

THE MiNDS FRAMEWORK: VISUALISING ARCHITECTURAL HISTORY THROUGH VISUAL CONSTRUCTIVIST LEARNING

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Abstract: *Architectural History is a fundamental subject in architecture education, yet many students experience difficulties due to the extensive use of text-based notes and chronological memorisation. This study introduces The MiNDS Framework (Mindmapping Interactive Notes for Design Studies) as a visual constructivist learning framework designed to enhance the teaching and learning of Architectural History through hierarchical knowledge organisation, architectural illustration, relationship mapping, and narrative learning. The framework was initially developed through the e-book Modern Architecture: Lineages, Masters, and Tropical Reinterpretation and evaluated using a convergent mixed-methods pilot study involving 35 Diploma in Architecture students and four expert architecture educators from Malaysian higher education institutions. Descriptive findings indicated high levels of perceived understanding ($M = 4.49$), interest ($M = 4.36$), higher-order thinking skills ($M = 4.31$), technology acceptance ($M = 4.05$), and learning effort ($M = 3.82$). Expert reviewers also recognised the framework as an engaging and practical teaching approach while recommending minor refinements to its graphical presentation and instructional design. Overall, the findings provide encouraging preliminary evidence supporting The MiNDS Framework and establish an initial empirical foundation for its continued validation and refinement within architecture and TVET education.*

Keywords: *Architectural History; Architectural Pedagogy; Mind Mapping; The MiNDS Framework; TVET; Visual Constructivist Learning.*

Introduction

Architectural History and Theory is a core subject in architecture education because it provides students with an understanding of architectural movements, influential architects, design philosophies, and the historical development of the built environment. Beyond learning historical facts, students are expected to recognise the relationships between architectural ideas and their influence on contemporary design practice (Salama, 2015).

Despite its importance, Architectural History is often regarded as one of the more challenging subjects for architecture students. Teaching commonly relies on lectures, text-based notes, and chronological descriptions, requiring students to memorise a large amount of information. This conventional approach often limits students' ability to understand the relationships between architectural concepts, resulting in fragmented rather than meaningful learning.

Architecture, however, is inherently a visual discipline. Throughout their studies, students communicate ideas through sketches, diagrams, drawings, and visual representations. While visual thinking forms the foundation of architectural design studios, it is less frequently integrated into the teaching of Architectural History. This mismatch creates a gap between how architecture students naturally learn and how historical knowledge is traditionally delivered. Various visual learning approaches, including mind mapping and concept mapping, have demonstrated positive effects on organising information and improving understanding (Buzan & Buzan, 2010; Nesbit & Adesope, 2006). Nevertheless, most existing approaches remain generic and are not specifically developed for Architectural History education, where students need to understand relationships between architects, movements, philosophies, and design evolution.

To address this gap, this paper proposes The MiNDS Framework (Mindmapping Interactive Notes for Design Studies) as a Visual Constructivist Learning Framework for Architectural History education. The framework integrates hierarchical knowledge organisation, architectural illustration, relationship mapping, narrative learning, and reflective thinking into a single visual learning approach that encourages students to construct understanding rather than memorise historical information.

The MiNDS Framework was first implemented through the development of the illustrated e-book *Modern Architecture: Lineages, Masters, and Tropical Reinterpretation* (Saaïd, 2025). This paper presents the initial pilot validation of the framework involving Diploma in Architecture students and expert architecture educators. Rather than providing conclusive evidence of effectiveness, the study establishes the initial conceptual and empirical foundation of The MiNDS Framework, which will be further validated and expanded in future research.

Literature Review

Architectural History plays a significant role in architectural education by providing students with an understanding of the evolution of architectural movements, design philosophies, technological innovations, and cultural influences that continue to shape contemporary architecture. Beyond recognising historical events, students are expected to understand how architectural ideas developed, interacted, and evolved across different periods. Such understanding forms an important foundation for critical thinking and informed design decision-making.

Despite its importance, Architectural History remains one of the subjects that students often perceive as difficult and content-intensive. Teaching is commonly centred on lectures, chronological narratives, and text-based notes, requiring learners to memorise extensive historical information within a limited period. Although this approach enables the delivery of large amounts of content, it often encourages factual recall rather than conceptual understanding. Students may recognise architectural styles or influential architects but experience difficulty explaining the relationships between architectural movements, philosophical influences, technological advancement, and environmental responses.

This challenge is particularly relevant in architecture education, where learning is naturally visual and exploratory. Throughout their education, architecture students communicate ideas through sketches, diagrams, drawings, and spatial representations. Consequently, learning strategies that promote visual exploration are more closely aligned with architectural thinking than approaches that rely predominantly on textual information. The inconsistency between the visual nature of architecture education and the conventional delivery of Architectural History therefore presents an important pedagogical concern.

Constructivist learning theory provides a useful perspective for addressing this issue. According to Piaget (1972) and Vygotsky (1978), meaningful learning occurs when learners actively organise, interpret, and connect new information with their existing knowledge. Learning is therefore not simply the acquisition of facts but a continuous process of knowledge construction. Within architecture education, similar learning processes are evident in design studios, where students progressively develop ideas through exploration, reflection, and visual representation. Applying these principles to Architectural History suggests that historical knowledge should also be constructed through active engagement rather than passive memorisation.

Visual learning approaches have demonstrated considerable potential in supporting this process. Mind mapping, concept mapping, and other graphical learning strategies have been shown to improve information organisation, comprehension, and long-term retention by presenting knowledge in structured visual forms (Buzan & Buzan, 2010; Nesbit & Adesope, 2006). Nevertheless, these approaches were developed as general educational strategies and provide limited consideration of the unique learning characteristics of Architectural History. Understanding architecture requires more than organising information into hierarchical branches; students must also recognise the relationships between architects, architectural movements, philosophical ideas, technological innovations, and contextual influences that collectively explain the evolution of architecture.

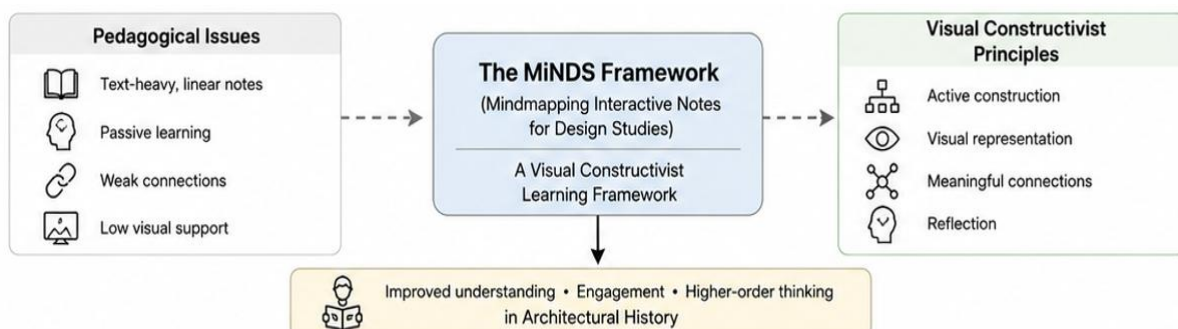


Figure 1: Conceptual development of The MiNDS Framework

Existing literature therefore indicates a pedagogical gap between visual constructivist learning principles and their practical application in Architectural History education. While previous studies have demonstrated the educational value of visual learning, relatively few have translated these principles into a structured learning framework specifically designed for architecture students. This study addresses that gap by proposing The MiNDS Framework (Mindmapping Interactive Notes for Design Studies) as a visual constructivist learning framework that integrates hierarchical knowledge organisation, architectural illustration, relationship mapping, narrative learning, and reflective thinking into a coherent pedagogical approach for Architectural History education (Figure 1).

The MiNDS Framework

Based on the pedagogical issues identified in the literature, this study proposes The MiNDS Framework (Mindmapping Interactive Notes for Design Studies) as a visual constructivist learning framework for Architectural History education. Rather than functioning as a conventional mind-mapping technique, the framework integrates constructivist learning principles with visual thinking to support meaningful knowledge construction through structured visual representation. The framework comprises five interrelated learning principles, namely hierarchical knowledge organisation, architectural illustration, relationship mapping, narrative learning, and reflective thinking, which collectively support conceptual understanding in Architectural History (Figure 2).

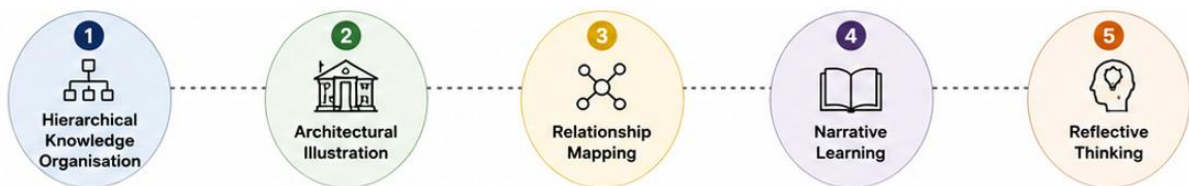


Figure 2: The MiNDS Framework: Five interrelated learning principles

Learning begins with hierarchical knowledge organisation, allowing students to organise historical knowledge systematically from broader architectural themes to more specific concepts. This structured organisation provides a clearer overview of architectural development while reducing fragmented understanding. The learning process is further strengthened through architectural illustration, where sketches, diagrams, and architectural drawings assist students in translating abstract historical concepts into meaningful visual representations.

The central component of the framework is relationship mapping, which encourages students to identify meaningful connections between architects, architectural movements, design philosophies, technological developments, climatic responses, and historical influences. Unlike conventional mind maps that primarily organise keywords, The MiNDS Framework emphasises conceptual relationships that explain the evolution of architectural ideas over time. The framework also incorporates narrative learning and reflective thinking, enabling students to interpret historical knowledge critically and relate past architectural precedents to contemporary design practice (Figure 2).

The overall implementation of The MiNDS Framework follows an iterative constructivist learning process consisting of organising information, visualising concepts, establishing relationships, interpreting knowledge, and reflecting on learning outcomes (Figure 3).



Figure 3: Learning Process of The MiNDS Framework

The learning cycle begins with the identification of a central architectural topic before learners organise relevant information into a structured hierarchy. Students then visualise architectural concepts through sketches and diagrams, establish conceptual relationships between historical ideas, and interpret the significance of these relationships within broader architectural development. The final stage involves reflection, where learners synthesise newly acquired knowledge with their existing understanding, leading to deeper conceptual learning and long-term knowledge retention (Figure 3).

The MiNDS Framework was operationalised through the development of the illustrated e-book *Modern Architecture: Lineages, Masters, and Tropical Reinterpretation*, which served as the primary instructional resource for this pilot study. The present study therefore represents the initial stage in validating the proposed framework prior to broader empirical testing and implementation.

Methodology

This study adopted a convergent mixed-methods pilot design to obtain preliminary evidence on the acceptability and perceived effectiveness of The MiNDS Framework in Architectural History education. Quantitative and qualitative data were collected concurrently and interpreted together to provide complementary perspectives on the proposed framework. Given that this study represents the initial development stage of The MiNDS Framework, the emphasis was placed on exploratory evaluation rather than statistical generalisation.

The quantitative component involved 35 Diploma in Architecture students from Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS), selected through convenience sampling after experiencing learning activities using the MiNDS-based instructional materials. Data were collected using a 5-point Likert-scale questionnaire consisting of five constructs, namely Interest, Understanding, Higher Order Thinking Skills (HOTS), Learning Effort, and Technology/AI Acceptance.

The qualitative component consisted of expert validation involving four experienced architecture educators representing Malaysian polytechnics and a public university. The experts evaluated The MiNDS Framework using a structured review instrument comprising quantitative ratings and open-ended comments focusing on the framework's pedagogical suitability, visual presentation, conceptual clarity, and potential for wider implementation in architectural education.

Quantitative data were analysed using descriptive statistics (mean scores), while qualitative responses were analysed through thematic summarisation to identify recurring strengths, limitations, and recommendations. The integration of both datasets provided preliminary evidence to support the proposed MiNDS Framework prior to large-scale validation.

Findings

The findings are presented based on the quantitative student survey and qualitative expert evaluation. Overall, both datasets consistently indicate positive acceptance of the proposed MiNDS Framework as a visual constructivist learning approach for Architectural History education.

Student Pilot Survey

The descriptive analysis revealed positive responses across all five constructs, with mean scores ranging from 3.82 to 4.49. As presented in Table 1, Understanding recorded the highest mean score ($M = 4.49$), followed by Interest ($M = 4.36$) and Higher Order Thinking Skills (HOTS) ($M = 4.31$). Technology and AI Acceptance also achieved a high level ($M = 4.05$), while Learning Effort obtained the lowest mean ($M = 3.82$), although it remained within the high category. These findings suggest that students perceived The MiNDS Framework as an effective and engaging learning approach that supported conceptual understanding and visual learning.

Table 1: Descriptive Statistics of Student Perceptions (n = 35)

Construct	Mean Score	Interpretation
Understanding	4.49	Very High
Interest	4.36	Very High
Higher-Order Thinking Skills (HOTS)	4.31	Very High
Technology & AI Acceptance	4.05	High
Learning Effort	3.82	High

Item-level analysis further showed that students highly appreciated the framework's ability to improve topic understanding, strengthen memory retention, facilitate revision, increase learning engagement, and help them visualise relationships between architectural concepts. These outcomes are consistent with the visual constructivist principles underpinning the proposed framework.

Expert Validation

The expert evaluation also produced encouraging findings. Overall, reviewers agreed that The MiNDS Framework provides a visually engaging learning approach capable of improving students' interest and conceptual understanding of Architectural History. The integration of architectural illustrations, structured visual mapping, and relationship mapping was consistently recognised as one of the framework's major strengths.

Three recurring themes emerged from the expert reviews. First, the framework successfully enhances visual engagement by presenting historical information in a more attractive and organised format. Second, the framework improves conceptual understanding by helping students establish meaningful relationships between architects, architectural movements, and design philosophies. Third, reviewers recommended further refinement of the visual presentation through denser graphical content, improved layout consistency, and continuous sketching practice to maximise learning effectiveness.

Summary of Findings

The quantitative and qualitative findings consistently indicate encouraging preliminary support for the proposed MiNDS Framework. The student pilot survey demonstrated high levels of perceived understanding, learning interest, higher-order thinking skills (HOTS), and acceptance of the framework as a visual learning approach. These findings suggest that The MiNDS Framework has the potential to enhance students' conceptual understanding and engagement in Architectural History through structured visual knowledge construction (Figure 4).

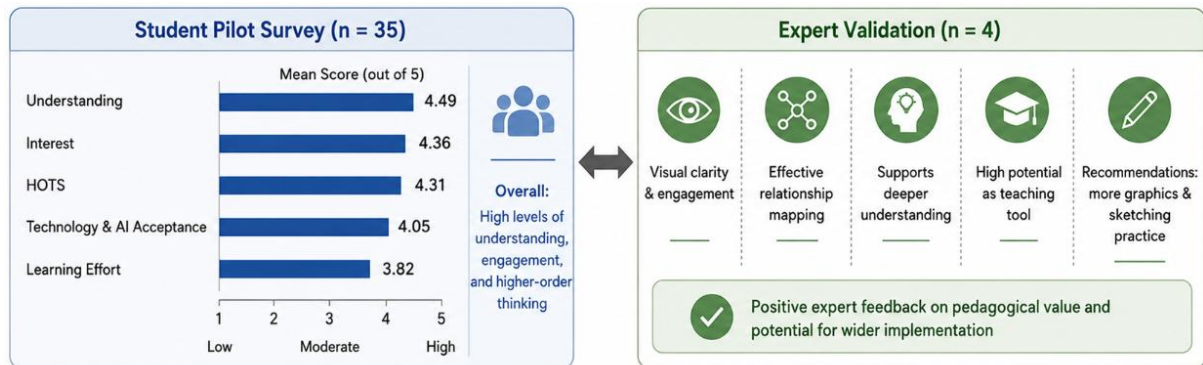


Figure 4: Pilot validation of The MiNDS Framework

Similarly, the expert validation reinforced the pedagogical value of the framework by highlighting its effectiveness in improving visual engagement, conceptual relationship mapping, and meaningful learning. While reviewers recommended minor refinements to the graphical presentation and instructional design, they unanimously recognised the framework's potential for wider implementation in architectural education. Collectively, these findings provide an encouraging empirical foundation for the continued refinement and future large-scale validation of The MiNDS Framework

Discussion

The present study introduced and provided preliminary validation of The MiNDS Framework as a visual constructivist learning framework for Architectural History education. Overall, the findings indicate positive acceptance among both students and expert reviewers, suggesting that the framework offers a practical approach for enhancing visual learning and conceptual understanding in architecture education.

The high levels of perceived understanding, learning interest, and higher-order thinking suggest that The MiNDS Framework supports meaningful learning by encouraging students to organise and relate architectural knowledge through structured visual representation. Rather than focusing on memorisation, the framework promotes conceptual relationship mapping, allowing students to understand the evolution of architectural ideas more effectively. These findings are consistent with constructivist learning principles, which emphasise active knowledge construction through meaningful learning experiences.

The expert evaluation further supports the educational value of the framework. Reviewers recognised its potential to improve visual engagement and conceptual understanding while recommending minor refinements to the graphical presentation and instructional design. These suggestions provide useful directions for improving the framework without affecting its underlying pedagogical concept.

Although the findings are encouraging, this study represents the initial stage of framework development. As the evaluation was limited to students' perceptions and expert judgement, the findings should be interpreted as preliminary evidence of feasibility rather than definitive evidence of effectiveness. Future research should therefore involve larger samples, multiple institutions, and experimental designs to evaluate the impact of the framework on academic performance, knowledge retention, and visual thinking skills.

Overall, the study demonstrates that The MiNDS Framework has considerable potential as a visual constructivist learning approach for Architectural History education. More importantly, it establishes an initial conceptual and empirical foundation for the continued refinement, validation, and wider implementation of the framework within architecture and TVET education.

Contributions of the Study

This study makes a foundational contribution to architectural pedagogy by introducing The MiNDS Framework as a visual constructivist learning framework for Architectural History education. Unlike conventional mind-mapping approaches, the framework integrates hierarchical knowledge organisation, architectural illustration, relationship mapping, narrative learning, and reflective thinking into a coherent pedagogical model that aligns with the visual nature of architectural learning. As an initial framework study, it provides a conceptual foundation for future validation and the continued development of visual learning approaches in architecture and design education.

Practically, The MiNDS Framework provides educators with a structured and visually oriented teaching approach that supports active learning and conceptual understanding in Architectural History. The framework can be readily adopted in the development of illustrated learning materials, interactive classroom activities, and digital educational resources to enhance student engagement and meaningful learning. The encouraging findings from this pilot study also demonstrate its potential for wider implementation in architecture programmes and other related disciplines within the TVET sector.

Conclusion

This paper introduced The MiNDS Framework (Mindmapping Interactive Notes for Design Studies) as a visual constructivist learning framework designed to enhance the teaching and learning of Architectural History. By integrating hierarchical knowledge organisation, architectural illustration, relationship mapping, narrative learning, and reflective thinking, the framework offers an alternative pedagogical approach that is better aligned with the visual learning characteristics of architecture students. The findings from the pilot study indicate encouraging preliminary evidence regarding the framework's acceptability and educational potential.

While the present study represents the initial stage of framework development, it establishes a conceptual and empirical foundation for future research. Further studies should focus on large-scale validation, experimental evaluation, and digital integration to strengthen the effectiveness and wider application of The MiNDS Framework in architectural education and related TVET disciplines.

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