# Augmenting the Performance of Architecture Students Using AI Tools: Exploring the Relevance of AI for Students' Learning and Development in Architectural History, Theory & Criticism at UET Lahore

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***Abstract-*** Generative AI is transforming various fields, including architectural education. However, in Pakistan, Generative AI is frequently viewed skeptically. AI is seen either as a potential replacement for architects or as ineffectual. The University of Engineering and Technology (UET) Lahore students' varied digital literacy levels pose additional challenges to embracing new technologies. This context necessitates a study to explore Gen AI's potential in the realm of architectural history, theory, and criticism in Pakistan.

This study utilizes Gen AI tools, including ChatGPT and Midjourney, to augment the design processes of architectural students. By integrating these tools, the research examines how these tools can make students more efficient and embrace creative fulfillment. The participants of the study include four groups of first-year students. The study finds that Generative AI for creative tasks increases student productivity and time management and helps reduce anxiety. Moreover, this study offers valuable insights for the future and provides a framework for integrating AI in architecture education.

***Keywords-*** Artificial intelligence, architectural design, Architectural history theory and & criticism, students' learning, design exploration techniques.

## I. INTRODUCTION

Architectural history is a significant domain in architectural academia that not only links the learners with the past but also streamlines the direction for the future. It reflects the values, belief systems, socioeconomic situation, and technological advancement under which a particular style of architecture or civilization has emerged or has taken a certain form. [1]Through studying architectural history, the learners can get valuable insights about how societies have addressed particular issues and expressed their cultural identity through built forms. Analyzing historical buildings and architectural movements encourages critical thinking skills among students. They study to appraise the successes and failures of historical designs, recognize underlying principles and ideologies, and consider the implications of different architectural choices on society and the environment. The history of architecture can play a fundamental role in shaping the education and professional practice of architects, enabling them to create buildings that are functional, aesthetically pleasing, and socially and culturally meaningful. [2-3]. Traditional teaching techniques within architectural history include lectures having photographs, documentaries, videos, physical models, site visits, crucial discussions, etc. In some cases, three-dimensional models are also incorporated in teaching methodologies for architectural history. [4-5].

In contemporary times, artificial intelligence (AI) has transformed the practice of architecture and design, fundamentally reshaping the way architects approach the design thinking process. [6-7]. It presents a significant shift in the study of architectural history theory and criticism and, at the same time, in the design exploration process. The traditional Method of design exploration and concept development seems more laborious and at risk of being obsolete. This research emphasizes the significance of artificial intelligence (AI) in academia, specifically concerning history theory and criticism. It explores how and to what extent AI tools can enhance teaching methods and aid students in comprehending both theoretical concepts and their practical applications. In the contemporary era, AI-driven visualization tools play a pivotal role in assisting students to grasp historical data, trends, and spatial relationships within architectural history theory and criticism. Utilizing interactive maps, timelines, and network diagrams generated by AI

algorithms offers students visual representations of historical contexts, movements, and influences. This enriches their comprehension of theoretical concepts and their practical applications in architectural design. However, it's crucial to acknowledge and address the challenges and limitations of AI tools, which, if not utilized correctly or consciously, can impede the creative process of design thinking and exploration. This research endeavors to illuminate the prevailing issue surrounding AI generative design tools, recognized both as a potential threat to humanity and a significant milestone in human history. Through this investigation, we aim to discern the extent to which AI can be employed and delineate the areas where humanistic approaches must be integrated alongside AI usage.

## II. METHODOLOGY

AI has vast implementation, and for the scope of this study, Gen AI is evaluated to see how it can inspire students to explore design possibilities, merging historical influences with contemporary trends.

The research is divided into four stages:

1. In the first step, the literature review is carried out to understand the use of AI around the world and identify a framework for researching student learning.
2. In the next stage, the authors designed the structure of the AI workshop in the course of architectural history. The selected students are in the early years of their architecture education.
3. The whole process is documented throughout and after the workshop. In one direction, the instructor's observations are considered, but for systematic documentation, a questionnaire is designed based on the framework and structure of the workshop.
4. The questionnaire is used to analyze student design outputs, to assess the impact of GenAI tools on learning and creativity.

The questionnaire further helps analyze an in-depth examination of how students utilized ChatGPT, Midjourney, BIM, and VR/AR software in their design processes. It explores the ways these tools facilitated the exploration of Greek & Roman styles for the participants.

Later, the questionnaire is analyzed with charts and diagrams to understand the outcome of the workshop based on the discussed objectives. The students also generated debates and discussions regarding the use of AI tools in the workshop. The detailed analysis is discussed in the last two sections of the paper.

*Documented Group*

For this particular study, students have been selected from the first year, pursuing their Bachelor of Architecture at the University of Engineering and Technology Lahore. The first-year students (total strength is 32) lack knowledge about AI tools and do not possess the necessary skillsets or resources to acquire subscriptions. The number of instructors was one. Furthermore, the university currently does not offer its students free subscriptions to AI tools. The students analyze and transform the architectural style of Greek and Roman architecture while using a simple cubic building. They are divided into four groups (each having eight students), and each group is directed to prepare a presentation on the assigned topic. The assigned topics are mentioned in the handout.

*Objectives and Advantages of the Study*

Gen AI tools have revolutionized various fields and are being considered another major groundbreaking point in history [8-9]. After the first digital turn on digital representation in the 1990s [10] and the second digital turn in 2010 with increased computational power, big data, and algorithm use [11]. Now, after almost a decade, AI is revolutionizing architectural practice, and Architecture firms are adopting the revolutionary change [12-13] in developed countries. AI is becoming common in design fields and is met with different perceptions. Pakistani students are also sporadically seen exploring new avenues, although a comprehensive policy is needed for strengthening the capabilities of the students and faculty to use AI tools with precision. [14] However, AI, especially in the field of architecture are discussed is often met with skepticism as well. This study is carried out to meet the following objectives:

This research emphasizes the significance of artificial intelligence (AI) in academia, specifically concerning history, theory, and criticism. This study explores:

- If Gen AI aids students in comprehending both theoretical concepts and their practical applications,
- If the use of Gen AI increases the productivity of the students in terms of time and quantity,
- If students of different backgrounds and levels find GenAI tools easy to use and comprehensible
- Understand if this teaching method is useful for teachers, and also the extent of usefulness of this method for future instructors.
- In the end, evaluate the limitations of this new method.

*Framework*

The AI is both admired as an ultimate solution and dreaded as dangerous by different sections of society. [15] Different sections have maintained a constant rift for some time. However, recently, Gen AI has emerged as a tool that can be leveraged as a collaborator. [16-17] offered a phased approach of "learn about AI, learn from AI, and learn with AI [18]." This collaborative approach offers a

compelling framework for integrating AI into education. Instead of fearing and avoiding AI or using it as the ultimate solution, this study adopts AI for collaboration in three phases.

In the first phase, the students learn about AI. Students learn different AI tools and how to use these tools for designated tasks. They also learn the scope and limitations of the tools. In the second phase, the students learn from AI. This is the phase where students use prompts to discover new knowledge, or dimensions related to the asked question. In the last phase, students learn to consider AI as a collaborative tool. Instead of accepting what AI offers the first time, students evaluate what led to the specific response, find out the accuracy of the response, and how the outcome can be changed. Giving feedback through available like and dislike buttons, as in ChatGPT, also educates the AI tools. They improve their prompts and outcomes and, in the process, educate both themselves and the AI. Hence, the last phase is labeled learning with AI.

This approach can be particularly effective in the context of this study. Here, AI can be used to collaborate and evolve historical architectural styles for contemporary design through AI integration. Instead of using AI as the ultimate solution, students can adopt a phased approach and learn to consider AI as a collaborative tool.

*Strengths of the Phased Approach:*

This approach provides clear and structured learning. Students learn in phases and are prepared to move on to the next phase. Instead of fully trusting or dreading, they learn the limitations and strengths of this new approach. Furthermore, at the last phase, they are prepared to understand that technology is also learning. Users can also choose to learn and evolve with AI.

Moving from theoretical knowledge to practical application allows students to actively engage with AI tools. Hands-on learning enables learners to experience the impact and usefulness of AI in both stages of learning from AI and learning with AI to enhance their design skills and creativity.

The final phase, learning with AI, encourages students to collaboratively use AI in their design processes. This innovative approach helps students understand the limitations and strengths of AI as well as themselves. Furthermore, how AI can help them augment their performance.

*Structuring the Experiment*

The experiment is structured in three phases as follows:

*Learn About AI:*

In the first phase, students are introduced to the fundamentals of AI and generative design tools, focusing on their potential to transform architectural design. For this purpose, seminars on AI technologies are being conducted. Students are guided through the process for using these tools for the development of contemporary design based on historical styles.

*Learn From AI:*

In the second phase, students observe and analyze how AI can generate design solutions. They learn from the AI's processes to enhance their understanding of architectural styles and design principles. They also learn different ways to incorporate historical arch elements in contemporary buildings.

Students are engaged in case studies and asked to use AI tools to reinterpret historical styles, analyze the outcomes and processes, and discuss their design after using AI.

*Learn With AI:*

This is the last phase where student create their design based on historical data after an iterative approach is adopted with AI tools. Students iteratively refine their designs, refining their prompts. They use GenAI tools like Midjourney or DALL-E to develop design concepts. This phase lets students consider AI as a collaborative equal in their creative design process.

*Application to the Current Study:*

Students are introduced to an assignment on using Greek and Roman architectural styles to inform a contemporary building. They are also engaged in interactive sessions and lectures on the scope of AI for such designs inspired by historical styles. Then, students are asked to use AI for their assignment and interpret their approach. Students are encouraged to critically analyze the outputs generated by their prompts. They are later advised to adopt an iterative process to refine their outcome based on AI-generated options and feedback.

*Questionnaire Structure for the Documentation*

The questionnaire is designed based on the discussed frameworks and is divided into ten sections. These sections are designed to gather targeted feedback on each phase of the framework, as well as the overall integration process. The structure of the questionnaire is as follows:

The initial part, or the unlabeled section, is used to collect demographic information about the participants. Section zero is used to collect perception and the existing AI role as per their understanding. The next three sections are based on the three phases of the previously discussed framework. Sections four to five are used to capture users' experience with AI in design and skill development. Six and seven are short sections to understand their perception of the limitations of the technology and their inclination to use AI in the future. Section eight discusses their perception of

the ethical side of the use of AI in design. And the last section captures their overall satisfaction and feedback.

## III. LITERATURE REVIEW

Computational algorithms and AI tools have significantly transformed the traditional design exploration processes and teaching methods as well. It provides an opportunity for designers and architects to explore the innovative models of AI, which facilitate the design generation, assessment, and refinement of design concepts, and even transform the theoretical concepts that they have studied in theory into real life through the lens of AI tools. As these technologies continue to evolve and innovate, conventional methods of designing and exploring could become obsolete if architects don't actively engage and adapt to these emerging technologies. Computational design tools provide an efficient alternative that not only enhances the speed and reduces the time consumption but also keeps the architects relevant in the continuously changing technological industry. These computational tools provide novel design solutions through generative design, machine learning, and recognize patterns that cannot be achieved with a manual exploration process. This allows architects to push their boundaries and explore a wider range of design iterations and possibilities. Besides, AI has also impacted the study of architectural history theory and criticism by enabling architects to influence historical data and precedents in novel ways. AI algorithms can inform contemporary design practices through analyzing architectural styles, typologies, and historical contexts to better understand and transform traditional methods of learning theoretical subjects. Architects can better understand the historical context, cultural influences, and design principles that foster their creative and analytical skills while using these AI-generated models. It empowers architects and designers through the integration of more complex and iterative design processes and automating their daily tasks, and at the same time, facilitating interdisciplinary collaboration. [20]

Furthermore, it presents a novel challenge for the architectural school as well. Providing students with access to AI tools, software, and resources can be challenging for architectural schools, particularly those with limited budgets or outdated infrastructure. Schools may need to invest in state-of-the-art computing facilities, software licenses, and technical support services to ensure that students have the necessary tools and resources to explore AI-driven design methods effectively. Also, architectural schools may need to adopt interdisciplinary collaboration with other departments to influence expertise in AI and related fields. Also, encouraging students to collaborate on projects with other relevant departments can help them broaden their perception of possibilities. [21] Academicians can play a key role in this whole process as they can incorporate the AI tools into their curriculum while equipping themselves with essential skills. This requires continuous evaluation and adaptation of the educational resources, pedagogical approaches, and learning outcomes to ensure that the students are well-equipped with the necessary skills to prepare themselves for a technology-driven profession.

With the advancement of AI tools, architectural trends in the 21st century have been significantly changed, and it has influenced the design education, process, creativity, and professional practice. At the same time, it has raised important questions on ethics, creativity, and human activity. Researchers have started investigating the potential of AI tools in the late 20th century. El-Attar examines the application of AI in architecture, including design optimization and construction management. It provides fundamental insights into the integration of AI tools into architectural design processes. [22].

[23] explored the significance of digital tools for architectural exploration and conceptual development, highlighting their potential to enhance students' digital understanding and design capabilities. Their research concludes that AI tools help to foster holistic and adaptive learning while preparing them for the futuristic, digitally driven profession. [24]. Mancini and Menconero also investigated the text-to-image AI tools in architectural education to enhance the capacities of the students while addressing the limitations and challenges faced by students and professionals. [25] The Midjourney is another AI tool that has been the subject of critical discussion nowadays. Radhakrishnan and Yin have examined it for assessing its influences on imaginative design processes and enquiring whether they augment or destabilize the traditional architectural ethics. [26]

Chaillou argues that AI tools can enhance and complement traditional design practices. He also examines AI-generated tools' impacts on design methodologies and architectural design practices.[27]. In the same way, Amer discusses the key potential of AI tools and their ability to transform the architectural processes as a whole.. Alessio Erioli's interview highlights the concept of "enhanced artificiality" with which human activity is fostered by a collaborative relationship with AI-generated tools, and it further pushes the boundaries of architectural development. [28].

Furthermore, Muntañola explores the use of AI tools in historical perspectives and highlights their future potential in architectural design. Zhang and Fort use Gaudi's work as a case study to explore the perception of AI's role in architectural design and use its illustrations to inspire contemporary architectural practices. Fareed and Nassif

investigate the use of AI tools to make learning more interactive by visualizing the historical architectural concepts with contemporary architectural concepts. Sadek investigates the problem-solving ability and experiential benefits of AI tools in architectural education, particularly for students' learning. Lastly, Human centered design approach highlights the ethical considerations of AI-driven models and human activity. This work discusses the need to uphold the human-centered methodology in the overall design process. (Towards Human-Centered Artificial Intelligence in Architecture, n.d.).
In a nutshell, artificial intelligence has played a key role in shifting the paradigm not only in education and design thinking processes but in all domains of human learning and exploration. By linking with the capabilities of AI-generated tools, architects and designers can unlock new avenues of exploration and understanding. In the same way, theoretical subjects like history theory and criticism can be best explored with the use of AI-generated tools.

*Exploration by the First-Year Students for Study:*
This part includes the assigned topics for the groups and their further details regarding the topics. The students were assigned the task of understanding and exploring the Greek and Roman architectural elements in contemporary design using AI-driven tools. The assignment helped the students understand the historical architecture while exploring the capabilities of AI-driven tools. The class was divided into four groups, each comprising seven students, and was given four different topics. The assigned topics are:'

*Group 1: Comparison of Greek and Roman Architectural Elements:*
Compare the architectural elements and design principles of ancient Greek and Roman buildings, focusing on structural systems, materials, and ornamentation.
Analyze the aesthetic, symbolic, and functional significance of architectural features such as columns, capitals, arches, and vaults in both civilizations.

*Group 2: Innovations in Greek and Roman Urban Planning:*
Explore innovations in Greek and Roman urban planning, including the development of gridiron street layouts, temples, agoras, a temple, and forum spaces, and civic infrastructure.
Examine the role of public buildings, temples, theaters, and amphitheaters in shaping the social and cultural fabric of ancient cities.

*Group 3: Ratios and Proportional Systems in Greek and Roman Architecture:*
Investigate the use of ratios, proportions, and geometric principles in Greek and Roman architectural design, such as the golden ratio, the Doric order, and the Vitruvian Man.
Discuss the significance of harmonic proportions and mathematical precision in creating aesthetically pleasing and structurally sound architectural compositions.

*Group 4: Contemporary Applications of Greek and Roman Architectural Traditions:*
Identify examples of contemporary buildings and urban developments that draw inspiration from Greek and Roman architectural principles.





Reimagining a building including the architecture of roman and Greek civilization





Prompts: 1. Design a mall with Roman Architecture Character (It could have two storey arcade with Corinthian column with a dome) try to make it more realistic. 2. Design a courthouse inspired from Roman Architecture. 3. Design a 5-star hotel with Greek architecture (it could have papyrus columns)





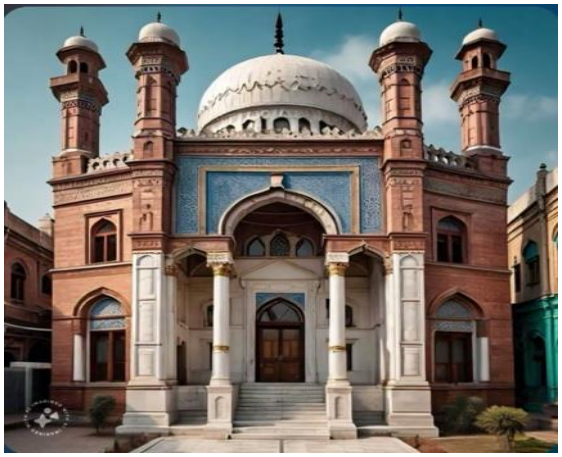
Design an ancient Greek architecture inspired coffee shop. I need a 3D image





4. Generate an image of Greek architecture fused with Roman Architecture buildings 5. Design a library interior inspired by Greek architecture

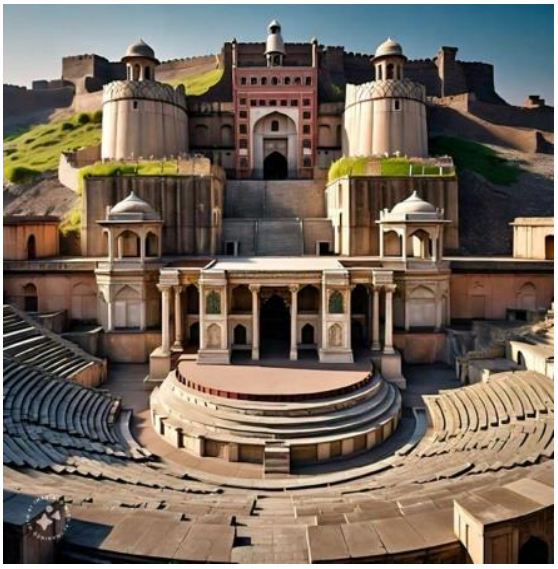




Picture 1: Generate a picture of Masjid Wazir Khan, but give it a Grek style. Include things like columns and other Greek architectural details such as pediments, friezes and columns while still keeping the basic symmetry of Islamic architecture.
Picture 2: I wanted to imagine the physics main block of UET but in roman style considering the composite concrete columns, domes and arches. Also I wanted to keep the brick facade of the building intact.



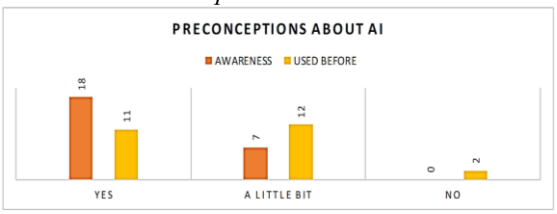
Design a pavilion inspired by Greek and Roman architecture. Add Greek Corinthian columns and roman domes too

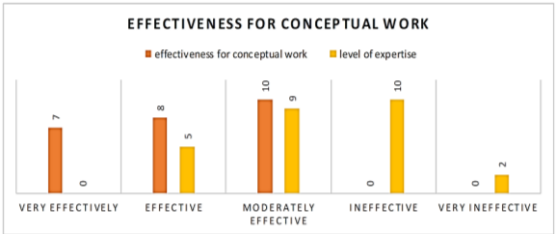


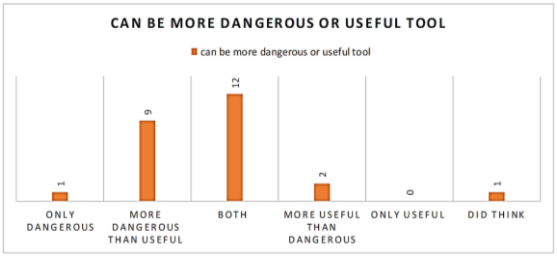
Generate an image of Lahore Fort, A UNESCO World Heritage Site, it showcases Mughal architecture with its massive walls, gates, and palaces adorned with decorative motifs and tile work. Blend it into Theatre of Epidaurus: A well-preserved ancient Greek theatre known for its perfect acoustics and semicircular seating arrangement, surrounded by columns and adorned with sculptures.

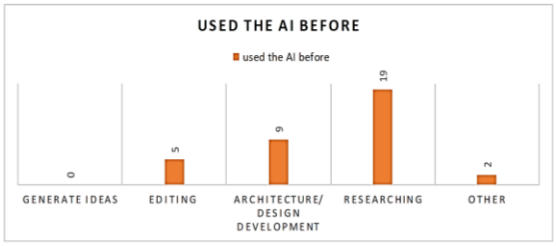
## IV. ANALYSIS

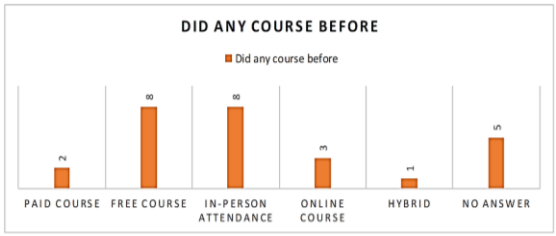
*Section 0: Preconceptions About AI*



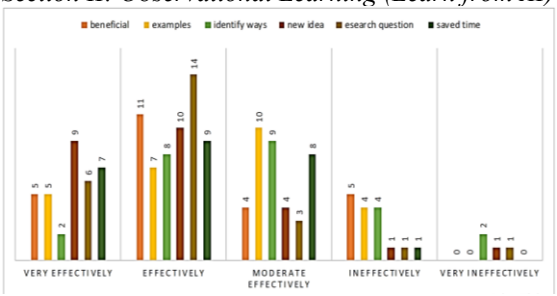



*Section -I*



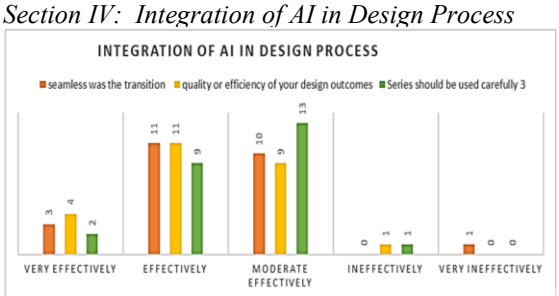

*Section II: Observational Learning (Learn from AI)*

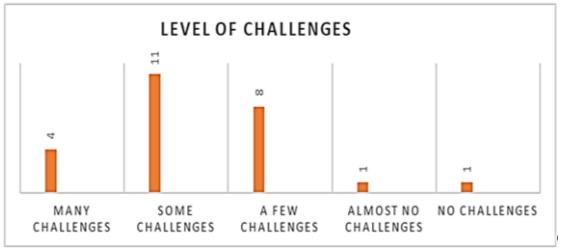



*Section III: Hands-on Experience (Learn with AI)*




*Section IV: Integration of AI in Design Process*

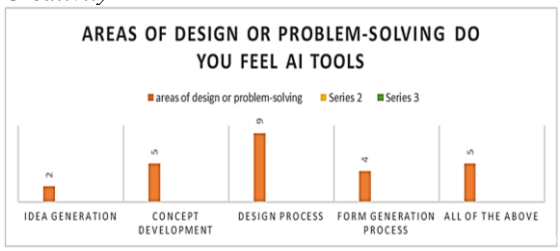


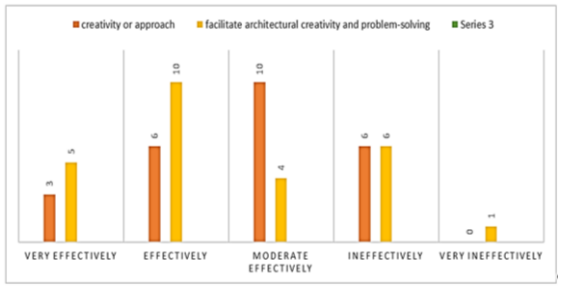





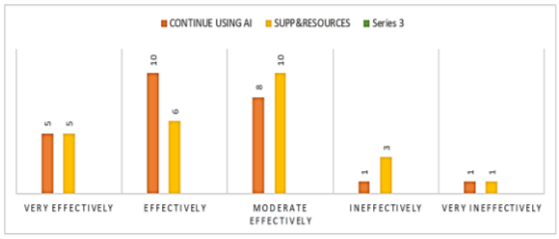


*Section V: Impact on Skill Development and Creativity*




*Section 7: Future Use and Recommendations*




## V. DISCUSSION

The analysis based on the assignment and survey gives significant insights into students' perception of AI tools, and at the same time, it also interprets the outcomes generated after using these tools. A debate was also generated in the class, after the questionnaire, about the use of AI tools. This discussion intends to reveal the significant findings of the research, interpret the results, and assess the

extent to which the assignment successfully meets the objectives.

*Understanding architectural history and its application to real-life examples*

The survey indicates that the students developed a clear and deeper understanding of architectural history and the vocabulary of Greek and Roman architecture. Previously, they used to study architectural elements theoretically. But after using the AI tools, they are now able to innovate their ideas and perceptions about architectural elements like classical orders, arches, and domes. The tools allowed them to visualize the ideas, patterns, proportional systems, and design philosophies in more interactive and engaging ways. The discussion also highlights the significance of traditional learning methodologies with contemporary tech-based approaches in fostering holistic learning experiences.

*Preconceptions About AI*

The analysis revealed that the students were already familiar with AI tools and were using them for various design research and projects. But this is the first time they have used it for any history-related assignment. The level of familiarity was in combination, as the majority of the students were aware of a very basic level of it. Very few students had no understanding of it. The majority of them found it very effective, especially concerning concept development and interpreting the ideas. The lecture also helped them to clear ambiguities regarding using AI tools. Some of the students found it dangerous, but after using it, they felt more confident and were in the phase of debate about it. It was creating a healthy and progressive discussion for the future of AI tools in architectural history and academia. As the discussion continued later, it was pointed out that Students may have prospects of AI as dependency issues or fear it as reducing human creativity and independent thinking approaches. Instructors must frame AI as a 'collaborative intelligence', emphasizing human judgment, historical accuracy, and contextual consideration.

*Observational Learning (Learn from AI)*

The survey highlighted that the assignment was beneficial in understanding the historical architectural vocabulary, and they successfully integrated their ideas from classical architecture with contemporary design concepts. It not only saved their time but also addressed the questions asked. They were in a position to iterate their design ideas to create more refined and relevant outcomes in a very short period. However, very few students faced challenges while interpreting the ideas and concepts that were mainly related to a less technical understanding. For this purpose, students must be guided to analyze AI-generated outputs analytically, while helping them to design a well-formulated prompt for historical architectural analysis, along with well-designed cases from historical architecture.

*Hands-on Experience (Learn with AI)*

While using the AI tool, they experimented with prompt designs as well. They find it crucial to design and interpret the results. Rightly designed prompts related to the research question can significantly improve the outcomes. The survey shows that the students find the AI tools user-friendly and can be easily understood. They find a huge difference in their output of design as the processing of the results has rapidly increased. Likewise, it has significantly reduced the time consumption of design exploration. Consequently, it implies that learning with AI has become an essential part of contemporary approaches. Integrating AI tools with theoretical subjects can provide students with an immersive learning experience that goes beyond the traditional way of teaching and learning. This 'learning by doing 'not only deepens their understanding of theoretical concepts but also trains them for a contemporary technology-driven era. AI tools serve as a bridge between theory and practice as they open up an innovative avenue for students to learn and explore. In the discussion session, it was pointed out that there is a risk of reliance on AI tools for form finding, conceptual development, so avoiding analytical drawing and thoughtful observation methodologies that must be balanced while using these tools.

*Integration of AI in the Design Process*

Integration of AI tools is revolutionizing the whole process of understanding, processing, and interpreting the concepts and architectural design. It's a whole new domain that has transformed human perception to a wider extent. The analysis also interprets that students find the transition from theoretical concepts to practical approaches quite seamless, as they can easily translate the classical vocabulary into contemporary buildings using AI tools. However, very few students find it difficult to translate and interpret the results, as it requires refined prompts to get the right answer. A few students suffered and found it time-consuming to refine the prompt to get clear outcomes. It was argued that Historical components and accuracy may be affected due to the visual revolution of AI tools; students may need to develop a detailed and well-designed prompt for this purpose. This Merger should emphasize the continuity of historical sense and contemporary form-finding, not sheer artistic imitation.

*Impact on Skill Development and Creativity*

The students were asked about various areas where they find AI tools most effective. The analysis

interprets that they find the area of design processing with AI tools is most effective. However, they also find design integration and concept development with AI tools less effective in comparison. There may be many reasons; one might be possible that the students need to explore more AI-driven tools to explore. Other than that, software skills can also aid in developing the concepts. Design Pedagogy should balance the use of AI tools with manual sketching, reflective study, and conceptual development. For this purpose, effective use of AI tools together with manual sketching for historical interpretation must be concentrated.

*Perceived Limitations and Challenges*

The analysis shows that the students find it challenging at some points of the design process and interpretation. Technical barriers and limited familiarity with tools are commonly inferred issues. AI tools have their limitations that can be overcome by having workshops and courses on AI tools. Technological advancements in the contemporary era will help to make these challenges less effective over time. Designing a well-refined prompt also takes time and expertise that can be improved with the proper use and development of skill sets. Understanding ethics and morals while using AI tools is another critical point that needs to be highlighted. Students generally don't realize or understand the limitations of AI tools while using them for research purposes.

The use of AI tools in architectural history theory & criticism offers both limitations and challenges at the same time. It enables the students to engage themselves in historical analysis with data-driven form analysis and makes the whole process more interactive rather than repetitive and conceptual. However, it raises certain concerns regarding over-reliance on technology, AI tools, and loss of self-reliance for critical thinking. Understanding these dynamics is critically important while collaborating with AI tools and architectural history. The following table summarizes the key advantages, limitations, and analytical implications of using AI tools for architectural history.

| Dimension | Advantages (Pros) | Limitations (Cons) | Analytical Implications |
|---|---|---|---|
| **Preconceptions About AI** | Sparks curiosity and challenges stereotypes for AI tools. It has made the process of concept development and interpreting the ideas more refined and accessible for all the students. | Students may have expectations of AI as dependency issues or fear it as reducing human creativity and independent thinking approaches. | Instructors must frame AI as a collaborative intelligence, emphasizing human judgment, historical accuracy, and contextual consideration. |
| **Observational Learning (Learning *from* AI)** | Integrates ideas from classical architecture with contemporary design concepts. It saves time and enables observation of AI's logic in recombining historical forms, styles, and patterns, offering insight into underlying compositional grammars. | Faced challenges while interpreting the ideas and concepts that were mainly related to a less technical understanding. May lead to passive learning or imitation without understanding | Works best when students are guided to analyze AI outputs critically, while helping them to design a well-formulated prompt, comparing them with authentic precedents and historical evidence |
| **Hands-on Experience (Learning *with* AI)** | 'learning by doing 'helps in theoretical concepts but also supports them for a contemporary technology-driven era. Encourages active engagement through repetitive prompting design, visual experimentation, and detailed understanding of architectural style. | Risk of reliance on AI tools for form finding, avoiding analytical drawing, and thoughtful observation methodologies | Effective use of AI tools coupled with manual drawings, study, sketching, and relative historical interpretation. |
| **Integration of AI in the Design Process** | finds the transition from theoretical concepts to practical approaches quite seamless; it enables hybrid design approaches where history supports innovation. | Historical depth may be dominated by visual innovation; students may need to develop a detailed and well-designed prompt for this purpose. | Amalgamation should highlight the continuity of historical sense and contemporary form-finding, not sheer artistic imitation. |
| **Impact on Skill Development and Creativity** | Enhances visual understanding and clarity, critical thinking skills, and prompt-writing skills; stimulates creative reinterpretation of heritage. | Find design integration and concept development with AI tools to be less effective. The reason may be less hands-on experience with AI-driven tools due to less exposure and more reliance on manual skills. | Pedagogy should balance AI tools fluency with manual skills, reflective study, and conceptual understanding. |
| **Perceived Limitations and Challenges** | It offers collaborative and inclusive learning and access to international archives and generates well-formulated ideas for the referred topic. | Technical barriers and limited familiarity with tools are commonly inferred issues that can be overcome by providing training sessions. | Future frameworks must combine *AI* literacy, ethical consideration, *and* context-sensitive applications in the architectural history curriculum. |

## VI. CONCLUSIONS & RECOMMENDATIONS

The research has widespread implications for academics and learning approaches. The outcomes support the integration of AI tools in architectural history and academia. It will not only strengthen the understanding of classical architectural vocabulary but also equip them with the technological tools of the contemporary era. By fostering a deeper connection between the theoretical way of teaching methodology and modern technology, we can develop innovative thinking and learning capabilities. This amalgamation can make academic learning more adaptive to contemporary technology-driven times.

Furthermore, in the contemporary, rapidly changing era, artificial intelligence has not only transformed the educational systems but also has a strong impact

on the skill development process. It has revolutionized the whole process of thinking and learning. To prepare students for the future, we need to make them not only embrace but also adapt these innovative skill sets. As AI has revolutionized the systems of healthcare, education, designing, and manufacturing, students must be ready to learn to use these AI-driven tools to solve real-life problems. There is a need to learn and understand the process along with AI tools, keeping in view the ethical boundaries. They need to understand the limitations and ethical limits of AI so they can make informed decisions about the solution to the problem. They need to understand that there is no danger in using AI, but they should know and recognize their ethical limitations. When used critically, AI tools can bridge observation, analysis, and design, allowing students to learn from and with AI in ways that deepen historical awareness and digital literacy. However, the risks of factual alteration, artistic shallowness, and more dependence highlight the need for balanced pedagogical frameworks. To enhance its benefits sensibly, educators should adopt a 'critical-constructive approach**':**

1. Adopt AI Literacy: students should learn how to interpret, verify, and question the AI-generated concepts and ideas.
2. Balance Tools and Theory: They should combine generative experiments with historical research, with contextual understanding and manual sketching as well.
3. Instill Ethical Guidelines: They must understand and develop ethical, moral values while using AI-driven tools for historical misinterpretation and data biases.
4. Promote development Learning: Prompt development is itself a skill that must be learned by the students for better enhancement.
5. Integrate Gradually: The use of AI tools should be integrated gradually and aligned as the study progresses, and should evolve based on the historical accuracy.

In a nutshell, by integrating AI into our educational system, we can nurture individuals who can not only invent confidently but also stay ahead in the technological era. The need of the hour is that we need to develop and streamline ethics and moral values while using AI tools. By embracing AI as a partner, we will not only ensure that we are keeping pace with the technologically advanced world, but we will be shaping our future as well. Generative AI should be considered not as a shortcut to creativity but as a catalytic agent for reconsidering how history, technology, and imagination amalgamate in architectural education to develop enriched and focused solutions.

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