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EXTENDED ABSTRACTS
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KINESTHETIC ARCHITECTURE EXPLORATION THROUGH FORM (KAtF): AN AI ENHANCED KINESTHETIC LEARNING MODULE

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ABSTRACT

Learning Kinesthetic Architecture through Kinesthetic Learning. Architectural education will undergo progressive transformation with the introduction of Kinesthetic Architecture Exploration through Form (KAtF), an innovative module that combines hands-on, physical learning activities with advanced artificial intelligence tools to generate creative ideas and solutions. This paper presents KAtF as an approach to learning kinesthetic architecture, emphasizing creativity, exploration, and technological fluency. At the heart of KAtF is the innovative integration of form-centric hands-on activities with AI-driven design exploration. Students engage in crafting paper sculptures that serve as physical embodiments of architectural forms, allowing for a profound exploration of spatial composition, proportions, and design principles. This form-centric approach fosters creativity and spatial intelligence while providing a tangible platform for architectural expression. This qualitative study investigates the efficacy of integrating kinesthetic learning principles with AI technology in architectural education, utilizing a paper sculpting module and AI prompting tools to facilitate form-centric hands-on learning. This study assesses the impact of this approach on rapid visualization and heuristic ideation among 24 and 81 architectural students in their third and fourth semesters, respectively at Universiti Teknologi MARA (UiTM), Perak Branch, Seri Iskandar Campus. Findings reveal significant improvements in students' visualization capabilities over time, alongside a proliferation of diverse ideas while maintaining originality and direction. The study underscores the importance of preserving the origin of ideas while leveraging technology, advocating for the incorporation of psychomotor skills development alongside AI integration to foster creativity and innovation in architectural design, thereby advancing architectural education holistically.

Keyword: Architectural Education, Artificial Intelligence (AI), Form-Centric, Hands-On Learning, Kinesthetic Architecture

1.   INTRODUCTION

The swift progress of artificial intelligence (AI) provides a substantial chance for architectural education, as it provides sophisticated instruments for design investigation and ingenuity. However, while AI in education has been extensively examined through instructional and constructivist theories (McArthur et al., 2005; McCormack et al., 2020), its utilization in education has traditionally focused on graduate-level studies, although its application in design education is now burgeoning. This growing need for innovative teaching methods in Malaysia's architectural education landscape, as highlighted by Sayed Abul Khair et al. (2023), underscores the importance of keeping pace with global advancements. One promising approach to address this need is the

integration of hands-on form-centric learning with AI-enhanced ideation. This approach aligns with the concept of kinesthetic learning, which entails the exploration of architectural forms through hands-on activities as a teaching method in architectural education. This concept differs from kinesthetic architecture which refers to the comprehension of space by actively moving and orchestrating the human body within spatial structures explored into the spatial understanding through physical engagement within architectural spaces. By incorporating practical learning with AI technologies, architectural education experiences can be greatly enhanced, promoting creativity, spatial intelligence, and technological proficiency among students. To illuminate the interaction between both tactile engagement and AI-driven design exploration, this paper presents the conceptual framework of Kinesthetic Architecture Exploration via Form (KAtF) module with few samples on the application.

2. METHODOLOGY

The evaluation of this module is centered on third semester and fourth-semester architectural students at Universiti Teknologi MARA (UiTM), Perak Branch, Seri Iskandar Campus. Through the innovation of the KAtF module, emphasis is placed on the efficacy of creative thinking and the extension of students' original ideas. This module involves a series of phases to assist the process of idea exploration from phase 1 which is the mapping that contributes to Kinesthetic architecture to design spaces that inspire movement, exploration, and interaction, enhancing people's experience of the environment. Next in the second phase, Sculpting, a hands-on learning focuses on form-making through paper model sculpture, integrating cognitive understanding of kinesthetic architecture with psychomotor skills. Then, in the third phase, Orbiting, the process of transforming a 3D paper sculpture into multiple 2D images involves capturing details and proportions, considering angles, lighting, and perspective to accurately represent the original model. Finally, in the fourth phase, students use AI tools such as Lookx AI and mnml.AI to transform 2D projections into generative AI images, setting initial parameters such as style, movement, scenario, and material to maintain the direction of original ideas. The module then can be extended with the AI Rapid Conceptualization & Heuristic Ideation (ARCHI) module, which focuses on text prompting to explore deeper into architectural concepts and design principles (Sayed Abul Khair et al., 2023).
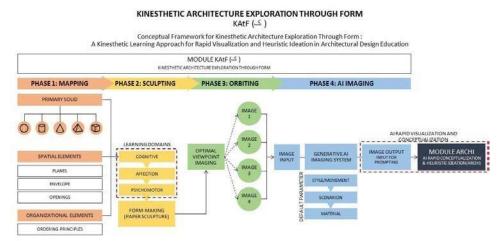

Figure 1 Conceptual Framework for Kinesthetic Architecture Exploration Through Form KAtf

3. FINDINGS

Table 1 Sample of students' ideation flow using KAtF module

Sample	Mapping	Paper sculpture model	Orbit Perspective	RAW Output
SAMPLE 1	Combination of pyramid and rectangle, direction for the horizontal plane, and linear organization			
SAMPLE 2	Combination of cylinder and cube, radial element, and clustered organization			
SAMPLE 3	Fusion of semi-circle and structural elements, focusing on linear axis			
SAMPLE 4	Combination of cylinder and dome elements, direction for the vertical and horizontal plane, and linear organization			
SAMPLE 5	Fusion of semi-circle and cylinder, directions to fluidity elements, and linear organization			
SAMPLE 6	Combination of hexagons, semi-circles, and cubes focusing on vertical lines and clustered organization			
SAMPLE 7	Integration of triangle solid, focusing on the enhancing of geometry and clustered elements.			

4.   CONCLUSION

The evaluation assesses the effectiveness of integrating paper sculpting modules and AI prompting tools into the curriculum to enhance creativity, spatial intelligence, and technological fluency among students. This approach advances architectural education by seamlessly combining psychomotor skills with AI integration to foster originality in design. KAtF not only enhances these skills but also offers significant benefits in time-efficiency, cost-saving, and idea exploration for both students and educators.

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