

Between Intuition and Instruction: Comparison of Generative Models in Symbolic Design Ideation Case Study of IKN Garuda Palace

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ABSTRACT

This study aims to map the comparison of various artificial intelligence (AI)-based generative models, particularly the shift from design intuition to text-based command instructions, as a potential source of ideas in symbolic architecture design. While generative AI is increasingly adopted in creative fields, there remains a critical research gap in the systematic evaluation of how different conversational platforms respond to abstract, symbol-based architectural narratives during early-stage ideation. To address it, this study employs a qualitative-comparative case study approach to evaluate three popular text-to-image generative models: Copilot, ChatGPT, and Gemini. The study was conducted by deploying identical command prompts based on the symbolic narrative of the Garuda National Capital (IKN) Palace and comparing the outputs across dimensions such as visual quality, contextual accuracy, diversity of ideas, generation speed, and adaptability to change. The concrete findings reveal distinct computational behaviours: Copilot excels at architectural integration through monumental abstraction, ChatGPT prioritises literal and explicit symbolic replication, and Gemini offers highly fluid, narrative-driven conceptual sketches. Based on these results, the concept of AI's potential is proposed through three main discussion frameworks: variation exploration, productivity efficiency, and communication visualisation. This study contributes a new evaluative framework for human-machine interaction in architectural pedagogy and practice, demonstrating how tailored prompt descriptions can transform AI from a passive visualisation tool into an active, reflective conceptual partner.

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1. INTRODUCTION

The transformation of symbolic architectural ideas [1] into visual representations is a crucial stage in the design process, especially for effectively communicating ideas from form to space [2]. With advances in technology, artificial intelligence (AI) tools such as Copilot, ChatGPT, and Gemini have begun to be adopted as creative partners to assist in the design ideation process [3], [4]. These three platforms enable text-based visual exploration through a conversational approach, making it easier for designers to generate initial ideas.

Within this framework, this study aims to map and compare the roles of generative AI models in exploring symbolic architectural ideas, focusing on three main aspects: variation exploration, productivity efficiency, and visual communication [5].

However, the transformation of abstract spatial ideas into visual media still faces substantial challenges, particularly in terms of speed, accuracy, and the representational capture of meaning. Although AI is increasingly popular as a tool in the creative field, comparative studies that specifically highlight the performance of various platforms in the context of architectural ideation are still limited. The absence of such studies leaves a critical gap in the development of evaluative approaches for examining the dynamics of human-machine interaction in generating meaningful design ideas.

This study aims to analyse and compare the performance of three AI platforms in supporting the architectural ideation process, namely Copilot, ChatGPT, and Gemini. The comparison was based on three main aspects that determine the effectiveness of the design process: exploration of variations in ideas from abstract to visual, visual productivity efficiency, and the ability to facilitate representational communication. In addition, this study examines the extent to which these three platforms can act as conceptual partners that not only carry out instructions but also adaptively and reflectively respond to design intuitions and preferences.

The findings of this study are expected to offer a new perspective on the role of AI in education and architectural practice, particularly as a tool during the initial design exploration stage. Furthermore, this study emphasises the importance of developing media literacy among academics and practitioners, so that they can interact critically with technology in the design process. In a digital era characterised by the speed and complexity of visual information, reflective design and awareness of technology's potential and limitations are increasingly important.

1.1. Visualisation of Symbolic-Based Design

Spatial representation in architecture is never merely a matter of form, but rather a reflection of a complex ideational process [6]. In the context of symbolic architecture, representation is a crucial medium for transforming abstract and conceptual ideas into experienced spatial forms. Symbols in architecture are not merely ornaments [7], but expressions of grand ideas that must be translated visually and spatially [1]. Even in more conceptual approaches, symbolic architecture is seen as an extension of grand ideas that transcend disciplinary boundaries, demanding responsive and reflective representational abilities [8].

As the digital era evolves, the way designers visualise ideas has undergone a significant transformation. The shift from data to algorithms has given rise to a new paradigm in which images are no longer the result, but rather the starting point for exploration of generative system-based design [9], [10]. Images now serve as catalysts for understanding and decision-making in the design process, particularly in the early stages that require intuition and visual impressions [11]. In this context, AI is no longer merely a tool but has the potential to become a co-designer that helps determine the visual form of ideas. This change in visual ontology is an important sign that architectural representation now involves non-human actors in the creative process.

The emergence of generative AI tools such as Copilot, ChatGPT, and Gemini shows the potential to accelerate the visual translation of design imagination [12]. AI's ability to generate images from text offers a new mechanism for symbolic exploration [13], [14], particularly for quickly filtering and developing ideas in diverse ways. Although this potential is becoming widely used and promises to ease visualisation, there has not been a comparative study that thoroughly reviews how each platform contributes to the visualisation of symbolic ideas. This gap is important to bridge so that the understanding of architectural representation in the AI era can be reviewed more critically, especially in the realm of education and design practices that are increasingly influenced by generative technology. Although AI is increasingly popular as a tool in the creative field, comparative studies that specifically highlight the performance of various platforms in the context of architectural ideation are still limited. While recent international literature has benchmarked overall image fidelity across various diffusion engines [15], [16] There remains a distinct vacuum in evaluating how these systems process high-context, symbol-based spatial narratives in collaborative human-machine workflows.

1.2. Artificial Intelligence in Idea Iteration

Spatial imagination in architectural design has long relied on object representation to bridge ideas and spatial experiences [17]. Images as a medium of representation play a central role in shaping designers'

understanding and influencing their decision-making [18]. Visual symbolism, especially in symbolic architectural approaches, emphasises the transition from linguistic messages to meaningful spatial expressions [1], [19]–[21]. In this context, symbols are not merely forms, but interpretive systems that articulate grand ideas through visual structures [22], [23].

The development of generative AI shifts the paradigm of representation toward a form of idea interaction that is not only digital [24] but also virtual, serving as a generator of new spatial ideas [25]. Basis Generative design bases enable the rapid creation of visual alternatives, while also changing visual ontology as AI begins to play a role as a co-designer in the ideation process [26], [27]. Amid this potential, designers' ability to filter and interpret AI results becomes crucial [28]. There is also a need to analyse the qualitative responses of AI platforms to different design prompts in both symbolic and spatial contexts [3]. Thus, representation is no longer merely an output, but an active part of the conceptual discussion between humans and machines.

However, even though AI has shown its ability to accelerate representational exploration and offer rich imaginative symbolism, there has been no comparative study that systematically reviews how various AI platforms respond to spatial ideas symbolically, especially in the early stages of design. This gap is important to bridge so that the interaction of ideas between humans and AI can be critically understood in both epistemological discourse and reflective design practice. Without this, designers risk passively adopting AI-generated results without interrogating the visual meanings and symbolic values they contain.

2. RESEARCH METHOD

This study uses a qualitative-comparative approach [29] with a focus on a limited case study, namely, text commands related to the design of the Garuda National Capital (IKN) as a national symbol rich in spatial and visual meaning. The selection of the Garuda IKN case is based on its strong symbolic character and high level of design imagination [30], [31], allowing exploration of how AI translates symbolic values into representative visual forms. Figure 1 shows the Garuda IKN design.



Figure 1. Conceptual Design of The IKN Palace Inspired by The Symbol of The Garuda Bird
Source: Nyoman Nuarta's official Instagram account

Data were collected through an exploratory process across three visual generative AI platforms: Copilot Designer, Gemini Image, and ChatGPT/DALL-E, each given a uniform prompt based on the Garuda symbol narrative. The curation of visual results was carried out as part of the method [32], in which each output was selected based on the legibility of the symbol, the quality of the spatial representation, and the

resulting visual narrative. The documentation of the results was accompanied by technical metadata (prompt features, process duration, model version, etc.) to support comparative performance evaluation. The experiment was conducted in October-November 2025, so new developments in the model and its outputs are beyond the scope of this study.

The analysis was conducted qualitatively, with an emphasis on the quality of symbolic translation in visualising AI results. Three main aspects were analysed: (1) the ability of each platform to produce spatial representations of the Garuda symbol, (2) the richness of meaning that emerged in visual interpretations, and (3) the narrative and design bias toward the symbolic values emphasised in the prompt. This approach aims to understand not only what AI produces, but also how and why these results emerge in the context of architectural symbolism.

The data were analysed using a comparative table that included feature dimensions, visual performance, and symbolic interpretation. This table not only compares technical advantages but also records the quality of interaction between prompts and outputs [33]. The analysis process is iterative and dialogic, in which visual results are interpreted in context, compared, and critiqued to build an understanding of the potential and limitations of AI as a co-designer in exploring symbol-based spatial ideas. To ensure analytical reliability and eliminate subjective bias, the five evaluation parameters were operationalised using a structured qualitative rubric scored on a 3-point scale (1 = Weak/Low, 2 = Moderate, 3 = Strong/High).

3. RESULTS AND DISCUSSION

The visual design experiment was conducted from October to November 2025 using three generative AI platforms: Copilot Designer, ChatGPT/DALL-E, and Gemini Image. All three were tested in parallel using an identical prompt: “Create an illustration of the State Palace architectural design inspired by the abstraction of the Garuda bird, reflecting modern energy-efficient architecture, located in the middle of a tropical forest.” This prompt was deliberately designed with four main elements: the design object (“State Palace”), symbolic inspiration (“abstract Garuda bird”), desired external characteristics (“energy-efficient modern architecture”), and background context (“tropical forest”). This composition is intended to test each model's ability to combine spatial ideas, ecological context, and symbolic meaning into a visual form. The following table is a descriptive comparison of the three generative modelling tools used.

Table 1. Comparison of popular generative models

Aspect	Copilot Designer	ChatGPT / DALL-E	Gemini Image
Developer	Microsoft	OpenAI (ChatGPT)	Google DeepMind
Platform	Microsoft	OpenAI (integrated with Microsoft Bing)	Google
Visual Model	Internal Copilot visual engine (DALL-E-based)	DALL-E (OpenAI)	Imagen (variant of Gemini)
Chat Integration	Native to the Copilot platform	Native to ChatGPT	Integrated into Gemini chat
Accessibility	Via Microsoft Copilot (desktop/mobile)	Via ChatGPT (Web, API)	Via Gemini Mobile
Licensing	Microsoft Privacy Statement	OpenAI with Microsoft hosting	Google Privacy & Safety

The exploration results show distinct response characteristics across platforms. Copilot Designer produces illustrations with a monumental, abstract approach, using geometric shapes and large scales to suggest the silhouette of Garuda without depicting explicit figures. Copilot's visual rendering is technically impressive, with realistic lighting and a well-integrated tropical atmosphere. In contrast, the output from ChatGPT/DALL-E tends to be literal, depicting the Garuda bird in its complete form as a dominant element, thereby subordinating the nuances of the architectural design. Gemini Image takes a more experimental, abstract approach. Still, its visual style resembles conceptual cartoon illustrations, with a strong simplification

of form and colour, creating a lighter, more speculative narrative impression. Figure 2 compares results from four experiments using three generative models.

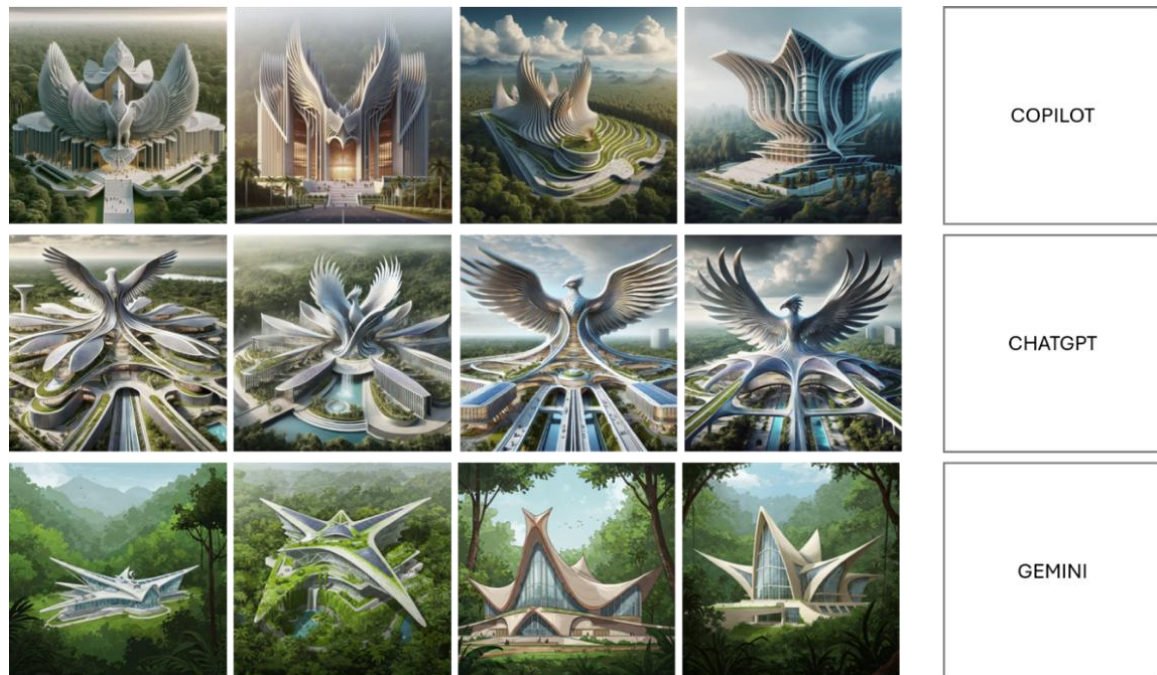


Figure 2. Comparison of Architectural Design Outputs Generated by Three Generative AI Models

The entire process was systematically documented, including the results, four outputs, and the creative visual interpretations offered by each model. The differences in these approaches not only demonstrate technical variations but also raise epistemological questions: to what extent is AI capable of interpreting complex symbols spatially and contextually? Using the same prompt, the three models show different understandings and representation strategies, opening space for critical reflection on the role of AI in symbol-based architectural design—whether it is merely a visual tool or an active interpretive partner in shaping spatial ideas.

The data selection and validation followed a strict four-stage expert curation procedure to establish academic robustness:

1. **Generation Validation:** Each bot ran the identical prompt four times concurrently to capture baseline variability. Interrupted or glitched renders (e.g., disconnected lines or warped geometry irrelevant to the prompt) were excluded.
2. **Curation Filtering:** Images were filtered based on an initial legibility check—the output must clearly represent both a 'State Palace' scale and a recognisable trace of 'Garuda' inspiration.
3. **Consensus Cross-Checking:** The curated images were cross-evaluated against the established rubric guidelines to minimise personal interpretation errors.
4. **Iterative Modification Audit:** The peer-check process was repeated for the text-modification phase (adding iron and wood parameters) to assess whether the AI's transformation logic responded directly to the text intervention or introduced arbitrary stylistic noise.

The systematic data analysis procedure was executed through three distinct phases:

1. **Horizontal Comparative Mapping:** Compiling the metadata and initial outputs into Table 1 and Table 2 to evaluate mechanical performance and baseline narrative differences between the platform engines.
2. **Prompt-Deconstruction Analysis:** Breaking down the generated visual language into semiotic tokens (e.g., analysing how a text prompt token like 'tropical forest' visually translates into 'decorative accessories' versus 'seamless environmental massing').

3. **Iterative Delta Analysis:** Assessing the visual shift (the delta) between Pre-Modification and Post-Modification outputs (Table 4). This phase explicitly analysed the computational elasticity of each model—measuring its ability to shift along the spectrum from literalism to morphological abstraction when prompted by material-specific instructions.

The selection of technical aspects such as visual approach, rendering quality, design variation, tropical background integration, and translation of the Garuda symbol as a basis for inter-model comparison is based on the need to understand not only the mechanical performance of AI, but also its narrative and semiotic capabilities in responding to complex architectural prompts. Because the prompt contains specific symbolic and contextual dimensions—namely, the abstraction of the Garuda bird in a tropical forest landscape, the assessment cannot be purely quantitative. These aspects reflect the extent to which AI models can capture and represent spatial meaning, design aesthetics, and symbolic depth in an integrated manner. By comparing responses to these elements, the comparison becomes relevant for assessing not only what the AI produces, but also how and why these results appear uniquely in each model.

Table 2. Comparative evaluation of architectural design outputs generated by three generative AI models.

Technical Aspect	Evaluation Indicators & Rubric	Copilot Designer	ChatGPT / DALL-E	Gemini Image
Visual Approach	Low: Literal replication	High (Score 3)	Low (Score 1)	Moderate (Score 2)
	Moderate: Semi-abstract gestures	Monumental abstract; wing elements and flower shapes are implied geometrically.	Symbolic literalism: the explicit Garuda bird figure is dominant in every composition.	Illustrative conceptualism; triangular shapes and light visual narratives.
	High: Monolithic abstraction			
Rendering Quality	Low: Flat/Cartoonish style	High (Score 3)	Moderate (Score 2)	Low (Score 1)
	Moderate: Standard digital presentation	High-quality, detailed textures and a natural atmosphere, providing a professional impression.	Moderate quality; dominant figures, but the rendering is flat and repetitive.	Illustrative style resembles digital cartoon sketches rather than a full architectural rendering.
	High: Professional photorealism			
Design Variation	Low: Repetitive layouts	High (Score 3)	Low (Score 1)	Moderate (Score 2)
	Moderate: Positional shifts only	High variation; each of the four images has a unique spatial composition and character.	Low variation; all designs tend to be repetitive, featuring similar bird figures.	Moderate variation; minimal variation in form, focusing more on repeating triangular layouts.
	High: Distinct spatial forms			
Tropical Background Integration	Low: Detached border decorative	High (Score 3)	Moderate (Score 2)	Low (Score 1)
	Moderate: Background present but static	Strong integration; the forest landscape blends seamlessly with the building mass and forms.	Partial integration; the background is present but does not integrate with the building structure.	Decorative integration; trees and vegetation appear as accessories rather than integrated elements.
	High: Seamless massing blend			
Garuda Symbol Interpretation	Low: Literal icon supremacy	High (Score 3)	Low (Score 1)	Moderate (Score 2)
	Moderate: Transitional fragments	Implicit translation; expressed thoroughly through spatial structure and design gestures.	Direct translation; the bird serves as the dominant icon with minimal abstraction.	Free translation; more conceptual and inconsistent in the treatment of symbols.
	High: Integrated spatial structures			

The stark divergence in computational behaviour across the three platforms can be theorised through the lens of algorithmic ontology and training-data curation paradigms. Copilot’s tendency toward monumental abstraction aligns with architectural theories that position visual representation as an ideational catalyst rather than a finalised artefact. By embedding the symbolic architecture within the structural massing, Copilot mimics an advanced architectural design method in which form and environmental context coexist in a dependent relationship.

Conversely, ChatGPT/DALL·E’s manifestation of symbolic literalism represents a semiotic breakdown between abstract linguistic instructions and architectural translation [34]. DALL·E’s heavy reliance on internet-scale CLIP (Contrastive Language-Image Pre-training) models forces a literal synthesis: when prompted with 'Garuda', it surfaces the most statistically dominant visual token—the physical bird—subordinating the complex spatial logic required for a 'State Palace'. This creates a design bias toward direct mimesis rather than spatial abstraction.

Gemini’s illustrative conceptualism functions on an entirely different computational logic, prioritising loose, exploratory visual narratives. Rather than acting as a photorealistic drafting engine, its variant of Imagen acts as a speculative sketching tool, capturing the fluid, non-committal visual impressions characteristic of a designer’s earliest intuitive gestures.

Additional experiments were conducted with prompt modifications that emphasised transforming architectural forms into more abstract ones, as well as adjustments to materials, predominantly iron and wood. Other elements of the prompt—namely the State Palace, Garuda inspiration, tropical forest context, and energy-efficient design characteristics—were retained in their entirety. This modification aimed to explore the extent to which the AI model could translate material expression and form abstraction without compromising the established symbolic intent and spatial narrative. With this approach, differences emerged in the visual articulation of each model, both in geometric gestures, surface textures, and material resonance with the tropical setting. This experiment also provides an opportunity to evaluate the model’s ability to understand the connection between visual symbolism and material choices within architectural language. Table 3 shows a limited scheme of the descriptive text changes.

Table 3. Prompt modification for design iteration

Category	Description
Initial Command	Create a design illustration of the state palace architecture , inspired by the abstraction of the Garuda bird, reflecting modern, energy-efficient architecture set in the middle of a tropical forest .
Modification Command	Change its form to be more abstract , its materials have nuances of iron and wood , and keep the rest unchanged.

The visual transformation in this additional experiment shows how each AI model responds to instructions to increase the abstraction of form and shift the dominance of materials toward shades of iron and wood, without altering the design’s contextual elements. In the modified version, Copilot shows improved spatial integration between the bird shape and the building mass—the structure becomes sleeker, more monolithic, and more monumental, with metal materials and wooden elements implied in the building’s texture and colour. The modification implies a more coherent morphological approach, in which abstraction does not eliminate symbolic identity.

ChatGPT, which was originally literal in its depiction of the complete bird figure, has now shifted to a more angular, skeletal interpretation. The design feels more experimental with sharp lines and open structures that indicate a deconstructive process of the Garuda symbol. Iron is present as a firm frame, while wood serves as a spatial binding accent, resulting in a more open visual landscape that still maintains a symbolic direction.

Meanwhile, Gemini maintains its illustrative style but shows increased geometric complexity and articulates the wings as architectural structures. The modified version is more detailed and gestural, with an emphasis on layering and textures that explicitly suggest wood-iron materials. Although it still retains its conceptual cartoon character, Gemini shows an effort to adapt to material demands and to achieve formal

abstraction, resulting in a more articulate architectural form, even if it is not yet fully monumental. The following table compares generative models based on the iterative outputs above.

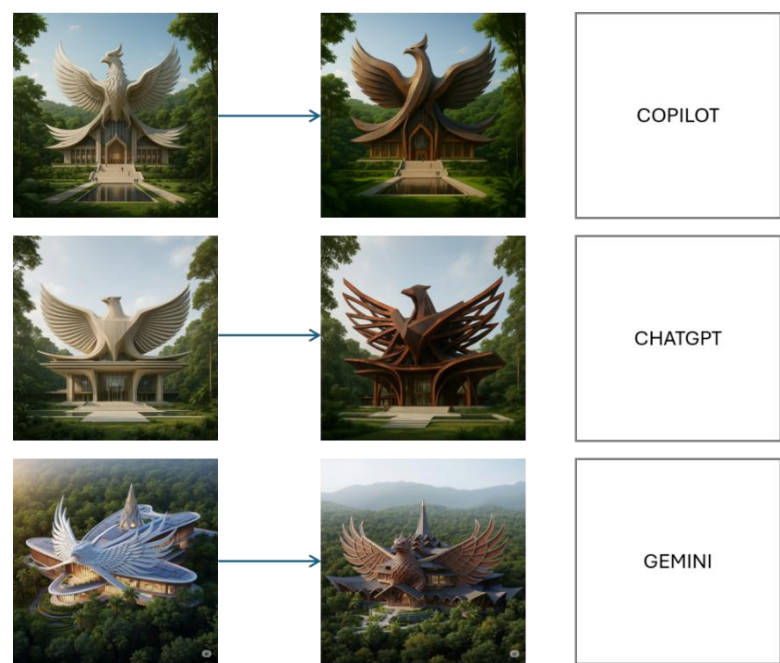


Figure 3. Iterative architectural design outputs generated by three generative AI models.

Table 4. Comparison of design iterations generated by three generative AI models.

Model	Initial Character (Pre-Modification)	Character After Modification	Response to Material (Iron & Wood)	Response to Form Abstraction
Copilot	Monumental, winged, realistic tropical atmosphere, implicit symbols.	More streamlined and geometric; integration of Garuda symbols into a monolithic and elegant building mass.	Metal and wood material representations appear through texture and colour.	High morphological abstraction without losing symbolic identity.
ChatGPT	Literal and dominant bird figures; architectural design is subordinate.	More skeletal and angular forms; open structures provide a deconstructive impression.	Iron material is expressed in the frame structure; wood serves as a balancing element.	Transition toward semi-abstraction with sharp and experimental gestures.
Gemini	Light, cartoonish illustration; futuristic forms but tend to be decorative.	More detailed and complex, wing and bird-body layering is more expressive spatially and texturally.	Iron-wood material appears as expressive textural motifs.	Increased abstraction, though it remains within a narrative-illustrative style.

The iterative comparative table shows how prompt modifications affect the visual and material strategies of each AI model in responding to Garuda-based architectural designs. Copilot directs the design towards monumental, abstract forms with elegantly integrated metal and wood textures, while maintaining symbolic depth within geometric structures. ChatGPT transitions from literal representation to a more experimental skeletal approach, revealing iron frames and wooden details as expressions of open design. Meanwhile, Gemini presents increased illustrative complexity, with visual layering and more exploratory wing articulation, while maintaining an expressive narrative style. These iterations confirm that prompt changes not only affect the aesthetics of the output but also shape the computational logic and inherent style of each

model in the technical formation of spatial and symbolic meaning. Analysing the delta between the initial and modified prompt iterations reveals critical insights into 'computational elasticity', the model's capacity to adjust structural constraints in response to changing textual instructions. The shift toward iron and wood forced a deconstructive process across all engines, but with varying degrees of success.

Copilot demonstrated a highly reflective design awareness; it synthesised the material constraints ('iron and wood') in colour and texture without dismantling its established monumental geometry, acting as an adaptive co-designer. ChatGPT's transition from a heavy, literal figure to a sharp, deconstructive, skeletal iron frame reveals that its underlying model requires highly specific material prompts to escape literal semantic traps. However, this shift highlights a profound limitation: the model lacks intrinsic spatial awareness, treating architectural components as a surface-level collage of sharp lines rather than a load-bearing or tectonically valid spatial system. Gemini's increased texture mapping, layered atop its persistent cartoon-like geometry, further demonstrates that while generative models can rapidly iterate on aesthetic variations, they struggle to achieve a holistic, ideologically integrated architectural language.

3.1. Exploring Variations: Expanding the Space of Architectural Imagination

The ability of three generative AI models to respond to design prompt modifications demonstrates tremendous exploration potential in rapidly and diversely expanding architectural possibilities. Copilot, ChatGPT, and Gemini each present unique interpretations, ranging from monumental abstractions to speculative illustrative expressions. These differences are not limitations, but rather representations of the pluralism of form, context, and visual style offered by the new design engine. In a single iteration, designers can witness shifts in spatial gestures, transformations in materiality, and conflicting yet mutually enriching symbolic articulations. This creates a far more dynamic, imaginative field than conventional approaches, expanding the space for ideas without losing the original design intent.

Beyond mere visual variations, the results of each AI model demonstrate their readiness to support a speculative design approach—in which the future of architecture is projected through simulations of free and open design forms and narratives. With instant iterations, designers can evaluate and compare previously unimaginable aesthetic and spatial possibilities, not merely as 'alternatives', but as conceptual explorations that can spark deeper design discussions. In this context, AI serves not only as a visual aid but as an ideational catalyst driving a paradigm shift toward a more reflective, inclusive, and interactive design process.

3.2 Efficiency Productivity: Reducing Burden, Accelerating Iteration

Amid time constraints and the complexity of architectural projects, generative AI tools such as Copilot, ChatGPT, and Gemini offer a significant leap in productivity. The transition from concept to visual representation no longer relies on time-consuming manual steps; it can be done instantly and repeatedly. This efficiency is not just about speed but about reducing cognitive load—allowing architects and architecture educators to focus on the substance of ideas rather than technical execution. AI bridges the gap between intuition and visual articulation, optimising teaching workflows and interdisciplinary collaboration that were previously hampered by tool and skill gaps.

More importantly, AI-generated digital images no longer function as final artefacts but rather as reflective, open-ended tools for negotiating meaning. In the context of teaching and research, this shifts the paradigm of architectural representation from the result to a speculative, reflective, dialogical process. Teachers and students can easily compare and deconstruct design versions, encouraging deeper discussions about values, context, and visual ethics. Thus, AI is not only a technical accelerator but also an intellectual facilitator, capable of enriching the processes of learning and architectural creation in a more holistic way. There is a deep, ongoing responsibility and maturity required to interpret rapid iterations of variation, as demanded by a design learning process.

3.3 Visual Communication: Unity of Words and Images in Representation

In an era of increasingly multimodal design, generative AI is driving a shift in how architecture is communicated—from merely technical presentations to visual narratives that can reach audiences across disciplines and cultures. Images generated by Copilot, ChatGPT, and Gemini serve not only as design illustrations but also as narrative media that intuitively convey the atmosphere, context, and intent of ideas. The unity between words as text commands and visual images as their translations expands the capacity of architectural representation, allowing design messages to be felt and interpreted symbolically and

communicatively, especially in environments that demand cross-language and cross-background communication.

Pedagogically, the integration of AI into the visualisation process encourages greater media literacy among architecture students, inviting them not only to produce attractive images but also to critically assess the meaning and visual impact of those images. Representation becomes an arena for dialogue, a place where words and images reinforce one another to construct reflective and relevant design narratives. With this approach, visualisation is no longer the end point of documentation, but the starting point for contextual re-reading that is open to interpretation. Further depth is needed because, to date, generative models are limited to illustrations and abstract models, not yet holistic integration, both technically and ideologically. AI, in this case, is not just a tool, but a partner in building a visual language that is more empathetic, poetic, and responsive to the cultural and social complexities of the future.

3.4 Critical Limitations and Implications for Design Practice

While these generative models provide unparalleled efficiency in expanding the space of initial architectural imagination, a balanced critical reflection reveals severe structural and epistemological boundaries that practitioners and educators must navigate.

1. **The Illusion of Tectonic Validity:**

None of the tested platforms possesses an intrinsic understanding of structural engineering, physics, or building materials. Wood and iron are treated purely as graphic textures or formal gestures rather than authentic tectonic logic, meaning AI outputs remain restricted to shallow visual simulations.

2. **Contextual and Ecological Disconnection:**

Although Copilot blended the building mass seamlessly with the tropical setting, the integration is purely atmospheric and scenic rather than functionally energy-efficient, as specified in the prompt. The tools cannot compute genuine environmental data, risking the generation of greenwashed architectural forms that are physically unviable.

3. **The Risk of Passive Assimilation:**

Because these platforms generate high-fidelity, polished imagery in seconds, they risk short-circuiting the deep, slow reflection that architectural learning demands. Students and practitioners may passively accept visually seductive artefacts without interrogating their cultural, symbolic, or ethical values.

This phenomenon underscores the 'illusion of tectonics' [35], where generative AI mimics highly polished architectural aesthetics without an intrinsic understanding of load-bearing physics, material constraints, or actual ecological performance. Therefore, prompt programming must be accompanied by rigorous media literacy in architectural pedagogy to avoid the passive consumption of unviable forms. For contemporary design practice, these findings imply that AI cannot replace human architectural intuition or technical expertise. Instead, its optimal role is an interactive conversational mirror—a tool to test form mutations and rapidly push past creative blocks, provided the architect maintains strict critical agency and media literacy over the output.

4. CONCLUSION

This study demonstrates how the integration of generative AI in the architectural design process has gone beyond mere visual automation, becoming a conceptual catalyst that expands the space for imagination, work efficiency, and cross-audience communication. Copilot, ChatGPT, and Gemini not only generate rapid and diverse variations in form but also enable speculative design exploration that can enrich spatial and symbolic interpretations. The three open an inclusive, interactive, and reflective landscape and arena, making the representation process a discursive arena rather than just a result.

In terms of productivity, AI enables designers, educators, and learners to overcome technical barriers, accelerate iteration, and shift their focus toward creating deeper meaning and finding the best iterations. Digital images now serve as a medium for thinking, not just conclusive visualisation, encouraging cross-disciplinary collaboration and deeper spatial understanding. The efficiency offered is not reductive, but transformative: creating new space for intellectuality and empathy in the design process.

Finally, this study emphasises the importance of visual and media literacy in education and the development of contemporary architectural design. Generative AI facilitates the integration of instructional

words, intuitive translations, and image outputs into a more communicative and symbolic form of communication, reinforcing architectural messages in a complex global context. In this role, AI is not merely a design tool but a thinking partner that helps formulate narratives, build poetic visual language, and create a design ecosystem that is more responsive to current cultural and social challenges. Further opportunities from this study include addressing contextual limitations and exploring various other generative models more specific to architecture, such as simulation, visualisation, or integrated complex modelling, including BIM and other approaches.

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