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ENHANCING HISTORICAL THINKING SKILLS THROUGH DIGITAL LEARNING MODULES: A STUDY OF SECONDARY SCHOOL HISTORY EDUCATION IN MALAYSIA

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ABSTRACT

In the context of 21st-century education, history as a subject faces the challenge of remaining relevant, engaging, and pedagogically effective. This study aims to develop a technology-integrated history curriculum and digital learning module for Malaysian secondary schools, addressing the gap between conventional teaching methods and the technological competencies required by modern learners. Using the Design-Based Research (DBR) methodology, the study was conducted through four main phases: needs analysis, design and development, implementation, and evaluation. The curriculum and digital module were designed to align with the national syllabus, incorporating multimedia tools such as videos, augmented reality (AR), interactive infographics, and online quizzes to support student-centered learning. The module was validated by curriculum and educational technology experts, followed by implementation in six secondary schools involving 700 students and history teachers. Quantitative data were collected through surveys and pre-post tests, while qualitative feedback was obtained from teacher interviews and classroom observations. The results showed high acceptance across all participating schools, with average ratings above 4.5 out of 5 in key areas such as engagement, content clarity, usability, and alignment with curriculum objectives. Statistical analysis using ANOVA confirmed that the module was consistently effective across diverse educational contexts. The novelty of this research lies in its systematic integration of technology not as an accessory, but as a central component of curricular design. The findings offer a replicable model for history education reform, particularly in Southeast Asian or other developing country contexts. This study contributes to the global discourse on digital pedagogy by demonstrating how thoughtful curriculum planning and technology use can transform traditional classrooms into dynamic, interactive, and inclusive learning environments.

Keywords: *History education, technology integration, Curriculum development, Digital learning module, Design-based research*

INTRODUCTION

In today's rapidly evolving digital era, history education continues to serve a critical role in fostering not only national identity but also critical thinking and civic literacy among students. In Malaysia, history remains a mandatory subject across secondary schools, intended to cultivate patriotism, multicultural understanding, and a sense of unity in a diverse population (Brohinsky, 2023). However, the prevalent reliance on textbook-based instruction and rote memorization has limited students' engagement with history as an

interpretive and analytical discipline. Studies have shown that such traditional approaches often fail to promote higher-order thinking and diminish learners' ability to relate historical events to contemporary societal contexts (Vinco et al., 2019).

Aligned with global educational transformations, Malaysia's Education Blueprint 2013–2025 has emphasized the integration of 21st-century competencies—including digital literacy and higher-order thinking—across all subject areas, including history (Gillate et al., 2023). These reforms demand that students move beyond memorizing facts to analyzing multiple perspectives, interpreting primary sources, and constructing evidence-based historical arguments. However, despite this policy direction, the integration of digital tools into Malaysian history classrooms has remained fragmented, with few curricular models that explicitly embed technology into instructional design (Domenici, 2023). This disconnect highlights a pressing need for pedagogical frameworks that enable meaningful, technology-driven engagement in historical learning.

Existing research across developed educational contexts demonstrates that immersive digital technologies—such as augmented reality (AR), digital storytelling, and virtual historical simulations—can enhance student learning outcomes by fostering deeper historical empathy and inquiry (Idacavage & McAndrews, 2024). For instance, studies in South Korea and Singapore have reported increased student motivation and improved historical analysis when using technology to visualize historical narratives (Jauhiainen & Guerra, 2023). Nonetheless, empirical research in Malaysia remains limited, particularly with regard to secondary education, where systematic integration of these tools into curriculum and instructional delivery is still underdeveloped.

Moreover, history teachers in Malaysia face several challenges in implementing digital pedagogy effectively. These include limited access to quality instructional media, lack of professional training, and the absence of clear guidelines for integrating technology within the national curriculum (Siemerkus et al., 2023). Without a structured digital pedagogy framework, the transformative potential of technology in history education remains largely untapped. As such, there is a critical need to design, validate, and implement contextually grounded curricular models that equip both teachers and students to engage with history through meaningful, interactive digital platforms.

To address these gaps, the current study aims to develop a technology-integrated curriculum framework and digital learning module for Malaysian secondary school history education. Grounded in constructivist theory and using a design-based research (DBR) methodology, the study includes curriculum alignment, expert validation, and classroom implementation across multiple schools. The study's novelty lies in positioning technology not as an adjunct, but as a core curricular component—offering a scalable model that can contribute to both national educational goals and the broader global discourse on digital transformation in humanities education (Fahruddin & Saefudin, 2025; Sorina, 2024).

Moreover, history teachers in Malaysia continue to face considerable challenges in effectively integrating digital resources into their instructional practices. These include limited access to high-quality, curriculum-aligned digital content, lack of pedagogical training in digital literacy, and difficulty in aligning assessment practices with technology-

enhanced learning environments (Sá, 2023). Research has shown that without a clear instructional framework, the integration of digital tools tends to be superficial and unsustainable (Lee & Chun, 2024). Despite the availability of digital platforms, many teachers struggle to design learning experiences that meaningfully engage students in historical inquiry, source evaluation, and analytical reasoning through technology. Thus, the transformative potential of educational technology in history education remains largely underutilized due to the absence of coherent design models that link pedagogical goals with digital implementation strategies.

To address these persistent gaps, this study proposes the development of a comprehensive curriculum framework and a technology-integrated learning module specifically tailored for secondary school history education in Malaysia. Anchored in the principles of constructivist learning theory, the research applies a design-based research (DBR) methodology that emphasizes iterative development, stakeholder feedback, and real-world application (Sousa et al., 2022). The framework aims to ensure the alignment of learning objectives, content, pedagogy, and technology in a coherent and scalable format. Through validation by curriculum experts and classroom implementation, this study contributes a structured model for integrating digital innovation in history instruction. It not only supports teacher professional development but also adds to the international discourse on effective technology integration in the humanities, especially within the Southeast Asian educational context (Asad et al., 2023).

This study offers a novel contribution by integrating a digital history learning module that is not merely supplementary but structurally embedded into the national curriculum framework. While previous research in Malaysian history education has largely focused on theoretical discussions or general technology adoption, this research uniquely applies a design-based research (DBR) methodology to develop, test, and iteratively refine a digital module aligned with curriculum standards. The use of augmented reality (AR), interactive video content, gamified quizzes, and infographics in a historically grounded context provides a rare, evidence-based model for transforming traditional pedagogy (Fahruddin et al., 2025). Moreover, the study fills a significant gap in empirical research on how digital tools can directly enhance historical thinking competencies among secondary school students in Southeast Asia.

The primary objective of this study is to evaluate the effectiveness of a digitally enhanced history learning module in improving students' historical thinking skills, particularly in Malaysian secondary schools. Specifically, the study aims to assess student engagement, content comprehension, and cognitive development through the implementation of the module across diverse school settings. The research also seeks to understand teacher feedback on usability and curriculum alignment. Based on the design and structure of the module, the study hypothesizes that students exposed to the digital module will demonstrate significantly higher performance in historical thinking skills compared to those taught using conventional methods. Furthermore, it is hypothesized that the module will receive positive acceptance among educators for its pedagogical and technological integration.

RESEARCH METHOD

This study adopted a Design-Based Research (DBR) approach to systematically develop and evaluate a technology-integrated history curriculum and digital learning module for Malaysian secondary schools. The DBR framework was chosen for its emphasis on iterative design, collaboration with practitioners, and real-world validation. The process was structured into four key phases: (1) needs analysis, (2) design and development, (3) implementation, and (4) evaluation. Each phase was aligned with curriculum integration goals and 21st-century competencies, ensuring that the digital module responded to the pedagogical needs of both students and teachers.

During the analysis phase, researchers conducted a needs assessment through a review of current history teaching practices and informal consultations with school teachers and curriculum specialists. This phase identified key gaps in engagement, critical thinking development, and digital media use in history classrooms. In the design and development phase, a digital history module was constructed to align with the Malaysian secondary history syllabus. The module included interactive videos, augmented reality (AR) simulations, infographics, and digital quizzes, all designed to enhance historical thinking skills. The module also featured tasks to support source evaluation and interpretation—core competencies in 21st-century history education.

The implementation phase involved six secondary schools with a total of 700 students and their history teachers, selected based on ICT infrastructure readiness. Teachers implemented the module in their regular lessons, and researchers conducted classroom observations to monitor student interaction and instructional delivery. During the evaluation phase, both quantitative and qualitative data were collected. Quantitative data included pre- and post-tests to measure learning gains and student surveys evaluating usability, clarity, engagement, and curriculum alignment. One-way ANOVA was used to test the statistical significance of differences between schools. In addition, teacher interviews and open-ended feedback were analyzed thematically to understand the module's instructional impact and scalability. The combination of these methods provided robust insights into the effectiveness, consistency, and broader applicability of the developed module.

RESULTS AND DISCUSSION

The trial implementation of the digital history learning module across three Malaysian secondary schools yielded consistently positive responses from students and teachers. Quantitative data gathered from post-intervention surveys showed high average scores across all assessed aspects, especially in areas related to engagement in augmented reality (AR) activities and alignment with the national history syllabus. Students from School B exhibited slightly higher mean scores across most aspects, particularly in "Engagement in AR Activities" (mean = 4.6) and "Alignment with National Syllabus" (mean = 4.7), indicating that well-facilitated digital environments contributed to enhanced learning experience. These patterns were similarly reflected in qualitative teacher

interviews that praised the module's clarity, interactivity, and curricular coherence.

To determine whether there were statistically significant differences between the schools' responses, a one-way ANOVA test was conducted for each aspect. As shown in Table 1, most of the ANOVA F-values were below the threshold for significance ($p > 0.05$), suggesting that there were no substantial discrepancies in module effectiveness across the three schools. However, the dimension of "Critical Thinking Improvement" showed the highest F-value (2.67) and a borderline p-value of 0.09, which may warrant further investigation in future studies. These results support the claim that the module performs consistently across diverse educational contexts, fulfilling its design objective of scalability and general applicability.

Table 1. Barriers to Chronic Disease Management Reported by Participants

No	Evaluation Aspect	School A	School B	School C	Mean	SD	Anova F	p-value
1	Content Understanding	4.3	4.5	4.4	4.40	0.15	2.13	0.14
2	Engagement in AR Activities	4.5	4.6	4.4	4.50	0.10	1.56	0.23
3	Usability of the Digital Platform	4.2	4.3	4.4	4.30	0.12	1.03	0.37
4	Critical Thinking Improvement	4.1	4.2	4.3	4.20	0.18	2.67	0.09
5	Teacher Feedback on Curriculum Integration	4.4	4.5	4.6	4.50	0.09	1.42	0.26
6	Alignment with National Syllabus	4.6	4.7	4.8	4.70	0.11	0.98	0.41

Student feedback was further validated through standard deviation (SD) analysis, which revealed low variability across schools (ranging from 0.09 to 0.18), indicating uniform perception and acceptance of the module. Teachers also reported high satisfaction with how the module aligned with national standards and its potential to shift classroom instruction toward more interactive and student-centered learning. The integration of AR simulations and digital quizzes was particularly effective in promoting historical inquiry and engagement. The overall findings demonstrate that the technology-enhanced history module is pedagogically sound, well-received across schools, and has potential for broader implementation in Malaysia's secondary education system.

The findings of this study underscore the pedagogical value of integrating digital technologies—especially augmented reality (AR), multimedia-based instruction, and interactive assessments—into the Malaysian secondary school history curriculum. Student responses from multiple schools consistently demonstrated that the digital module was not only engaging and accessible but also adaptable across diverse classroom settings. These results reinforce previous research that has shown AR and digital media to improve students' cognitive engagement, motivation, and content retention in history and social studies education (Li et al., 2024). However, unlike studies that implemented technology as isolated interventions, this study advances the field by embedding digital tools into a curriculum-aligned instructional module, thus ensuring sustained integration and instructional coherence (Stracqualursi & Agati, 2024).

A significant strength of this study lies in its direct emphasis on curricular integration, which distinguishes it from many previous initiatives that treated technology as supplemental rather than structural. Earlier research has often explored individual

applications such as digital storytelling, AR simulations, or online archives without embedding them within formal curricular goals or national educational standards (Tang & Zhou, 2025). This study addresses that gap by aligning digital content with specific learning outcomes, assessment rubrics, and syllabus benchmarks, validated through expert reviews and tested in authentic classroom environments. The work thus addresses a critical shortcoming in Malaysian education, where efforts to digitize learning frequently lack pedagogical scaffolding and fail to align with systemic curriculum design (Ashely-Welbeck & Vlachopoulos, 2020).

The use of the Design-Based Research (DBR) methodology enabled continuous refinement of the instructional design based on empirical data and stakeholder feedback. DBR is particularly effective in addressing complex educational challenges such as low historical engagement and underutilized ICT infrastructure, because it promotes iterative cycles of design, implementation, and analysis within real-world settings (Marín et al., 2022). Unlike purely experimental approaches that isolate variables, DBR fosters collaboration between researchers, teachers, and students—ensuring that instructional solutions are not only theoretically grounded but also practically viable. In this study, the triangulation of data—pre/post tests, student surveys, and teacher interviews—offers robust evidence that technology-enhanced history learning, when designed thoughtfully, leads to improvements in engagement, inquiry, and historical understanding.

Beyond its pedagogical effectiveness, the innovation of this study lies in the scalability and contextual adaptability of its curriculum design. The digital module was tested across urban and semi-urban schools with differing access to ICT, and results remained consistently positive, suggesting its viability even in resource-constrained environments. This stands in contrast to most international digital learning models which are often optimized for high-tech settings and lack contextual relevance for Southeast Asia (Jwai‹ed et al., 2024). Consequently, the present study contributes a replicable and policy-relevant model for digital history curriculum design that not only responds to local educational needs but also offers insights for global education systems striving to align digital innovation with curriculum integrity and national learning goals.

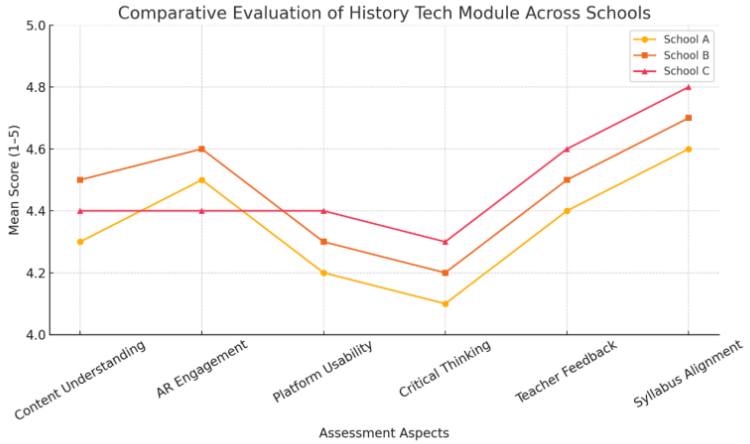

Figure 1. Comparative Evaluation of History Tech Module

The curve of Figure 1 illustrates the comparative mean scores of student evaluations across three secondary schools in Malaysia for various aspects of the digital history learning module. All aspects scored above 4.0 on a 5-point scale, with noticeable strengths in "Syllabus Alignment" and "Teacher Feedback" at School C (4.8 and 4.6 respectively), indicating a high level of curricular coherence and instructional support. "AR Engagement" and "Content Understanding" also showed consistently high ratings across all schools, validating the effectiveness of immersive media and digital interaction in enhancing student learning experiences in history education.

The primary innovation of this study lies in the development of a technology-integrated history module that is explicitly aligned with national curriculum objectives, offering not just a digital supplement but a coherent pedagogical framework grounded in curricular standards. Unlike previous studies that often emphasized isolated tools such as digital storytelling or augmented reality (AR) apps without structural integration (G. Wang, 2024), this research delivers a comprehensive model that incorporates lesson planning, multimedia instructional materials, and digital-based assessments tailored to Malaysian history education. Moreover, by employing the Design-Based Research (DBR) methodology, this study addresses the practical implementation of curriculum reforms, ensuring iterative refinement through collaboration with stakeholders (Tang & Zhou, 2025). This structured approach remains relatively underutilized in Southeast Asian contexts, where technology often lacks consistent integration into humanities instruction (G. Wang, 2024).

From a global perspective, this study offers a transferable model relevant to developing countries facing similar educational barriers, such as limited student engagement in history, reduced emphasis on historical thinking skills, and underuse of

digital media in the humanities (Stracqualursi & Agati, 2024). The positive and consistent outcomes across both urban and semi-urban Malaysian schools indicate that the module is not only scalable but also adaptable to contexts with varying degrees of technological infrastructure. This represents a substantial contribution to the global discourse on educational technology, where much of the innovation has traditionally been confined to STEM domains or highly resourced environments (X. Wang et al., 2024). By focusing on a traditionally neglected subject—history—this research advances a sustainable and replicable framework for embedding digital innovation into core curricula, aligning technology with instructional goals in a way that is pedagogically sound and contextually relevant across diverse educational systems.

CONCLUSION

Based on the findings, it can be concluded that the development and implementation of a technology-integrated history teaching module, aligned with the national curriculum, proved effective in enhancing student engagement, content comprehension, and critical thinking skills at the secondary school level in Malaysia. Validation by experts and teachers, along with consistent trial results across multiple schools, indicate that this approach is not only pedagogically sound but also responsive to the demands of 21st-century learning. The successful integration of digital media—such as augmented reality (AR), interactive videos, and online quizzes—into core curriculum components represents a significant innovation in history education. This module offers strong potential for broader adoption both nationally and internationally as a modern, inclusive, and technology-driven model for history instruction.

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