JURNAL TEKNIK
Volume 22, No. 2, Desember 2024
P-ISSN : 1693-6191 E-ISSN : 2715-7660 DOI : https://doi.org/10.37031/jt.v22i2.530

Architecture Students' Perception of AI in Academic Project Resolution

[1]Ulfaizah Sahril Nurfadhilah, [2]Wahyu Saputra

[1]Universitas Negeri Makassar, Daeng Tata Street, Indonesia
[2]Universitas Negeri Gorontalo, Prof. Ing. B.J. Habibie Street , Indonesia
e-mail:wahyusaputra@ung.ac.id

Abstrak

Penelitian ini bertujuan untuk mengkaji persepsi mahasiswa arsitektur terhadap peran kecerdasan buatan (AI) dalam mendukung penyelesaian tugas akademik, mencakup tugas-tugas berbasis teks hingga proses desain. Data dikumpulkan melalui survei daring menggunakan Google Forms dengan pertanyaan semi-terbuka dan tertutup, yang melibatkan 289 mahasiswa arsitektur sarjana dari enam universitas di Pulau Sulawesi. Analisis data dilakukan menggunakan statistik deskriptif dan uji Chi-Square dengan SPSS versi 26. Temuan menunjukkan bahwa AI diterima dengan baik oleh mahasiswa arsitektur, meskipun pemahaman mereka terhadap teknologi ini terbatas, yang menyoroti perlunya peningkatan pelatihan AI dan kursus pendidikan di institusi akademik. Saat ini, AI sebagian besar digunakan untuk tugas-tugas non-desain, namun, terdapat potensi besar untuk aplikasi AI dalam proses desain. Alat-alat ini dapat meningkatkan kreativitas mahasiswa dengan memfasilitasi brainstorming dan memberikan inspirasi. Implementasi AI yang seimbang sangat penting untuk mengurangi kemungkinan dampak negatif pada orisinalitas dan kredibilitas.Penelitian ini menekankan pentingnya pengembangan teknologi AI yang lebih relevan dengan kebutuhan pendidikan arsitektur serta pelatihan yang terarah untuk memaksimalkan manfaat AI dalam konteks akademik dan profesional.

Kata kunci: Kecerdasan Buatan, Persepsi Mahasiswa Arsitektur, Tugas Kuliah

Abstract

This study aims to examine architecture students' perceptions of the role of artificial intelligence (AI) in supporting the completion of academic tasks, ranging from text-based assignments to design processes. Data were collected through an online survey using Google Forms with semi-open and closed-ended questions, involving 289 undergraduate architecture students from six universities in Sulawesi Island. Data analysis was conducted using descriptive statistics and Chi-Square tests with SPSS version 26. The findings indicate that AI is well-received by architecture students, despite their limited understanding of the technology, highlighting the need for enhanced AI training and educational courses in academic institutions. Currently, AI is primarily used for non-design tasks; however, there is significant potential for AI applications in design processes. These tools can enhance students' creativity by facilitating brainstorming and providing inspiration. A balanced implementation of AI is crucial to mitigate potential negative impacts on originality and credibility. This study underscores the importance of developing AI technologies that are more relevant to the needs of architectural education and targeted training to maximize the benefits of AI in both academic and professional contexts.

Keywords*: Artificial Intelligence, Architecture Students' Perception, Academic Projects*

Diterima : Juli 2024
Disetujui : Oktober 2024
Dipublikasi : Desember 2024

Introduction

Innovations in artificial intelligence (AI) have significantly transformed various fields, including architecture, by revolutionizing professional design practices and architectural education (Bölek et al., 2023; Çelik, 2023). AI systems, characterized by

their ability to simulate human intelligence, process vast amounts of data accurately, extract knowledge, and apply it to specific tasks, have introduced unparalleled efficiency and precision in architecture (Haenlein & Kaplan, 2019). Over the years, architectural design tools have evolved from traditional manual drafting to advanced computational systems, culminating in the emergence of AI-driven parametric and computational design approaches (Chaillou, 2021; Cudzik & Radziszewski, 2018). These developments reflect a broader shift towards integrating AI into creative and technical workflows in architecture.

AI technologies such as Veras AI, MidJourney, ArchiGan, Dall-E, and Stable Diffusion have become integral in professional architectural design. These tools optimize complex design problems, enhance geometric and spatial efficiency, and reduce resource consumption while maintaining creativity (Bölek et al., 2023; Dunaevskiy et al., 2022). Additionally, AI has been instrumental in analyzing structural loads, planning pedestrian traffic, and generating novel architectural forms previously considered unattainable (Borglund, 2022; Cudzik & Radziszewski, 2018). Such tools enable designers to produce unique, efficient, and high-quality outcomes, which often surpass traditional methods in terms of both creativity and efficiency (Nasrullah et al., 2023; Reffat, 2002). For example, MidJourney's generative capabilities allow for the creation of innovative design concepts (Jaruga-Rozdolska, 2022), while ArchiGan has been shown to provide significant contributions to the architectural design process by enabling the cross-application of AI in generating adaptive design solutions (Chaillou, 2021). Moreover, AI applications in construction have reduced errors, improved workplace safety, and streamlined operations (Amer, 2023).

Despite these advancements in professional practice, the integration of AI into architectural education remains inconsistent. While AI offers transformative potential as a pedagogical tool, its adoption in academic contexts has been uneven, often limited to experimental evaluations of AI's role in optimizing specific design tasks (Cudzik et al., 2024; Sadek & Mohamed, 2023). For instance, studies highlight the potential of AI-based tools like Chat GPT, Scholarcy, and Quillbot in supporting textual and research-related academic tasks, yet their integration into architectural education frameworks remains underexplored (F. J. Pinzolits, 2023; Setiawan & Luthfiyani, 2023) . Moreover, tools such as Stable Diffusion and MidJourney, while valuable for generating creative design outputs, are underutilized in academic settings due to limited exposure and training for students (Chen et al., 2023; Jaruga-Rozdolska, 2022). This disparity reflects broader challenges, including limited awareness and the need for tailored educational strategies to integrate AI effectively.

Furthermore, challenges in adopting AI are exacerbated by concerns over its risks and limitations. For example, Desouki et al. (2023) and Krausková & Pifko (2021)identify significant risks, including ethical considerations, dependency on automation, and potential loss of creativity. These risks underscore the importance of a balanced approach to AI adoption, where educators and students are equipped with critical thinking skills to navigate both the opportunities and pitfalls of AI in architectural practice. Additionally, studies such as Harapan et al. (2021) emphasize the role of AI in driving innovation and efficiency, which aligns with the need to explore how such technologies can be adapted to support academic and professional growth in architecture.

This study seeks to address these gaps by exploring architecture students' perceptions of AI technology, focusing on its application across diverse academic tasks, including textual references, scientific research, architectural design, and graphic design. By examining the most utilized AI tools for specific academic purposes, this research aims to identify their perceived benefits and challenges. The findings are intended to provide actionable insights for optimizing the integration of AI into architectural education. Through better alignment of AI tools with academic needs, educators and curriculum developers can enhance students' learning experiences, promote efficiency, and support academic success.

Additionally, this research emphasizes the potential of AI not only in design-related tasks but also in non-design activities, offering a comprehensive understanding of its role in architectural education. For example, the adoption of tools like ArchiGan, which bridges design creativity and computational efficiency (Chaillou, 2021), and Chat GPT, which supports research and textual analysis (Setiawan & Luthfiyani, 2023), demonstrates how AI can enhance the breadth of architectural education. By identifying students' preferences, challenges, and the impact of AI on their academic work, this research contributes to the development of AI-based curricula tailored to the unique demands of architectural education. Ultimately, it lays the groundwork for creating effective teaching strategies, ensuring that AI technologies are utilized to their fullest potential, and preparing future architects to meet the demands of an AI-integrated professional landscape.

Method

This study employed a quantitative survey approach to examine architecture students' knowledge, experiences, and perceptions of AI technology. A survey method was chosen to systematically capture trends and behaviors among respondents relevant

to the research objectives. Data were collected through an online questionnaire distributed via Google Forms on social media platforms (WhatsApp, Facebook, Instagram) from June 8 to October 17, 2023. The questionnaire included semi-open and closed questions.

Respondents are selected using purposive sampling, ensuring relevance to the study's focus. The inclusion criteria were: 1) active architecture students on Sulawesi Island, Indonesia, 2) undergraduate (S1) students, and 3) actively engaged in their studies. A total of 289 respondents met these criteria. This sample size aligns with recommended ranges for survey research (30–500 respondents) to ensure statistical reliability (Memon et al., 2020).

The majority of respondents were aged 18–26 years (mean: 20.5), with an almost equal gender distribution (50.2% male, 49.8% female). Respondents were drawn from six universities: University Muslim Indonesia, Universitas Hasanuddin, Universitas Negeri Makassar, Universitas Negeri Gorontalo, Universitas Negeri Manado, and Universitas Tadulako. Most respondents were in their 2nd to 14th semesters, predominantly in the 3rd semester (33.9%), with interests spanning architectural design (45.0%), interior design (25.6%), and other fields such as theory, construction, and urban design.

The study focused on three main areas:

1. Knowledge of AI technology, including types of AI known.
2. Experience in using AI for academic tasks categorized as textual references (P1), Research/Scientific Inquiry (P2), architectural design processes (P3), and graphic design (P4).
3. Perceptions of AI's sustainability in architectural education and professional practice.

The collected data were analyzed descriptively using SPSS 26. Semi-open and closed responses were categorized into frequencies and percentages. To assess significant differences in observed frequencies, a one-sample chi-square test was applied. Cross-tabulation was also conducted to explore relationships between variables. This approach allowed for a detailed understanding of respondents' responses and their variations across different research focus areas.

Results dan Discuss

1. Knowledge and Utilization of Artificial Intelligence

The study reveals significant differences in architecture students' knowledge of artificial intelligence (AI). A total of 69.6% of students reported being aware of AI

technology, while 30.4% admitted to being unaware of its existence (Table 2). Despite this, the majority of architecture students demonstrated awareness of AI. Consistent with prior research, awareness gaps among architecture students regarding AI tools for design remain evident (Nasrullah et al., 2023).

Table 1. Knowledge and Utilization of Artificial Intelligence in General

Knowledge and Utilization of AI	Responses	F (%)	N	Asymp.Sig.<.005
Knowledge related to AI	Unaware	88 (30.4)	289	0,000
	Yes, aware	201 (69.6)		
Utilization of AI in Completing College Assignments	Never used	47 (23.4)	201	0.000
	Yes, have used	154 (76.6)		

Among the 201 participants aware of AI, a total of 252 responses were recorded about the types of AI technologies they recognized (Table 3). Chat GPT emerged as the most mentioned AI tool (53.6%), recognized for its capabilities in conversation-based assistance, language translation, and text-based functions. Other tools cited included Humata AI (a PDF assistant for understanding journal content) and Perplexity AI (a search engine with chatbot functionality). Design-related AI tools like Midjourney AI and Veras AI were also noted, but text-based AI tools dominated the responses. Interestingly, some participants conflated AI with other technologies, such as virtual reality (2%), social media (1.2%), auto-correct (0.8%), and Building Information Modeling (0.8%).

Table 2. Architecture Students' Knowledge of Various Types of AI Technologies

No	Each Presentation Based on AI Types	Various Types of AI
1	53,6%	Chat GPT
2	3,6%	Asisten Virtual, Humata AI, dan Perplexity AI
3	2,9%	Virtual Reality, Midjourney Bot
4	1,6%	Veras AI
5	1,2%	Dall-e, AI Search Engines, Media sosial, dan Quillbot.
6	0,8%	Notion AI, Adobe Firefly, AI Render, Anthiago, Auto Correct, BIM (Building Information Modeling), Bing AI, DeepL, Grammarly, Microsoft Bing, robot, Bard, Ilustrasi Voice Assistant.
7	0,4%	Ryter AI, AI Builder, AI Chatting, Alexa, Alpha Go, Arco AI, Asisten buatan, Autodraw, Bots, Cerviray AI (Pyridam Farma), Character AI, Chat PDF, Coohom AI, Durable, Explain Paper, Genie AI, Google Assistant, Instan, Machine learning, Maket AI, Narrow AI, Nightmare AI, Nuance, Paraphraser io, Photoshop Beta, Prome AI, Rerender AI, Siri, Social Media Algorithms, Software parametric, Sophia, Stable Diffusion, Teknologi Presenter AI, Tesla Autopilot, Tome, Tutor AI, Verses AI, dan You. Com

Regarding AI usage, 76.6% of students aware of AI technology had applied it in completing academic tasks, while 23.4% admitted to never using it. This aligns with prior studies showing increasing adoption of AI across disciplines (Popenici & Kerr, 2017; Selwyn, 2019). However, differences in adoption rates remain, as some students may lack perceived need or face barriers to adoption. Factors such as concerns about

plagiarism accusations (Playfoot et al., 2024), institutional pressure to uphold academic integrity (Stone, 2023), and preferences for traditional methods (Hardi et al., 2022) hinder engagement. Additionally, variations in perceptions of AI's benefits and drawbacks (Al-tkhayneh et al., 2023) influence usage decisions.

Overall, the findings indicate that while AI is widely recognized and applied by many architecture students, challenges in understanding and adopting the technology persist. This highlights the need for more comprehensive education on AI's applications and implications in academic settings.

2. Utilization of Artificial Intelligence by Type of Academic Projects

This section examines architecture students' utilization of AI technology across four types of academic tasks: written text references/theory (P1), scientific research (P2), architectural design process (P3), and graphic design (P4). Based on the responses of 154 participants (Table 4), significant differences in AI usage were observed depending on task type. Most participants reported using AI for P1 (83.1%) and P2 (59.7%), while fewer utilized AI for P3 (22.7%) and P4 (23.4%).

These findings indicate a higher adoption of AI for text-based tasks compared to design-oriented tasks. The dominance of Chat GPT as the most widely used tool reflects a trend where students rely heavily on AI for text-based tasks requiring information retrieval or linguistic analysis. In contrast, the lower utilization of AI for design tasks, such as architectural visualization, highlights challenges or a lack of understanding regarding design-specific AI tools, as identified by (Desouki et al., 2023). This underscores the need for training and the introduction of tools such as Autodraw or Pix2Shape, which are more relevant to design processes.

Table 3. Utilization of Artificial Intelligence by Type of Academic Projects

Utilization of Artificial Intelligence by Type of Task	f (%)		N	Asymp.Sig.<.005
	Yes	No		
P1	128 (83,1)	26 (16,9)	154 (100)	0.000
P2	92 (59,7)	62 (40,3)	154 (100)	0.016
P3	35 (22.7)	119 (77,3)	154 (100)	0.000
P4	36 (23.4)	118 (76,6)	154 (100)	0.000

AI technology usage varies across task types (Table 5). For P1, 83.1% of students used AI, with Chat GPT/OpenAI (66.3%) as the primary tool, followed by Scholarcy (10.9%) and Quilbot (8.0%). In P2, Chat GPT/OpenAI (61.4%) remained dominant, with Scholarcy (10.8%) and Quilbot (7.2%) also playing significant roles. For design tasks, Autodraw emerged as the leading tool, used by 42% of students for P3

and 48.6% for P4. Other notable tools include Pix2Shape (11%), Python for Architect (11%), and Canva (21.6%), though Canva is not an AI-based technology.

These findings align with prior research showing limited AI adoption for architectural design tasks. For example, 91% of Egyptian practitioners had not personally used AI tools in architecture despite awareness of these technologies (Desouki et al., 2023). This trend suggests that while AI is widely used for text-based academic activities, its application in design tasks remains nascent.

Table 4. Utilization of Artificial Inteligence by Type of Academic Projects

Type of Task	N (%)	Highest Percentage (%) of Types of AI Technology Usage Based on Task Type		
		1	2	3
P1	128 (83,1)	Chat GPT/Openai (66,3%)	Scholarcy (10,9%)	Quilbot (8,0%)
P2	92 (59,7)	Chat GPT/Openai (61,4%)	Scholarcy (10,8%)	Quilbot (7,2%)
P3	35 (22.7)	Autodraw (42%)	PIX2 Shape (11%)	Pyton for Architect (11%)
P4	36 (23.4)	Autodraw (48,6%)	Canva (21,6%)	Booth AI (10,8 %)

Chat GPT/OpenAI is widely adopted due to its versatility, including functions like text-based conversation, language translation, productivity enhancement, and personalized learning (Suharmawan, 2024). It also supports scholarly writing, from drafting prompts to refining final outputs (Setiawan & Luthfiyani, 2023). Other tools, such as Scholarcy for summarizing papers and Quilbot for paraphrasing, further demonstrate the utility of AI in academic contexts (F. J. Pinzolits, 2023). For design, tools like Autodraw, Pix2Pix, and Python for Architect are prominent, while graphic design relies on AI tools like Booth AI to enhance image quality.

The findings highlight misconceptions among students, such as the use of Canva or general design tools misidentified as AI technologies. Nonetheless, architecture students tend to use various AI tools tailored to specific academic needs rather than relying on a single function. This reflects the broader trend of AI diversification in higher education (Aoun, 2017).

3. Frequency of Utilization of Artificial Inteligence by Type of Task

The research findings reveal varying frequencies of AI utilization among architecture students across different academic tasks (Figure 1). Out of 154 participants, the distribution of AI usage by task type indicates that Textual Reference (Theory) involves the highest number of users (128 participants), followed by Research/Scientific Inquiry (92 participants), Graphic Design (36 participants), and Architectural Design Process (35 participants).

For Textual Reference (Theory) tasks, usage is nearly evenly split between

occasional (36%) and frequent (35%), with rare usage ranking third. In Research/Scientific Inquiry, frequent usage dominates (37%), closely followed by occasional usage (35%), while rare usage is less significant. Tasks involving the Architectural Design Process see occasional usage as the majority (43%), followed by rare usage (40%) and minimal frequent usage (14%). Similarly, Graphic Design tasks are primarily associated with occasional usage (50%), while rare usage (22%) and frequent usage (14%) are less prominent.

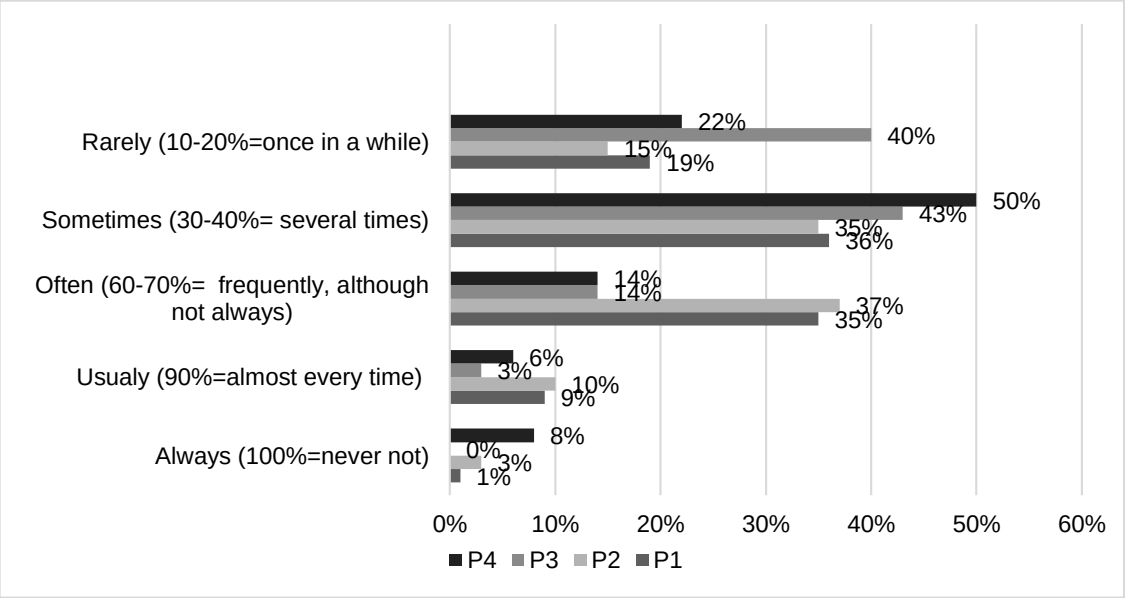

Figure 1. Frequency of Utilization of Artificial Inteligence by Type of Academic Projects

These findings highlight that while AI is adopted across a range of tasks, its usage frequency varies by task type. Text-based tasks such as Textual Reference (Theory) and Research/Scientific Inquiry show higher frequent usage compared to design-oriented tasks, such as the Architectural Design Process and Graphic Design, where occasional and rare usage dominate. Overall, architecture students tend to use AI sporadically, with the frequency of usage influenced by the specific demands and contexts of each task.

4. Reasons of Architecture Students in Utilizing AI to Complete Projects

From 154 participants, 252 responses highlighted key motivations for architecture students' use of AI (Figure 2). The primary reason, cited by 44% of respondents, was overcoming difficulties in finding references, demonstrating AI's role as a vital tool in addressing information barriers. Additionally, 24% used AI under deadline pressure, emphasizing its effectiveness in enhancing productivity during time constraints, while 23% relied on AI for idea generation, showcasing its potential to stimulate creativity. A smaller percentage used AI in relaxed situations (5%) or as part of daily routines (2%),

reflecting varied but less critical motivations.

Task-specific analysis (Table 6) revealed that text-based tasks (P1, P2) are predominantly driven by time limitations, whereas design tasks (P3, P4) are motivated by difficulties in generating ideas. Despite these distinctions, the overarching pattern indicates that the most frequent use of AI aligns with the challenges of accessing information, meeting tight deadlines, and overcoming creative blocks. The slight percentage differences between secondary motivations (e.g., deadlines and lack of ideas) underscore the consistent reliance on AI across task types.

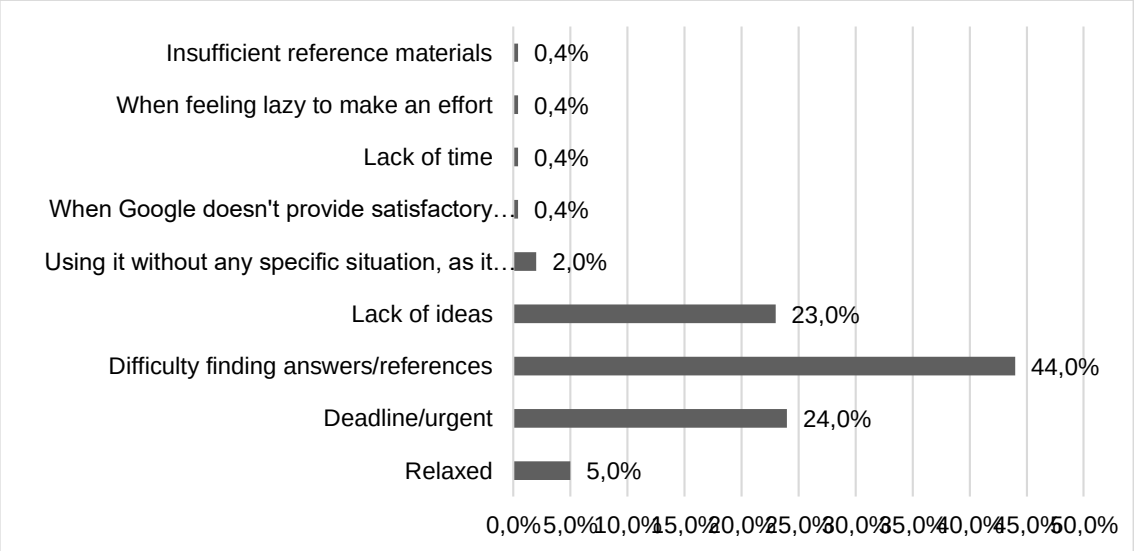

Figure 2. Reasons of Architecture Students in Utilizing AI to Complete Academic Projects

Table 5. Cross-Tabulation Utilization of Artificial Inteligence by Type of Academic Projects

Results	P1		P2		P3		P4	
	f	%	f	%	f	%	f	%
Relaxed	11	5	8	8	7	13	6	11
Deadline/urgent	58	27	26	25	12	22	11	20
Difficulty finding answers/references	92	42	43	41	19	35	19	35
Lack of ideas	47	22	24	23	15	27	14	25
Using it without any specific situation, as it has become my daily necessity	5	2	5	5	2	4	5	9
When Google doesn't provide satisfactory answers	1	0,5	0	0	0	0	0	0
Lack of time	1	0,5	0	0	0	0	0	0
When feeling lazy to make an effort	1	0,5	0	0	0	0	0	0
Insufficient reference materials	1	0,5	0	0	0	0	0	0
n	**217**	**100**	**106**	**100**	**55**	**100**	**55**	**100**

These findings underline the critical role of AI as a problem-solving tool in architectural education, particularly in alleviating specific challenges faced by students. The frequency of AI usage further reflects varying degrees of dependency, where frequent users encounter persistent challenges, while sporadic users face situational needs. Overall, this suggests that AI is not only a complementary tool but also a pivotal

enabler in navigating academic constraints, especially in environments demanding high efficiency and creativity.

5. Perceptions of the Usefulness of AI Based on the Experience of Using AI in Completing Academic Projects

The findings reveal varied experiences among architecture students in utilizing AI to complete academic tasks, with a total of 346 responses from 154 participants. The majority reported that AI enhanced efficiency (44%), while others noted quick task completion (18%) and ease of use (16%). Additionally, 9% indicated that AI helped them make more informed decisions during the design process, reflecting its potential in decision-making. However, 8% described their experience as ordinary, 5% felt it enhanced creativity, and a small portion (0.3%) reported that AI use was more difficult or yielded negligible impact (Figure 3).

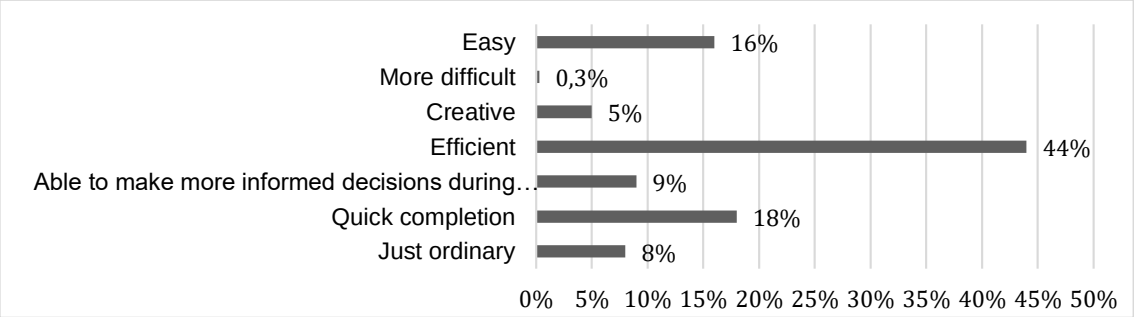

Figure 3. Perceptions of the Usefulness of AI Based on the Experience os Using AI in Completing Academic Projects

When analyzed by task type (P1, P2, P3, P4), students generally perceived AI as beneficial across various tasks, particularly in improving efficiency (23–30%) and ease of task completion (22–24%) (Table 7). For design-related tasks (P3), 19% of students highlighted the value of AI in making more informed design decisions. Despite these benefits, the impact of AI on creativity remains limited, as relatively few students felt it enhanced their creative output.

Table 6. Cross-Tabulation of Perceptions by Task Type of the Usefulness of AI Based on the Experience of Using AI in Completing Academic Projects"

Results	**P1**		**P2**		**P3**		**P4**	
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Just ordinary	23	11	7	6	6	9	4	6
Quick completion	51	24	22	20	10	14	15	22
Able to make more informed decisions during the design process	26	12	15	14	13	19	11	16
Efficient	51	24	33	30	16	23	16	23
Creative	14	7	9	8	8	12	8	12
More difficult	1	0,5	1	1	1	1	1	1
Easy	48	22	24	22	15	22	14	20
n	**214**	**100**	**111**	**100**	**69**	**100**	**69**	**100**

These variations may be influenced by task complexity and students' motivations for using AI, such as overcoming deadlines, finding solutions, or addressing knowledge gaps. Prior studies support these findings, indicating that AI can save time and improve efficiency in tasks requiring automation and information processing (Holmes et al., 2019; Luckin & Holmes, 2016). However, its application to creative tasks remains challenging, aligning with research suggesting that AI struggles with intuition and aesthetics (McNeese et al., 2018).

Moreover, students reported that AI supports decision-making in architectural design by analyzing data, identifying solutions, and evaluating options, consistent with findings that AI enhances design-related decisions (Fitriyanto & Zakariya, 2023). However, while AI provides substantial benefits for tasks involving information processing, it is insufficient for work requiring human intuition and creativity, particularly in design-related contexts (Dunaevskiy et al., 2022). These results suggest that while architecture students generally view AI as an efficient tool for academic tasks, its role in supporting creative and complex problem-solving requires further development.

6. Perceptions of Architecture Students on the Quality Improvement of Assignments Utilizing AI

As artificial intelligence (AI) becomes increasingly integrated into academic settings, understanding its perceived impact on task quality is essential. The findings reveal balanced perceptions among architecture students regarding the impact of AI on task quality, with 49% reporting improvements and 51% indicating no significant changes (Table 8). Statistical analysis showed no significant difference between these groups (Asymp. Sig. = 0.872), suggesting evenly distributed perceptions of AI's effectiveness.

Table 7. Perception of Architecture Students on the Quality Improvement of Assignments Utilizing AI

Perception	f (%)		n	Asymp. Sig. <.005
	Yes	No		
Experiencing an improvement in the quality of academic projects when using AI assistance compared to without using AI	76 (49)	78 (51)	154 (100)	0.872

When analyzed by task type, AI was found to be more effective for graphic design tasks (78%) and research-based assignments (68%) compared to theoretical (51%) or textual tasks (32%) (Table 9). These results indicate that the perceived effectiveness of AI depends on the nature of the task, with creative and analytical tasks benefiting more from AI assistance.

These findings highlight that factors such as task type, complexity, and

proficiency with AI tools significantly influence students' perceptions. Tailoring AI tools to specific academic applications and providing proper training are essential to maximize their potential in improving academic outcomes.

Table 8. Cross-Tabulation of Architecture Students' Perception of Improved Quality of Assignments Using AI by type of academic project

Type of Task	Experiencing an improvement in the quality of academic projects when using AI assistance compared to without using AI				
	No		Yes		*n*
	f	%	f	%	
P1	63	49	65	51	128
P2	20	32	42	68	62
P3	11	31	24	69	35
P4	8	22	28	78	36

7. Perceptions of the Sustainability of Artificial Intelligence Utilization

Based on table 10, the majority of architecture students (79.9%) perceive AI as functioning adequately to meet their academic needs, while 20.1% feel otherwise. Furthermore, 72.1% of participants plan to continue utilizing AI in future architecture-related work, reflecting a positive outlook on the sustainability of this technology. However, 27.9% do not share this intention, indicating challenges in AI adoption, including dissatisfaction or mismatches with academic needs.

Table 9. Perception of the Sustainability of Artificial Intelligence Utilization

Perception	f (%)		N	Asymp. Sig. <.005
	Yes	No		
AI can function as it should for the needs of architecture students.	123 (79,9)	31 (20,1)	154	0.000
In the future, they will continue to utilize AI technology in tasks related to architecture	111 (72,1)	43 (27,9)	154	0.000

These findings indicate a generally positive acceptance of AI technology in architectural education, yet they also highlight the need for improvements to better align AI capabilities with student expectations. Addressing these challenges is crucial for fostering broader adoption of AI among architecture professionals in the future.

Conclusion

This study reveals the growing popularity of AI among architecture students, despite their limited knowledge. Educational institutions are encouraged to provide more training, seminars, and guidance on AI, as well as integrate specialized AI courses or modules into the architecture curriculum. Such efforts can enhance students' understanding of various AI technologies and their effective application in both academic and professional contexts.

Currently, AI usage is predominantly focused on non-design tasks, such as writing and information retrieval. However, there is significant potential for developing AI tools tailored to architectural and graphic design. These tools could support students' creativity by facilitating brainstorming, offering design inspiration through trend analysis, and generating diverse design variations. AI capable of understanding aesthetics and providing creative feedback could help students produce more innovative designs. Nonetheless, there is an ongoing tension between conventional methods, valued for their credibility and originality, and the adoption of AI technology in design-related tasks. For example, while traditional methods are often preferred for their perceived originality, tools like MidJourney or Autodraw can complement these approaches by offering novel inspiration.

This study contributes to existing literature by expanding the focus from design-specific AI applications to broader academic tasks, offering insights into how AI can address diverse challenges faced by architecture students. The integration of AI into architectural education presents both opportunities and challenges. While AI offers potential to replace certain traditional methods, it also raises concerns about diminishing individual creativity and the credibility of outcomes. A balanced approach is essential to mitigate these risks, promoting the thoughtful and ethical use of AI in education. This includes fostering critical thinking in AI usage, maintaining originality, and establishing ethical policies to ensure responsible integration of AI into architectural practice.

Overall, this study underscores the untapped potential of AI to support architecture students in completing academic tasks, particularly in creative and complex design processes. It also emphasizes the need for better alignment between AI technologies and the academic demands of architecture students to fully realize the benefits of this technology.

While this study offers valuable insights, it is important to acknowledge several limitations. First, the reliance on self-reported data introduces potential biases, as the findings are shaped by students' subjective perceptions and experiences. Second, the sample is limited to a specific demographic of architecture students, which may not comprehensively reflect the broader diversity of AI adoption across different educational or professional settings. Future studies could explore the effectiveness of tailored AI training modules in enhancing students’ creative output or investigate how specific AI tools impact long-term learning outcomes in architectural education.

To enhance the utilization of AI in design tasks, architectural education institutions can integrate practical training focused on AI-based design tools. Additionally, the development of project-based modules that combine design tasks with

AI technology can help students understand the potential benefits of AI in improving creativity and efficiency.

References

Al-tkhayneh, K., Alghazo, E., & Tahat, D. (2023). The Advantages and Disadvantages of Using Artificial Intelligence in Education. *Journal of Educational and Social Research*, *13*, 105. https://doi.org/10.36941/jesr-2023-0094

Amer, N. (2023). Architectural Design in The Light of AI Concepts and Applications. *MSA Engineering Journal*, *2*(2), 628–646. https://doi.org/10.21608/msaeng.2023.291906

Aoun, J. E. (2017). *Robot-Proof: Higher Education in the Age of Artificial* Intelligence. The MIT Press. https://doi.org/10.7551/mitpress/11456.001.0001

Bölek, B., Tutal, O., & Özbaşaran, H. (2023). A systematic review on artificial intelligence applications in architecture. *Journal of Design for Resilience in Architecture and Planning*, *4*(1), 91–104. https://doi.org/10.47818/drarch.2023.v4i1085

Borglund, C. (2022). *Artificial Intelligence in Architecture and its Impact on Design Creativity : A Study on how Artificial Intelligence Affect Creativity in the Design* Process (Issue 22464). KTH, Real Estate and Construction Management.

Çelik, T. (2023). The Role of Artificial Intelligence for The Architectural Plan Design: Automation in Decision-making. *Proceedings of the 2023 8th International Conference on Machine Learning Technologies*, 133–138. https://doi.org/10.1145/3589883.3589903

Chaillou, S. (2021). AI & Architecture – An Experimental Perspective. In *The Routledge Companion to Artificial Intelligence in Architecture* (1st Edition, pp. 420–441). Routledge.

Chen, J., Wang, D., Shao, Z., Zhang, X., Ruan, M., Li, H., & Li, J. (2023). Using Artificial Intelligence to Generate Master-Quality Architectural Designs from Text Descriptions. *Buildings*, *13*(9). https://doi.org/10.3390/buildings13092285

Cudzik, J., Nyka, L., & Szczepański, J. (2024). Artificial intelligence in architectural education - green campus development research. *Global Journal of Engineering* Education, *26*, 20–25.

Cudzik, J., & Radziszewski, K. (2018). *Artificial Intelligence Aided Architectural Design*.

Desouki, M., El-Haddad, T. A., & El-Boshey, B. (2023). Revolutionary Artificial Intelligence Architectural design solutions; is it an opportunity or a threat?

Mansoura Engineering *Journal*, *48*(6). https://doi.org/10.58491/2735-4202.3091

Dunaevskiy, E., Lisova, A. P., & Besedina, A. R. (2022). PROSPECTS FOR THE DEVELOPMENT OF THE USE OF ARTIFICIAL INTELLIGENCE IN DESIGN AND CONSTRUCTION. *Regional Problems of Architecture and Urban Planning*. https://api.semanticscholar.org/CorpusID:258965014

F. J. Pinzolits, R. (2023). AI in academia: An overview of selected tools and their areas of application. *MAP Education and Humanities*, *4*(1), 37–50. https://doi.org/10.53880/2744-2373.2023.4.37

Fitriyanto, D. A., & Zakariya, A. F. (2023). Evolusi Peran Arsitek di Era Artificial Intelligence dan Teknologi Berbasis Data. *Jurnal Arsitektur TERRACOTTA | No.1 |*, *5*(1), 23–29.

Haenlein, M., & Kaplan, A. (2019). A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence. *California Management Review*, *61*(4), 5–14. https://doi.org/10.1177/0008125619864925

Harapan, A., Indriani, D., Rizkiya, N., & Azbi, R. (2021). Artificial Intelligence in Architectural Design. *International Journal of Design (INJUDES)*, *1*(0). https://doi.org/10.34010/injudes.v1i1.4824

Hardi, R., Pee, A. N. C., Abdullah, M. H. L. Bin, Pitogo, V. A., Pribadi, A. S., & Rusdi, J. F. (2022). Academic Smart Chatbot to Support Emerging Artificial Intelligence Conversation. *2022 International Conference of Science and Information* Technology *in Smart Administration (ICSINTESA)*, 194–199. https://doi.org/10.1109/ICSINTESA56431.2022.10041632

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial Intelligence in Education. Promise and Implications for Teaching and Learning.*

Jaruga-Rozdolska, A. (2022). *Artificial intelligence as part of future practices in the architect's work: MidJourney generative tool as part of a process of creating an architectural form*. 95–104. https://doi.org/10.37190/arc220310

Krausková, V., & Pifko, H. (2021). Use of Artificial Intelligence in the Field of Sustainable Architecture: Current Knowledge. *Architecture Papers of the Faculty of Architecture and Design STU*, *26*(1), 20–29. https://doi.org/doi:10.2478/alfa-2021-0004

Luckin, R., & Holmes, W. (2016). *Intelligence Unleashed: An argument for AI in Education*.

Memon, M., Ting, H., Cheah, J.-H., Ramayah, T., Chuah, F., & Cham, T.-H. (2020). Sample Size for Survey Research: Review and Recommendations. *Journal of*

Applied *Structural Equation Modeling*, *4*, i–xx. https://doi.org/10.47263/JASEM.4(2)01

Nasrullah, A., Fais Giffari, M., Hidayat, T. S., Achmad, F. S. R., & Muhlis, M. F. M. (2023, June 26). Efektivitas Kecerdasan Buatan VerasAI sebagai Referensi Desain Fasad Mahasiswa Arsitektur. *Prosiding Seminar Nasional Dies Natalis Ke-62*. https://journal.unm.ac.id/index.php/Semnasdies62/index

Playfoot, D., Quigley, M., & Thomas, A. G. (2024). Hey ChatGPT, give me a title for a paper about degree apathy and student use of AI for assignment writing. *The* Internet *and Higher Education*, *62*, 100950. https://doi.org/https://doi.org/10.1016/j.iheduc.2024.100950

Popenici, S. A. D., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology* Enhanced *Learning*, *12*(1), 22. https://doi.org/10.1186/s41039-017-0062-8

Reffat, R. M. (2002). Utilization of Artificial Intelligence Concepts and Techniques for Enriching the Quality of Architectural Design Artifacts. *Proceedings of the International Conference in Information Systems*.

Sadek, M. R., & Mohamed, N. A. G. (2023). Artificial Intelligence as a pedagogical tool for architectural education: What does the empirical evidence tell us? *MSA Engineering Journal*, *2*(2), 133–148. https://doi.org/10.21608/msaeng.2023.291867

Selwyn, N. (2019). *Should robots replace teachers? AI and the Future of Education* (1st ed). Cambridge UK : Polity Press.

Setiawan, A., & Luthfiyani, U. (2023). *Penggunaan ChatGPT Untuk Pendidikan di Era Education 4.0: Usulan Inovasi Meningkatkan Keterampilan Menulis*. https://doi.org/10.36232/jurnalpetisi.v4i1.3680

Stone, A. (2023). Student Perceptions of Academic Integrity: A Qualitative Study of Understanding, Consequences, and Impact. *Journal of Academic Ethics*, *21*(3), 357–375. https://doi.org/10.1007/s10805-022-09461-5

Suharmawan, W. (2024). Pemanfaatan Chat GPT Dalam Dunia Pendidikan. *Education Journal : Journal Educational Research and Development*, *7*(2), 158–166. https://doi.org/10.31537/ej.v7i2.1248