posters

Source: Not specified

Figure 2. A poster about personas

Source: Not specified

Students generated their initial concepts using the data and ideas they acquired. For the midterm exam, they submitted a digital file that detailed their processes and visualized their concepts. They developed this concept using a combination of space visuals and the mood board technique. In the Figure 3, we see a mood board example which is created for a pharmacy concept (Figure 3).

Throughout the second process which they use AI, students were required to be transparent about the AI tools they used. They openly shared how they utilized these tools, including the specific prompts they wrote, both with educators and their peers. This exchange of information was maintained throughout the course, fostering a collaborative learning environment.

Figure 3. A moodboard example

Source: Not specified

After the first design process, students conducted the process with the help of AI tools. As mentioned above, they used text-to-image tools like Canva, Copilot, and Bing. The first week after the introduction of AI tools to students, they brought personas, which were created with the help of ChatGPT and different text-to-image tools. For example, in the Figure 4, the student created personas for a café with the help of chat GPT and Canva (Figure 4).

The following week, they created customer journey maps with the help of Chat GPT. In the Figure 5, student created a user journey map for a library user (Figure 5).

Figure 4. Personas by AI tools

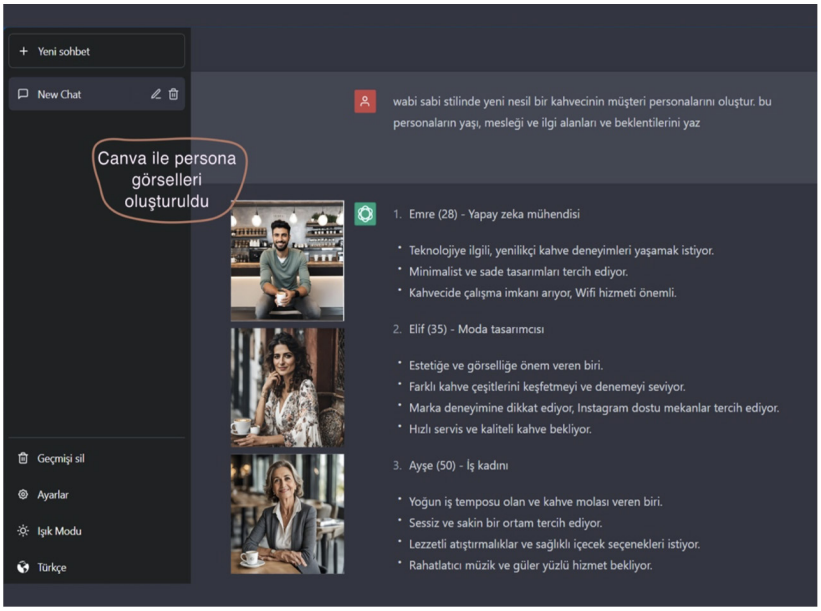

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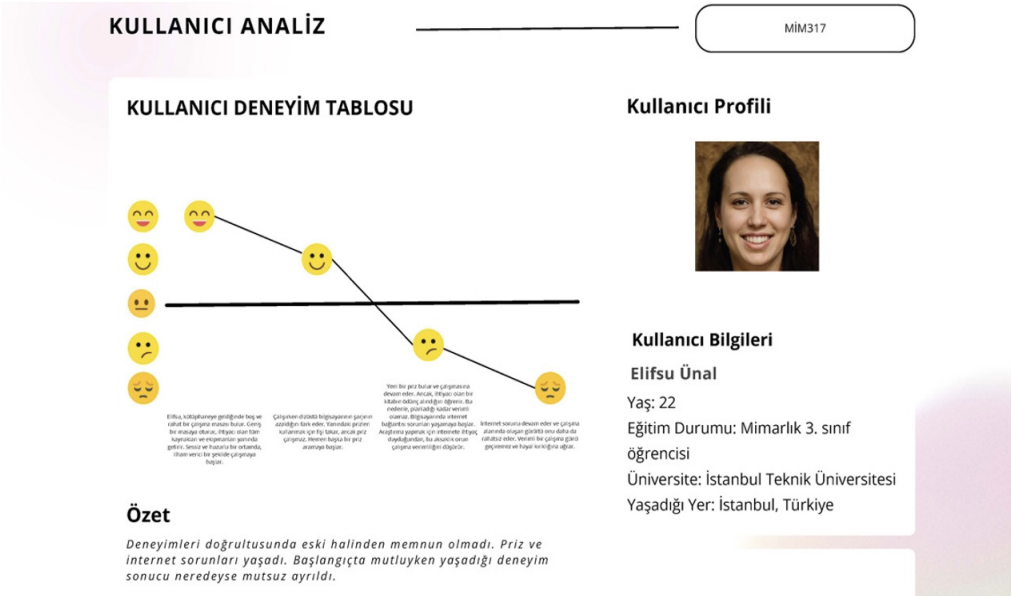
Figure 5. Customer journey by AI tools



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Lastly, they created concept images and moodboards for their interiors with AI. In the Figure 6, we can see concept images of a music studio with the help of Co-pilot (Figure 6).

This is the process of the class. You can find the summary of the process in the table on the next page. The survey results will be explained in the next chapter.

Results

In this chapter includes the results of two questionaries and observation of educator. Two questionnaires are distributed to the students during the course. The initial survey was before introducing the students to artificial intelligence applications. Surveys asked the students about their familiarity with the topic, the methodologies they used in relation to artificial intelligence, and their predictions for the technology's future. We administered the second survey after the course concluded. The objective of this poll was to assess how the course influenced students' perspectives on artificial intelligence.

The first survey results

- Their level of understanding of artificial intelligence

The definition of artificial intelligence was asked of students, and only 28% of students truly defined artificial intelligence. They think that artificial intelligence is used in areas like academic research, coding, smart homes and appliances, and 3D modeling.

- The methodologies the students used in relation to artificial intelligence.

Fifty seven percent of students used artificial intelligence in their academic studies. They mostly used it (28%) for their homework. Some of them used it in design ideation (19%). While some of them used it for image generation (19%), some of them used it for text generation for their design posters (10%). (See Figure 7 on the next page)

Figure 6. Concept interiors by AI tools

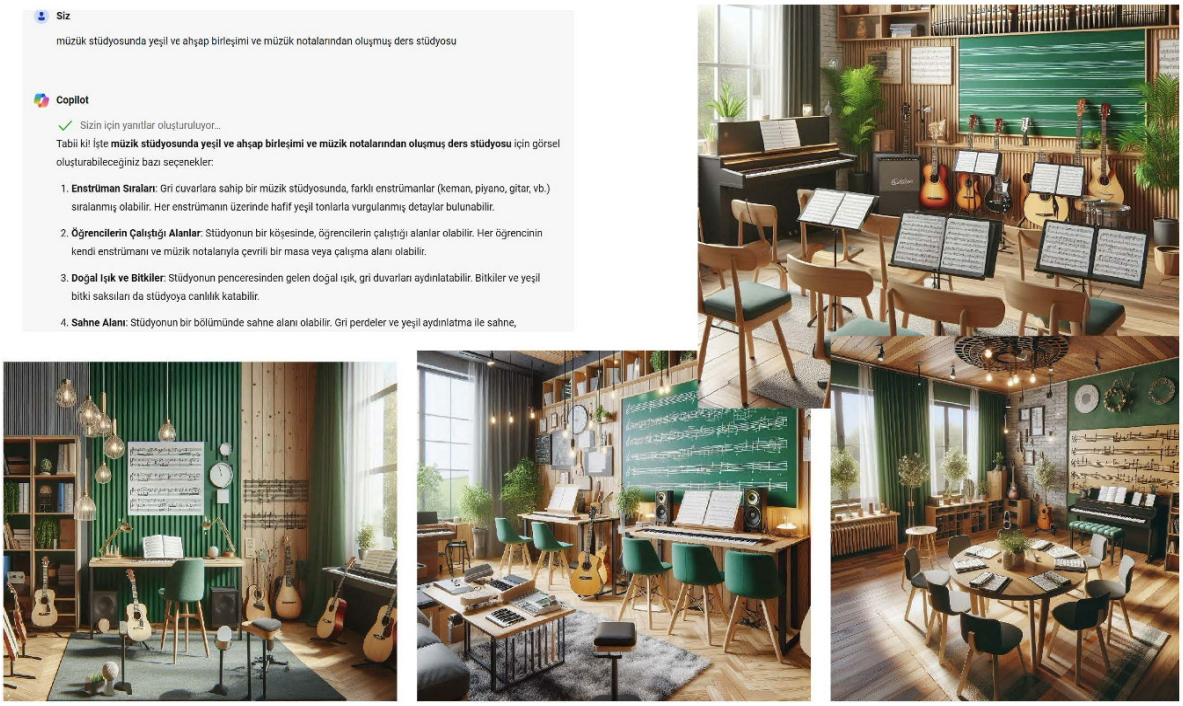

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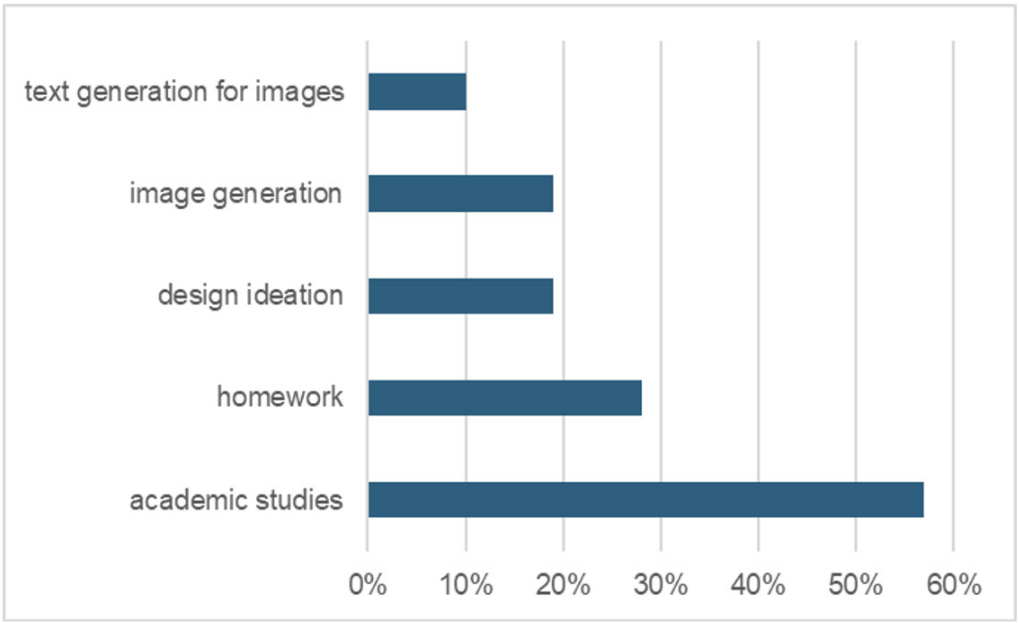
Table 1. The class process

Course Structure	**PHASE 1: EMPATHIZE**	**PHASE 2: DEFINE**	**PHASE 3: GENERATE**	**PHASE 4 & 5: PROTOTYPE / TEST**
PART 1: *(Traditional Process)*	- Persona -Service Safari (Observations & Interviews)	-Customer Experience Journey Map -Affinity Mapping	-Mood Board Creation -New Customer Experience Journey Map -Concept Renders	*Theoretical Phase Only* (Not applied in studio)
PART 2: *(AI-Integrated Methods)*	-AI-Assisted Personas (via Text-to-Text & Text-to-Image tools)	-AI-Assisted Journey Maps *(via Text-to-Text & Text-to-Image tools)*	-AI-Generated Concept Interiors -AI-Generated Mood Boards - AI-Assisted User Experience Maps *(via Text-to-Image and Text-to-Text tools)*	*Theoretical Phase Only* (Not applied in studio)

Source: Not specified

Figure 7. Usage of AI



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Forty eight percent of students express discomfort with utilizing AI technologies for their projects, while 67% of students believe they are not effectively utilizing AI tools. They have concerns regarding the utilization of AI tools in their studies, such as skepticism towards the accuracy of the information provided to students, the limited scope of information offered, ethical concerns surrounding the use of AI tools, and the absence of emotional engagement in their design.

- Their predictions for the technology's future

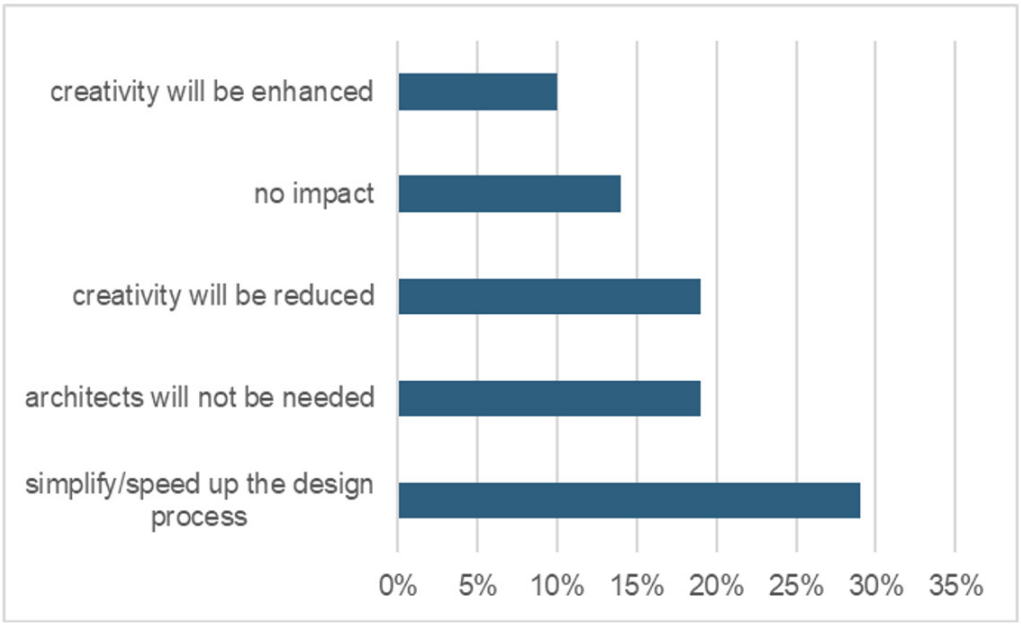
The first question about the future prospects of the students is about AI in design education. Sixty two percent of students think that AI tools can improve design education, while 29 % of students think the opposite. Here are some positive and negative prospects that students wrote about in the survey. Negative thoughts: "AI tools will make everything easier, but they will not affect the learning process." (24%) "They make students lazier, and they can forget everything easier." (14%) "Because of the limited information, AI tools can limit students' research." "It is not a reliable source and feeds on both true and false information." "It can be dangerous; people will not be able to control it." "It can produce derivative design works." "Design and art-related tasks require human participation in their creation." Positive thoughts: "Artificial intelligence has the ability to enhance traditional methods of learning." "AI tools continuously enhance their capabilities." "It enables us to examine information from many viewpoints and perceive diverse concepts".

The second question is about students' anticipations of the impacts of AI applications on the architecture profession in the future. Twenty nine percent of students believe it will simplify/speed up the design process. Nineteen percent of them think that architects will not be needed. Nineteen percent of them anticipate that the degree of creativity will be reduced, resulting in uniformity of production. Fourteen percent of them think that there will be no impact, 10% of them believe that AI tools enhance creativity. (Figure 8)

The third question is if they believe that AI will change traditional ways of working in architectural design. If that is the case, provide a detailed explanation. Seventy six percent of students think that AI tools will improve the traditional ways of doing things in architecture, while 19% of them think the opposite. "The design process will be faster." (24%) "It will have implications for the notion of originality." (10%) "It will help designers with visualizations and calculations." (10%).

Lastly, 76% of them think that they will use AI tools in their design processes in the future.

Figure 8. The first anticipations of AI in architecture



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The second survey result

The purpose of the second survey was to monitor how students' perspectives on AI tools changed after using them in class and to learn their views on the future of AI technology after using AI tools in a certain structure. In addition, they were asked to evaluate the course process.

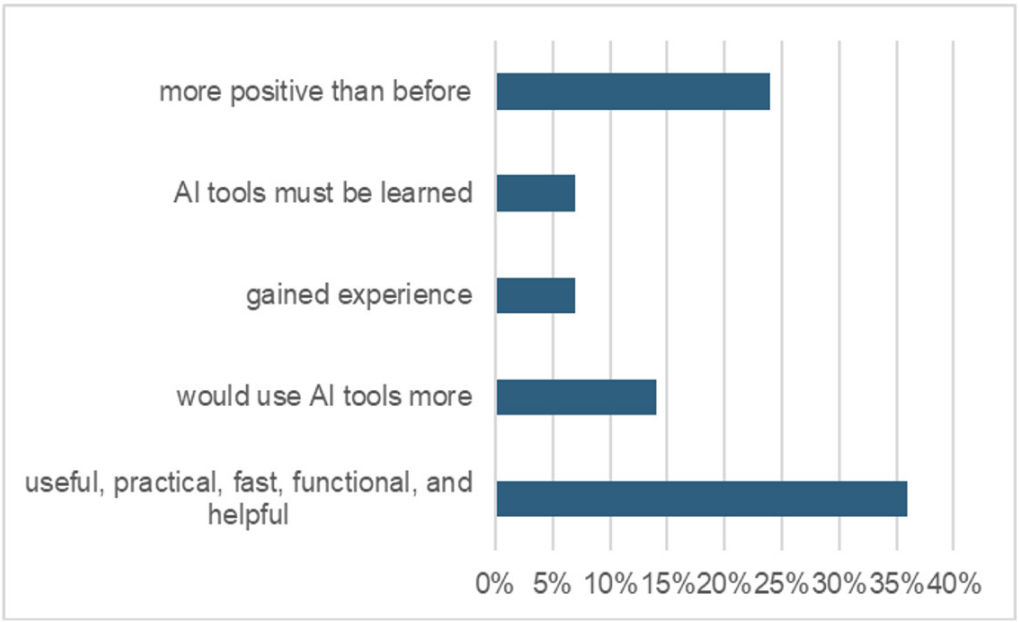
The first question: How has students' perspective on artificial intelligence (AI) changed after its utilization in this class? Thirty six percent of the students define AI with words like useful, practical, fast, functional, and helpful. 24% of the students are more positive about AI than before the class. Fourteen percent of them indicated that they would use AI tools more. Seven percent of them thought that they had gained experience, and 7% of them found that AI tools must be learned. (Figure 9) The second question is, "Has using artificial intelligence (AI) tools met your expectations? Why or why not?". Seventy six percent of students marked yes. "They find it easy and fast". (18%). "It is good at visualization." (6%). "The tools helped me and gave me ideas when I was stuck in the design process. However, it is inadequate for the whole design process. It cannot generate practical solutions for technical details like creating plans." (6%). "AI tools sometimes cannot understand the prompts that we write and get confused." (6%).

The third question is "What aspects of AI did you find most useful in your learning experience?". Thirty three percent of them think that artificial intelligence has facilitated the generation of more ideas and concepts in their work. Thirty three percent of them indicated that AI made the process faster. Eighteen percent of them find it very helpful in the visualization process.

The fourth question is, "Will you use the information you learned about AI in the future? and how?" All of the students indicated that they would use AI tools in the future. Thirty six percent of the students foresee that they will use AI tools in the beginning of the design process to have inspiration. Thirty percent of them also indicated that they will use AI in the beginning for the research phase. While only 6% of them asserted that they will use AI tools in later phases of the design process.

The fifth question is, "How do you think AI applications will change the architecture profession in the future?" Thirty six percent of the students anticipated that the design process would be easier and faster. Thirty eight percent of them add that more design ideas will be produced in a short time period. Fifteen percent of them predicted that visualization would be quicker and easier. Eighty eight percent of students marked that they will use AI tools in their future architecture practice.

Figure 9. The last perspectives on AI



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Educator's observations

Despite initial signs of caution regarding AI applications, nearly all students had previously incorporated AI into their assignments and projects. According to survey responses, students reported using AI tools to generate text and images for their academic work prior to the course, although they expressed dissatisfaction with the results.

Following a lecture on artificial intelligence, students applied "text-to-text" and "text-to-image" AI technologies to create visual representations of design tools such as Persona, MoodBoard, and Customer Journey. For instance, during persona creation, students used DALL-E to produce visual depictions of personas, while ChatGPT was employed to generate persona narratives. They did not utilize specialized AI based design software (Although there are AI tools specifically designed for design methodologies such as customer journey mapping and mood board creation) due to language barriers and a lack of prior exposure to these tools. This limitation, however, offered the opportunity to evaluate students' understanding of specific design methods through their use of more accessible AI tools.

In the course's final exam, each student was required to independently replicate all design processes using AI tools under the instructor's supervision. This setup allowed for direct observation of both the generated visuals and the students' workflow. The survey results brought up some problems, like the fact that AI sometimes got the instructions wrong and made outputs that were more and more similar over time, showing that AI can't always come up with new results.

The instructor identified opportunities for improving the course structure. One recommendation was to extend the coverage of user-centered design methodologies before introducing AI tools. We could then introduce AI applications in the final three weeks, mandating that students use AI tools exclusively for all design tasks during that period. Alternatively, we could integrate AI tools into each phase of the user-centered design curriculum from the outset, offering a more comprehensive experience. This adjustment is under consideration for the next terms.

It is anticipated that, prior to the study that data gathered through user-centered research methodologies would enhance students' ability to craft effective prompts. However, this benefit was not observed during the course. Future surveys may include questions on this aspect to gain further insights.

Conclusion

The integration of artificial intelligence into both our lives and design disciplines is rapidly progressing. This progress is leading both designers and academics/educators to pay closer attention to this issue. Rather than viewing a newly developing technology as an enemy to be avoided, it's a more appropriate approach for a designer/researcher to view it as a tool that will make our work easier and to consider how we can use it more efficiently. This study highlights this significant shift in design education by having architecture students use text-to-image AI tools within the context of a user-centered design process and examining their initial perceptions and subsequent attitude changes. Initially, students held a more reserved attitude toward AI technologies due to their concerns about their reliability, ethical implications, and potential negative impact on future job opportunities. This cautious attitude of students is, in fact, one that anyone can develop toward a burgeoning technological change.

However, the conscious, guided, and practical integration of AI has significantly changed students' perspectives for the better. In the post-course survey, students described AI tools as "useful," "practical," and "functional." This demonstrates that students have largely embraced GAI tools. These identified advantages are consistent with existing literature. Students noted that the use of AI accelerated the ideation and concept generation processes. Various design ideas were generated more easily and quickly, especially during the initial research and inspiration stages. Improved visualization allowed for more effective presentation of initial ideas and concepts. In addition, this study introduced future architects to a new hybrid set of competencies. This set, combined with user-centered design logic and text-to-image and text-to-text AI tools, offers a different creative thinking process.

Despite their many benefits, students also mentioned several drawbacks of AI tools. Students noted that AI tools fail to correctly interpret complex or nuanced commands (prompts) and sometimes produce "random" or "nonsensical" results. Additionally, the inability of existing

text-to-visual models to provide practical and reliable solutions for technical design details such as architectural plans and structural elements was considered a significant limitation. These limitations support the conclusion that AI is most effective in the preliminary and conceptual phases of the design process as a robust tool for ideation and visualization, rather than as a substitute for human expertise.

While it was hypothesized that user-centered research would improve prompt writing skills, this benefit has not been observable. This suggests that more explicit instruction is needed to develop verbal creativity and specific prompt modifiers to unlock the full potential of Generative Artificial Intelligence (GAI).

Future studies could introduce instructor-controlled AI use and AI tools later in the course, rather than before the second half of it. These modifications would allow students to learn more about the user-centered design process by doing, leading to more effective prompt writing. Furthermore, students could be provided with more comprehensive training in prompt writing, even in English.

Ultimately, this study confirms the strategic value of incorporating AI into architectural design education. It confirms that hands-on experience transforms student perception from skepticism to practical adoption, effectively preparing them to engage with the technological and social dimensions of the evolving architectural profession. The future of architectural education lies not only in teaching students to use these powerful tools but also in teaching them to critically manage their outputs and understand their limitations, maximizing human creativity and domain knowledge in a new AI-enriched design environment.

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