



Immersive pedagogy in History: Cognitive scaffolding and affective growth

**Nurul Asyikin Hassan^{1*}, Mohd Nazir Md. Zabit¹, Septian Aji Permana²,
Siti Zahrah Mahfood¹, Dg. Junaidah Awang Jambol³**

¹Universiti Pendidikan Sultan Idris (UPSI), Malaysia

²Universitas PGRI Yogyakarta, Indonesia

³University Malaysia Sabah (UMS), Malaysia

*Corresponding Author: nurulasyikin.h@fsk.upsi.edu.my

ABSTRACT

This research investigates the integration of VR-Mnemonics as a targeted pedagogical innovation for History instruction within the Malaysian secondary education context. Utilizing a single-site qualitative case study design, the study focused on three (N=3) Form 5 students at a residential school in Sabah. Informants were purposively selected based on a profile of persistent academic underperformance and failure in national-level History assessments. Data were derived from multiple sources, including document analysis of learning artifacts and student reflective notes. Applying a reflexive thematic analysis, the study identified that the intervention effectively addressed the limitations of conventional instruction by improving both factual retention and cognitive interest. Core findings indicate a remarkable qualitative improvement in the students' academic trajectory, particularly in mastering complex historical chronologies and demonstrating advanced historical reasoning. Emerging themes highlighted the tool's capacity for immersive cognitive scaffolding and its role in transforming student attitudes toward a traditionally "difficult" subject. However, the study is characterized by limitations, such as the small sample size (N=3), device accessibility constraints, and the potential for teacher expectancy effects, suggesting that while the innovation is promising, its scalability requires further validation across diverse school settings.

Keywords: Immersive pedagogy; VR-Mnemonics; history education; cognitive scaffolding; affective growth

Article history

Received:

14 March 2024

Revised:

16 April 2024

Accepted:

05 June 2024

Published:

01 June 2026

Citation (APA Style): Hassan, N. A., Zabit, M. N. M., Permana, S. A., Mahfood, S. Z., & Jambol, D. J. A. (2026). Immersive pedagogy in history: Cognitive scaffolding and affective growth. *Cakrawala Pendidikan: Jurnal Ilmiah Pendidikan*, 45(2), pp. 419-428. DOI: <https://doi.org/10.21831/cp.v45i2.71926>

INTRODUCTION

The pedagogical challenges surrounding History education, whether at the primary, secondary, or tertiary levels, represent a global phenomenon rather than a localized issue. Debates and conflicts regarding its instruction have been documented in various nations, including India, Tanzania, Indonesia, Australia, and many others (Stoddard, 2022; Namamba & Rao, 2017; Ghosh & Bairagya, 2018; Bain, 2011; Velayutham & Awang, 2023). These ongoing dissonances typically involve criticisms of outdated teaching methodologies, the over-reliance on conventional instructional materials, the overwhelming density of historical facts, and a lack of technological integration. Furthermore, stagnant teacher attitudes have significantly influenced students' interest, mastery, and the overall status of the subject within the academic world (Stoddard, 2022; Peck, 2018; Gross & Terra, 2018; Talin et al., 2020). Consequently, the community often harbours a negative perception of History, viewing it as a subject lacking economic value and productivity, primarily because it is frequently reduced to the mere memorization of facts (Ndomondo et al., 2022; Yulifar & Aman, 2023).

In Malaysia, these pedagogical issues directly impact student engagement and academic performance in both internal and public examinations (Lembaga Peperiksaan Malaysia, 2022). According to official reports, there was a noticeable decrease of -1.1% in History achievement in 2020 compared to 2019. This trend is particularly alarming in the context of the Sijil Pelajaran Malaysia (SPM) certification, where a pass in History and Bahasa Malaysia is mandatory. In 2019, approximately 78,643 candidates out of 416,416 failed to obtain their certificate due to these requirements (Lembaga Peperiksaan Malaysia, 2019). The statistics from previous years further underscore this crisis; in 2018, about 83,356 candidates failed, while in 2020, 62,446 candidates were unsuccessful out of 401,105 registrants (Lembaga Peperiksaan Malaysia, 2021). Although the failure rate slightly improved in 2022 with 33,906 candidates failing to secure their certificates, the consistent volume of underperforming students proves that mastery of the History subject remains a significant hurdle for many, subsequently affecting their educational and career trajectories (Lembaga Peperiksaan Malaysia, 2022).

To mitigate these challenges, various academic programmes have been implemented to enhance student performance. For instance, studies by Pham & Nguyen (2023) suggest that Project-Based Learning (PBL) provides added value by linking historical events to contemporary life and fostering Higher Order Thinking Skills (HOTS). Additionally, there is an increasing emphasis on teacher creativity and diverse instructional approaches, such as inquiry-based methods, discussions, and the strategic use of textbooks (Ghosh & Bairagya, 2018). The Ministry of Education has also made significant strides in improving school infrastructure, particularly audio-visual facilities, to support modern teaching needs.

Furthermore, in line with the advancements of Industrial Revolution 4.0 and 5.0, which emphasize the synergy between high humanistic values and technological civilization, History education requires a transformative landscape (Jiang & Liu, 2023). Studies suggest that student-focused methods utilizing tablets and digital tools can boost interest and mastery, aligning with the "Society 5.0" vision (Vo et al., 2020). Industrial Revolution 4.0 integrates virtual spaces with human interaction through intelligent robotics, big data analytics, and cloud computing. This evolution aims to create a 'smart society' where humans are adept at using technology to solve social challenges. Reports indicate that human-robot collaboration can increase productivity by up to 85%, suggesting that similar technological integration in education could significantly benefit the learning process.

In response to these technological shifts, this study explores a novel integration of Virtual Reality (VR) and mnemonic strategies, termed VR-Mnemonics. This approach combines a modern immersive experience with the conventional mnemonic method to facilitate historical learning. While mnemonics are widely recognized as effective memory aids for factual retention and conceptual mastery (Scruggs et al., 2010; Putnam, 2015), and VR has been proven to alleviate boredom and increase interest through immersive environments (Remolar et al., 2021), their combined potential remains under-explored. Recent literature, such as the study by Johnsdorf et al. (2023), compared conventional mnemonics against 2D and 3D VR videos, suggesting that mnemonics alone are effective for solid memory formation. However, that study focused on the differences between the two methods, whereas the current research investigates their integration.

Despite the proven benefits of both VR and mnemonics in isolation, a critical research gap persists regarding the lack of evidence for an integrated VR-mnemonic intervention specifically designed for struggling learners within the Malaysian upper-secondary History context. While previous studies have often treated these as competing methods, this research seeks to address this gap by exploring how their synergy, combining the "fun factor" of VR with the cognitive scaffolding of mnemonics, can support low-achieving students in mastering the Form 5 History syllabus.

Theoretically, this study is anchored in the Technological Pedagogical Content Knowledge (TPACK) framework developed by Mishra and Koehler (2006). This framework emphasizes the dynamic interplay between Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). In the context of VR-Mnemonics, these elements are synthesized through the use of VR equipment (TK), mnemonic and question-answering techniques (PK), and the SPM History syllabus (CK) to create a comprehensive and immersive pedagogical experience

(Augustine & Mohamed, 2023; Eng & Keong, 2019). To sharpen the focus of this investigation and address the implicit nature of previous research goals, this study is guided by the following explicit research questions: 1) How is the VR-Mnemonics intervention implemented as an immersive pedagogical innovation in the teaching of History? 2) What are the observed effects of using the VR-Mnemonics integration on the mastery of History among low-achieving students?

METHOD

This study employed a single-site qualitative case study design, anchored in the constructivist paradigm. This approach was selected as it allows for a flexible and in-depth exploration of how a specific pedagogical innovation, VR-Mnemonics, functions within a real-world classroom context (Creswell, 2009). Unlike experimental designs that seek generalizability, this case study prioritizes the "thick description" of the learning process experienced by struggling learners.

The research was conducted at a residential school (MRSM) in Sabah, focusing on a specific cohort of Form 5 students. A purposive sampling technique was utilized to select three (N=3) informants: Informant 1, Informant 7, and Informant 10. The selection logic was based on a "maximum variation" of struggle; these individuals were identified as "struggling learners" who consistently failed to meet the passing threshold in baseline History assessments.

To justify the selection, a screening phase was conducted involving a larger group. Table 1 illustrates the diagnostic baseline scores used to identify the informants who required urgent pedagogical intervention.

Table 1. Diagnostic baseline scores for informant selection logic

List of Informants	Mark Test 1	Mark Test 2	List of Informants	Mark Test 1	Mark Test 2
Informant 1	30	30	Informant 13	77	80
Informant 2	75	80	Informant 14	80	82
Informant 3	68	77	Informant 15	70	77
Informant 4	75	77	Informant 16	68	75
Informant 5	70	70	Informant 17	77	72
Informant 6	77	83	Informant 18	80	80
Informant 7	35	30	Informant 19	78	81
Informant 8	65	75	Informant 20	68	78
Informant 9	70	75	Informant 21	75	75
Informant 10	25	35	Informant 22	80	80
Informant 11	71	75	Informant 23	70	75
Informant 12	78	80			

Source: MRSM Kota Kinabalu

The sample for this case study consists of three informants (Informants 1, 7, and 10) drawn from a broader baseline dataset. Preliminary cognitive outcomes regarding these specific informants have been previously reported in Hassan et al. (2025). However, the current article extends the literature by performing a secondary qualitative analysis. This paper focuses strictly on the pedagogical innovation process through the TPACK framework and the affective transformations of the learners during the VR-Mnemonics intervention.

Data were gathered through a triangulation of qualitative sources to ensure the credibility and "trustworthiness" of the findings. The primary instruments included: 1) Pedagogical Artifacts or document analysis. This involved a deep dive into student work; specifically structured and essay-based scripts produced during the intervention phases. These were not treated as mere "test scores," but as qualitative evidence of shifts in historical conceptualization and factual mastery. 2) Teacher's reflexive journals. These journals captured the researcher's observations regarding student engagement, emotional responses, and the nuances of the VR-Mnemonics implementation.

To address the requirement for robust reporting, data were analyzed using Reflexive Thematic Analysis. This involved a multi-stage process of familiarization with the student scripts

and journals, followed by systematic coding and the development of overarching themes that captured the essence of the learning transformation.

Triangulation was achieved by cross-referencing the themes emerging from student artifacts with the observations recorded in the reflexive journals. To further safeguard the validity of the qualitative interpretation, an external audit was performed. This involved a Senior Subject Teacher (SST) who acted as a "peer debriefer," reviewing the coding process and verifying the alignment between the raw data and the final thematic interpretations.

FINDINGS AND DISCUSSION

Findings

Analysis of assessment artifacts

To evaluate the developmental trajectory of the informants regarding their proficiency in historical inquiry, a series of assessment artifacts comprising structured and essay-based items were analysed.

Table 2. Qualitative analysis of student artifacts (Baseline phase)

Index	Verbatim Response	Cognitive Coding	Core Theme
Structured Questions: Summarise the positive effects of British imperialism...			
Mel/1	Great	Fragmented historical comprehension; unsatisfactory.	Foundational gaps
Essay Question: Explain the effects of the Agricultural Revolution...			
Mel/2	To provide and prepare food for the people, the industrial sector and for trade.	Generalized analysis; lacks specific historical depth.	Knowledge Building

Source: MRSK Kota Kinabalu

Table 3. Qualitative analysis of student artifacts (Post-VR-Mnemonics phase)

Reference Code	Verbatim Response	Coding	Core Theme
Structured Questions: Summarise the positive effects of British imperialism...			
Mel/3	The positive effect of imperialism... locals could learn the English language.	Advanced comprehension; precise identification.	Cognitive Expansion
Mel/4	This was because... lower administrative staff were given basic knowledge of English.	Interpretative depth; evidence-based response.	Cognitive Expansion
Essay Question: Explain the effects of the Agricultural Revolution...			
Mel/7	The Agricultural Revolution... caused a shift in economic resources and large-scale trade.	Excellent analytical synthesis; interpretive clarity.	Cognitive Expansion
Mel/8	"This is because agricultural activities were expanded for commercial purposes."	Robust interpretation; high-level mastery.	Cognitive Expansion

Source: MRSK Kota Kinabalu

Each informant completed a dual-set of assessments (two structured and two essay questions) administered at two distinct intervals: the pre-intervention phase and the post-

implementation phase of the VR-Mnemonics method. These items were meticulously aligned with Bloom's Taxonomy to provide a granular view of the informants' cognitive progression, ensuring they adhered to the rigorous standards of the national examination (SPM). The evaluation rubric, verified by a Senior Subject Teacher, served as the primary instrument for assessing depth of understanding.

Qualitative observation of the answer scripts revealed a significant shift in response quality. In the baseline phase, informants frequently left sections incomplete or provided superficial answers that failed to address higher-order cognitive levels. However, following the VR-Mnemonics intervention, there was a noticeable expansion in the depth and accuracy of their responses, particularly in addressing complex, high-level questions. Tables 2 and 3 provide a representative analysis of these shifts based on the Bloom's Taxonomy framework.

Reflective observations and thematic results

The pedagogical shift from conventional history instruction to the VR-Mnemonics intervention was documented through comprehensive reflexive field notes and thematic categorization. In the baseline phase, the instructional atmosphere was consistently characterized by cognitive disengagement and a lack of intrinsic motivation among the selected struggling learners. Observation of Informant 1 during conventional rote-memorization tasks revealed a significant deficit in academic focus:

"The student appeared completely detached from the instructional flow, offering vacant expressions and failing to participate in classroom discourse. When prompted to recall the chronology of the Agricultural Revolution, the student exhibited severe anxiety and remained silent." (Reflexive Journal, January 9, 2023).

Conversely, the deployment of the VR-Mnemonics intervention, facilitated via Android-based applications and VR Box hardware, fundamentally reconstructed the classroom dynamics. The shift from abstract textual memorization to multidimensional spatial immersion stimulated an immediate affective and cognitive transition:

"A notable transformation was observed; students transitioned into active knowledge constructors, engaging in collaborative discussions during the VR-Mnemonics session. The previously rigid environment was replaced by a space of autonomous exploration, which directly enhanced their motivation to address the critical thinking tasks." (Reflexive Journal, January 20, 2023).

To rigorously answer the explicit research questions, the data were organized into two major themes and their respective sub-themes, mapping out the implementation process and the resulting affective-cognitive transformations.

Objective 1: The implementation of VR-Mnemonics as an immersive pedagogical alternative

The qualitative data revealed that the implementation of VR-Mnemonics served as a critical pedagogical intervention by introducing a decentralized, self-paced learning framework. Two distinct sub-themes emerged from the analysis of this implementation process.

Sub-theme 1.1: Autonomous scaffolding and cognitive load reduction

Conventional pedagogical practices previously utilized in the classroom (e.g., Rally Robin, Gallery Walk) heavily relied on real-time peer pacing, which frequently overwhelmed low-achieving students. The reflexive journal confirmed that:

"Informants 1, 7, and 10 struggled to retain content under standard time constraints, often forgetting key historical concepts immediately after instruction, which subsequently hampered their ability to address structured and essay components." (Reflexive Journal, January 9, 2023)

The "borderless" nature of the VR-Mnemonics intervention eliminated these temporal and spatial constraints. By allowing students to repeatedly revisit virtual environments and digital question-answering strategies at their own pace, the technology minimized cognitive load. Informants

could pause, reflect, and internalize complex historical timelines without external pressure. Informant 7's reflective notes highlighted this utility.

"Usually, I get left behind because the teacher moves too fast. With the VR video and the acronym layout, I could look at the historical events over and over until I actually understood what caused what." (Student Reflective Note, Informant 7).

Sub-theme 1.2: Transition from fragmented recall to historical reasoning

The structured mnemonic component integrated within the immersive VR environment provided a clear framework for essay construction. Rather than forcing students to blindly memorize sentences, the intervention offered visual and conceptual anchors. This systematically elevated their written output from fragmented, one-word answers to coherent historical arguments, as evidenced by the shift from baseline literal failure to advanced conceptual mastery in their final evaluations.

Objective 2: Affective impacts of VR-Mnemonics on history mastery

The integration of immersive technology heavily influenced the learners' emotional resilience and attitude toward History, which had long been perceived as a tedious and low-yield subject. The qualitative transformation is categorized into two major affective sub-themes:

Sub-theme 2.1: Mitigation of academic boredom and anxiety

In the baseline phase, history instruction was deeply linked with psychological stress and fear of failure. The sensory "hook" of the VR intervention successfully transformed this negative perception. By gamifying and spatializing the historical context, the tool mitigated academic boredom. Informant 10 noted a drastic reduction in learning anxiety:

"I used to hate History classes because it felt like a history textbook was just being read to us. Looking through the VR box made me feel like I was standing inside the history itself. It was fun, and for the first time, I wasn't scared of getting the wrong answer." (Student Reflective Note, Informant 10).

Sub-theme 2.2: Restoration of academic self-efficacy

The gradual mastery of historical concepts under the VR-Mnemonics framework directly fostered a sense of competence among the informants. This psychological shift from learned helplessness to high self-efficacy was critical in enabling them to approach high-level analytical questions (KBAT) with confidence.

To provide a concise overview of these holistic transformations, Table 4 summarizes the qualitative shifts across both phases.

Table 4. Summary of informant qualitative proficiency shifts

Informant ID	Baseline/Conventional Phase Profile	Post-VR-Mnemonics Phase Profile
1	Fragmented historical comprehension; severe learning passivity; incomplete assessment scripts.	Advanced factual retention; active participation; ability to write evidence-based responses.
7	Generalized superficial analysis; heavy reliance on rote memorization; high exam anxiety.	Robust historical interpretation; high-level mastery of cause-and-effect essay structures.
10	Cognitive overload; conceptual disengagement; persistent failure at baseline threshold.	Restored learning confidence; mastery of complex chronologies; distinction-level qualitative output.

Source: Compiled from Document Analysis and Reflexive Journals (2023)

Discussion

The synthesis of these qualitative findings leads to a core theoretical conclusion: VR-Mnemonics functions as a transformative immersive pedagogical framework that addresses both the cognitive and affective barriers faced by low-achieving learners in History education. The empirical outcomes of this study partially converge with the findings of Johnsdorf et al. (2023), who established that mnemonic strategies are exceptionally powerful tools in history education for strengthening memory paths and factual retention. However, a major point of divergence emerges regarding the self-sufficiency of traditional mnemonics. While Johnsdorf et al. (2023) argued that conventional mnemonics do not necessarily require technological enhancements to be effective, this study counter-argues that for persistently struggling learners, standalone mnemonics are often insufficient. This insufficiency is heavily tied to the "prolonged training" bottleneck identified by Putnam (2015); low-achieving students frequently lack the initial intrinsic motivation and cognitive stamina required to sustain traditional mnemonic training.

By strategically merging Virtual Reality with mnemonic scaffolds, this research successfully bypassed the limitation noted by Putnam (2015). The immersive nature of the VR hardware provided an immediate sensory "hook" that captured the students' attention and reduced their boredom in learning History, creating a positive affective foundation before the structured cognitive scaffolding of the mnemonic strategies took place. A similar pattern was reported by Kuncoro et al. (2025), who found that VR-based learning improved students' learning outcomes and received positive responses regarding its ease of use. Although their study was conducted in civil engineering education, the findings support the view that immersive environments can make complex content easier to understand by presenting it in a more concrete and interactive form. In the present study, the virtual presentation of historical events may have helped the informants connect abstract information with clearer visual experiences. The combination of immersive engagement and mnemonic scaffolding also aligns with Gunawan et al. (2023), who emphasized that a positive and low-stress learning environment is an important condition for deeper understanding.

Purwanto and Sunawan (2022) found that structured classroom support increased students' achievement motivation, including self-efficacy, task value, and goal orientation. In the present study, repeated access to VR content and mnemonic guidance may have made difficult History tasks feel more manageable. This experience may have supported the informants' confidence and willingness to remain involved in the learning process. Thus, the VR-Mnemonics framework may have served not only as an engaging tool but also as structured support for organizing historical information. This interpretation is consistent with Radović and Manzey (2019), who found that a mnemonic acronym supported the learning and mental representation of a sequential task.

Nevertheless, to maintain analytical objectivity, several critical contextual constraints must be evaluated. First, the scalability of the VR-Mnemonics intervention is fundamentally dependent on hardware availability. Kuncoro et al. (2025) noted that VR can provide flexible access to learning experiences that are difficult to obtain in real settings. However, this advantage still depends on the availability of suitable devices, technical support, and well-prepared digital content. Therefore, the wider use of VR-Mnemonics may require different levels of support across school contexts. The logistical demand for VR Boxes and compatible smartphones poses a significant barrier for larger, resource-constrained public schools. Second, the time-on-task requirement is heavy; the instructional design, asset preparation, and individualized troubleshooting demand extensive teacher dedication, which may not be fully viable under standard crowded curriculum schedules. Finally, the potential influence of the teacher expectancy effect (Pygmalion Effect) must be acknowledged. Because the researcher engaged in highly intensive, localized scaffolding with only three specific informants, the immense level of individual attention and emotional support likely amplified the students' success alongside the technological tool itself.

For future improvements, it is suggested that VR-Mnemonics be further integrated with interactive elements such as digital gamification to maintain student attention. The importance of

this "human-tech" integration is reflected in the teacher's reflexive notes, which were verified by the Senior Subject Teacher:

"Informants 1, 7 and 10 showed a very positive response and they mastered the learning. Perhaps it would be better if the VR-Mnemonik method was integrated with other methods so that the learning could be more interactive and aligned with the development of their age and generation." (Teacher's Reflection Notes, January 20, 2023)

CONCLUSION

The synthesis of this case study confirms that VR-Mnemonics transcends the limitations of conventional rote learning by harmonizing sensory immersion with cognitive scaffolding. The integration of Virtual Reality with mnemonic strategies effectively addresses the persistent academic disengagement among low-achieving students, as evidenced by the significant progression of Informants 1, 7, and 10. This study aligns with the perspectives of Gunawan et al. (2023), asserting that immersive technology does not merely serve as an "interest-grabber" but functions as a psychological catalyst that empowers problem-solving skills and emotional resilience in learning History.

Furthermore, the findings provide empirical support for Putnam's (2015) assertion that mnemonic methods must be integrated with contemporary learning techniques to maximize their efficacy for students with specific educational needs. By addressing the "prolonged training" weakness of traditional mnemonics through VR's "immediate engagement," this study successfully achieved its two core objectives: exploring the implementation process and evaluating its affective-cognitive impacts. As suggested by Radović and Manzey (2019), the synergy between conventional and modern pedagogical methods reinforces mental resistance against cognitive overload, thereby facilitating the transition of historical facts from short-term to long-term memory.

In conclusion, the VR-Mnemonics framework offers a viable "cognitive bridge" for inclusive education, proving that even students with a history of failure can achieve mastery when the pedagogical approach prioritizes both affective growth and memory retention. Future research should explore the scalability of this method across diverse demographic profiles to further refine the integration of immersive technology in the humanities.

ACKNOWLEDGEMENT

This research was supported by the Ministry of Higher Education through Strategic Research Grant Scheme (Comprehensive-GPKU) FSK: 2025-0065-106-01.

REFERENCES

- Augustine, R. B., & Mohamed, S. (2023). Pengetahuan teknologi pedagogi kandungan (TPACK) guru prasekolah (Content pedagogical technology knowledge (TPACK) of preschool teachers). *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 8(6). DOI: <https://doi.org/10.47405/mjssh.v8i6.2291>
- Bain, R. B. (2011). Considering the "Hidden" challenges of teaching and learning world history. *Historically Speaking*, 12(3), 20–22. DOI: <https://doi.org/10.1353/hsp.2011.0034>
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative and mixed method approaches*. SAGE Publications
- Eng, C. Y., & Keong, T. C. (2019). Pengetahuan teknologi pedagogi kandungan di Malaysia: Satu Kajian Meta Analisis. *Journal of ICT in Education*, 6, 86–95. DOI: <https://doi.org/10.37134/jictie.vol6.8.2019>
- Ghosh, S. & Bairagya, S. (2018). *A study on problems of teaching history at secondary level*. *Journal of Education & Development*, 8(15), 545-553.
- Gross, M. H., & Terra, L. (2018). What makes difficult history difficult? *Phi Delta Kappan*, 99(8), 51–56. DOI: <https://doi.org/10.1177/0031721718775680>

- Gunawan, A., Wiranto, N., & Wu, D. (2023). Application of virtual reality in diverse fields of study in education sector: a systematic literature review. *Procedia Computer Science*, 227, 948–957. DOI: <https://doi.org/10.1016/j.procs.2023.10.602>
- Hassan, N., Wan Ab Kadir, W. N. H., Mahfood, S. Z., Mahat, H., Awang Jambol, D. J., & Permana, S. A. (2025). From innovation to experience: Teaching history through VR mnemonics - A qualitative case study in an Asian context. *Innovative Educational Research*, 7(2), 176–191
- Jiang, J., & Liu, Y. (2023). Research on the virtual teaching of history subject in the process of meta-universe. In *Communications in computer and information science* (pp. 606–614). DOI: https://doi.org/10.1007/978-981-99-2446-2_55
- Johnsdorf, M., Pham, K. A., Schmidt, T., Truong, V. L., Wohnig, A., Kisker, J., Gruber, T., & Schöne, B. (2023). New is not always better: Virtual reality does not necessarily enhance mnemonic processing. *Frontiers in Psychology*, 14, 1089725. DOI: <https://doi.org/10.3389/fpsyg.2023.1089725>
- Kuncoro, T., Ichwanto, M. A., & Dwiyanto, F. A. (2025). Immersive learning through virtual reality for civil engineering education. *Cakrawala Pendidikan: Jurnal Ilmiah Pendidikan*, 44(1), 92–101. DOI: <https://doi.org/10.21831/cp.v44i1.50351>
- Lembaga Peperiksaan Malaysia, Kementerian Pendidikan Malaysia. (2019). *Laporan Analisis Keputusan SPM 2019*. <http://lp.moe.gov.my/index.php/laporan-analisis-keputusan/900-laporan-analisis-keputusan>
- Lembaga Peperiksaan Malaysia, Kementerian Pendidikan Malaysia. (2021). *Laporan Analisis Keputusan SPM 2019*. <http://lp.moe.gov.my/index.php/laporan-analisis-keputusan/900-laporan-analisis-keputusan>
- Lembaga Peperiksaan Malaysia, Kementerian Pendidikan Malaysia. (2022). *Kupasan Mutu Jawapan Sijil Pelajaran Malaysia*. 1–45.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record the Voice of Scholarship in Education*, 108(6), 1017–1054. DOI: <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Namamba, A., & Rao, C. (2017). Teaching and learning of history in secondary schools: history teachers' perceptions and experiences in Tanzania. *European Journal of Education Studies*, 3(3), 172–196. DOI: <https://doi.org/10.5281/zenodo.290606>
- Ndomondo, E., Mbise, A., & Katabaro, J. (2022). History teachers' conceptualization of competency-based curriculum in transforming instructional practices in lower secondary schools in Tanzania. *Social Sciences & Humanities Open*, 6(1), 100331. DOI: <https://doi.org/10.1016/j.ssaho.2022.100331>
- Peck, C.L. (2018). National, ethnic, and indigenous identities and perspectives in history education. In *The Wiley International Handbook of History Teaching and Learning* (eds S.A. Metzger and L.M. Harris). DOI: <https://doi.org/10.1002/9781119100812.ch12>
- Pham, T., & Nguyen, K. T. (2023). Research and application of project-based teaching methods in history at Can Tho FPT High School. *International Journal of Social Science and Human Research*, 06(04), pp. 2326–2331. DOI: <https://doi.org/10.47191/ijsshr/v6-i4-42>
- Purwanto, E., & Sunawan, S. (2022). Focused classroom meeting model of teaching for enhancing students' achievement motivation. *Cakrawala Pendidikan: Jurnal Ilmiah Pendidikan*, 41(3), 719–730. DOI: <https://doi.org/10.21831/cp.v41i3.49238>
- Putnam, A. L. (2015). Mnemonics in education: Current research and applications. *Translational Issues in Psychological Science*, 1(2), 130–139. DOI: <https://doi.org/10.1037/tps0000023>
- Radović, T., & Manzey, D. (2019). *The Impact of a Mnemonic acronym on learning and performing a procedural task and its resilience toward interruptions*. *Front. Psychol*, 10, 1–17. DOI: <https://doi.org/10.3389/fpsyg.2019.02522>
- Remolar, I., Rebollo, C., & Fernández-Moyano, J. A. (2021). Learning history using virtual and augmented reality. *Computers*, 10(11), 146. DOI: <https://doi.org/10.3390/computers10110146>

- Scruggs, T. E., Mastropieri, M. A., Berkeley, S. L., & Marshak, L. (2010). Mnemonic strategies: Evidence-based practice and practice-based evidence. *Intervention in School and Clinic*, 46(2), 79–86. DOI: <https://doi.org/10.1177/1053451210374985>
- Stoddard, J. (2022). Difficult knowledge and history education. *Pedagogy, Culture and Society*, 30(3), 383–400. DOI: <https://doi.org/10.1080/14681366.2021.1977982>
- Talin, R., Sharif, S., Singh, S. S. A. B., & Karim, M. S. B. (2020). Ciri personaliti berkualiti guru sejarah tingkatan enam. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 5(1), 32–39. DOI: <https://doi.org/10.47405/mjssh.v5i1.340>
- Velayutham, S., & Awang, M. M. (2023). Why teaching history is difficult. *Asian Journal of Research in Education and Social Sciences*. DOI: <https://doi.org/10.55057/ajress.2023.5.1.25>
- Vo, H. C., Nguyen, D. T. T. & Chung, K. T. T. (2020). Some ways to create interest for students towards history subject. *Journal of Critical Reviews*, 7(14). DOI: <https://doi.org/10.31838/jcr.07.14.158>
- Yulifar, L., & Aman, A. (2023). Resources of history learning in conventional and modern continuum lines. *Cakrawala Pendidikan: Jurnal Ilmiah Pendidikan*, 42(3), 586-600. DOI: <https://doi.org/10.21831/cp.v42i3.63713>