International Journal of Human Research and Social Science Studies

ISSN(p): 3050-547X, ISSN(e): 3050-5488

Volume 03 Issue 04 April, 2026

DOI: https://doi.org/10.55677/ijhrsss/04-2026-Vol03I04

Page No : 239-245

Augmented Reality as a Motivational Tool: Students' Engagement in Learning History

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ABSTRACT: In Malaysia, history lessons are depending on the text-based instruction, which limits student engagement and increase the historical concepts. This study aimed to explore history teachers'' experiences and challenges in integrating Augmented Reality (AR) as a tool to improve student motivation and engagement in the classroom. A quantitative survey was used in the data collection that involving 31 history teachers across Malaysia which selected through convenience sampling. Google Form as a validated online questionnaire to collect data and analyzed through descriptive statistics. The result shown that 87.1% of teachers are confident in using technology and 67.7% have used AR application in teaching and learning process. In addition, there are actually 41.9% used AR applications, which means there are a gap between knowing them and using it. The biggest obstacles in applying AR are limited technological resources (54.8%) and lack of training between teachers (16.1%). Therefore, 77.4% of participant said they were interested in AR applications that combine with computational thinking elements. These findings indicated that teachers are aware of AR potential to make history education more engaging, its effective implementation focused on the professional development and enhanced accessibility to AR resource. This study offers insights into how AR solution that align with curriculum goals with the aims of improving students' motivations and encouraging a higher-order thinking skill.

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Published Online:
April 09, 2026

KEYWORDS:
Augmented Reality (AR), History Education, Student Engagement, Computational Thinking (CT), Teacher Perceptions

Cite the Article: *Yi, P.X., Sari, E.M. (2026). Augmented Reality as a Motivational Tool: Students' Engagement in Learning History. International Journal of Human Research and Social Science Studies, 3(4),239-245. https://doi.org/10.55677/ijhrsss/04-2026-Vol03I04*

INTRODUCTION

Digital technologies have significantly changed the traditional way of teaching methods and the learning process. Whereby digital technologies offer a new opportunity to enhance effectiveness and learner engagement. Augmented reality (AR) allows virtual content to be used with the real-world environment, creating interactive learning experiences that can improve student engagement and understanding of concepts (Dunleavy & Dede, 2014; Garzón, 2021; Ibáñez & Delgado-Kloos, 2018; Remolar et al., 2021). As an emerging tool in educational practice, AR has been widely applied in Science, Technology, Engineering, and Mathematics (STEM) education to support and help in visualization and simulation (Ibáñez & Delgado-Kloos, 2018). AR helps students to visualize the real-world contexts and engage with multisensory content, which builds a stronger cognition (Bacca et al., 2014). Previous studies by (Remolar et al., 2021) show that AR plays an important role in making history lessons more interactive and student-centered.

History education in Malaysia still relies heavily on text-based instruction, which is the teaching method that uses texts and requires students to memorize the information (Ahmada et al., 2010; Johdi et al., 2010; Seman et al., 2011; Suhaimi et al., 2022). Students often struggle with understanding the sequences of historical concepts, remembering chronological sequences, and connecting events to broader sociopolitical contexts. These challenges may reduce motivation in the student learning process and limited understanding (Bacca et al., 2014). Based on the study of (Bacca et al., 2019), AR is addressing these limitations by animating static historical content through interactive simulations, three-dimensional reconstructions, and immersive timelines that bring historical narratives to life. For example, AR allows students to virtually explore ancient civilizations. This technology provides opportunities for experiential learning that go beyond the textbook-based methods (Azhar et al., 2019; Johdi et al., 2010;

Remolar et al., 2021). As a result, students can engage with historical events in a more meaningful way and helps them to understand better (Azhar et al., 2019; Johdi et al., 2010; Remolar et al., 2021).

AR integration in history classrooms, particularly in developing countries like Malaysia, still remains limited (Seman et al., 2011; Suhaimi et al., 2022). Previous studies show differences between STEM and humanities disciplines. For example, more than 70% of STEM teachers have used AR compared to only 15% of history teachers (Abdullah et al., 2022). This gap is often attributed to several challenges such as the lack AR content that fits the curriculum alignment, insufficient teacher training, and schools' infrastructural issues including outdated devices and unstable internet access (Ibáñez & Delgado-Kloos, 2018)(Nguyen & Tran, 2025). In addition, teachers have expressed uncertainty about how to use AR applications that meet the history learning objectives, which has made them hesitant to adopt this technology as well (Azar & Tan, 2020). Consequently, students in history classrooms continue to experience disengagement and passive learning behaviors when confronted with abstract or fact-heavy content.

To address these challenges, this study explores the history of teachers' views, readiness, and experiences in using AR as a motivational tool to enhance student engagement. By focusing on teachers' perspectives, the research aims to show how AR can overcome difficulties in understanding the concepts, organizing information, and remembering content what student learn. Unlike previous studies that mainly looked at and examined AR's effects on student learning outcomes in STEM fields (Gardeli.A, 2019; Ibáñez & Delgado-Kloos, 2018), this study contributes a humanities-focused perspective by examining AR in the context of history education and its impact on motivation.

This study's examination of teacher viewpoint, resource limitation, and instructional possibilities furnishes a framework for the enduring and curriculum-integrated application of AR within history education. This research contributes to the existing body of knowledge by investigating the relatively neglected nexus of AR, student motivation, and history instruction within developing educational settings.

METHOD

This research used a quantitative survey methodology to examine history teachers' understanding of Augmented Reality (AR), how they use it in the classroom, challenges faced, and their interest in AR applications embedded with computational thinking (CT) principles. The survey is particularly useful for exploring teacher perceptions on new technologies, because their attitudes and preparedness often determine successful adoption (Cai et al., 2014). This design was also well suited to investigate how AR might serve as a motivational tool to improve student engagement (Khan et al., 2019). Besides, this approach is consistent with the study's objective to explore current levels of AR adoption rates, identify existing barriers, and uncover teachers' interest in prospective AR applications that integrate computational thinking (CT) principles.

The participants consisted of 31 secondary school history teachers' questionnaires had been distributed among 90 teachers from various schools across Malaysia. Participants were chosen using a convenience method. Individual teachers voluntarily responded to an online invitation sent through Google Form. Data collection involved a structured online questionnaire (Khosla, 2021). Different teaching backgrounds, from novice teachers with under three years of experience to senior educators with over twelve years in the profession. The differences in the responses gave us valuable information about teachers' readiness to use AR in classrooms is influenced by their teaching experience, familiarity with technology, and specific teaching methods they use. The participants had a wide range of teaching experiences. Specifically, 64.5% possessed more than 12 years of teaching experience, whereas 9.7% had less than three years of experience. This variation in teaching experiences facilitated valuable insights into the disparities in AR readiness and utilization across different career stages.

The instrument was created based on previous research on AR in education, teacher readiness frameworks, and CT elements (Cai et al., 2014; Hébert et al., 2021; Khan et al., 2019). It consists of four main areas: demographic information such as teaching experience and technological confidence; awareness and usage of AR; barriers to adoption including training, access to devices, and curriculum alignment; and interest in future AR applications that integrate CT principles.

The online questionnaires allowed them to share specific examples of historical topics they found difficult to teach. This approach provided additional context to support the structured responses (Lochmiller, 2021). To ensure content validity, two experts in educational technology have reviewed the materials. Their feedback was used to clarify unclear items and improve content to match the study objectives. A pilot test was involved with five history teachers who were not part of the main study to assess clarity, response time, and instrument usability. Minor refinements were made following the pilot test to enhance item clarity and sequencing. The data were analyzed using descriptive statistical techniques such as frequencies and percentages to summarize teachers' familiarity with AR, usage patterns, perceived challenges, and levels of interest in future adoption. Cross-tabulations were also used to explore possible connections between demographic factors, such as age, gender, and teaching experience, and how people view AR (Khosla, 2021).

RESULT AND DISCUSSION

This section shown the results of the survey conducted with history teachers in Malaysia and discusses the findings in relation to existing literature. Analysis highlights teachers' professional backgrounds, the difficulties they face in teaching history, their

familiarity and experience with Augmented Reality (AR), as well as perceived challenges and future interest in AR applications designed with computational thinking (CT) principles.

Teachers' Demographics and Experience

A total of 31 secondary school history teachers participated in this study, with a majority having substantial teaching experience. Table 1 shows that, 64.5% of respondents had more than 12 years of teaching experience, while only 9.7% has less than three years. This suggests that the data reflect the views of mostly experienced experienced educators. This is important because teaching experience often influences how technology use and how adaptable teachers are in their methods.

Table 1. Teaching History Experiences among Teachers

	Frequency	Percent
Less than 3 years	3	9.7
4 to 7 years	3	9.7
8 to 11 years	5	16.1
More than 12 years	20	64.5
Total	31	100.0

This data suggests that the views in this study represent a lot of classrooms experience. The perspectives of experienced teachers are important, given their deep understanding of the challenges students face when dealing with abstract historical content (Seemiller & Grace, 2017).

Participants were asked to identify the three most difficult topics for students in the history curriculum. While the survey involved 31 teachers, only 8 teachers provided specific responses to this open-ended question. The frequency table below reflects only those responses, focusing on the chapter's most commonly cited by participants as challenging for student comprehension.

As shown in Table 2, topics from Form 4 and Form 5 were identified as the most difficult, particularly those involving complex socio-political and abstract historical content.

Table 2. Highest Difficult Topic in History Subject

	Frequency	Percent
Form 4 Chapter 3: *Tamadun Awal Manusia*, Chapter 8: *Pengukuhan Negara dan Bangsa,* Chapter 9: *Kemunculan Nasionalisme*	5	16.1
Form 4 Chapter 2: *Zaman Pra-Sejarah,* Chapter 4: *Kegemilangan Melaka,* Chapter 6: *Pentadbiran Negeri-Negeri Melayu Bersekutu*	1	3.2
Form 5 Chapter 4: *Malaysia dalam Kerjasama Antarabangsa,* Chapter 5: *Perpaduan Kaum,* Chapter 10: *Masa Depan Kita*	2	6.5

These chapters often require student engagement with complex ideas such as *Tamadun Awal Manusia*, *Pengukuhan Negara dan Bangsa*, and *Malaysia dalam Kerjasama Antarabangsa*, which many students can't feel from their lived experience.

The persistent challenges observed by teachers similar with existing research highlighting that history education often emphasizes content at the expense of conceptual clarity, which turn into negatively impacts both student engagement and comprehension when traditional teaching methods are likely outdated (Cetintav & Yilmaz, 2023). Therefore, this situation highlights the necessity for more interactive resources, such as AR to facilitate conceptual understanding and boost student motivation.

AR Awareness and Implementation in Teaching

This study focuses on the investigation of concerned teachers' familiarity with and use of AR technology. The results showed that although teachers are quite confident in using technology, their practical experience with AR tools is less prevalent than their conceptual understanding.

As presented in Table 3, 87.1% of the teachers expressed confidence in their ability to utilize computer technology, which is compared to 12.9% of teachers who are not feeling well in using technology as well.

Table 3. Feeling Confident using Computer Teaching

	Frequency	Percent
Yes	27	87.1
No	4	12.9
Total	31	100.0

In contrast, when asked if they had personally used an AR app, only 41.9% of the participants said yes (Table 4). This suggests that their practical experience with technology was limited.

Table 4. Experiences in Using Augmented Reality Applications

	Frequency	Percent
Yes	13	41.9
No	18	58.1
Total	31	100.0

Table 5. Augmented Reality Knowledge Among Users

	Frequency	Percent
Yes	21	67.7
No	10	32.3
Total	31	100.0

Similar patterns have been observed internationally, where AR is often seen as promising but isn't widely used in the education system, especially in Malaysia, mainly because of existing systemic barriers (Bacca et al., 2014; Ibáñez & Delgado-Kloos, 2018).

Table 6. Using Augmented Reality Application in Teaching

	Frequency	Percent
Yes	21	67.7
No	10	32.3
Total	31	100.0

Table 6 shows that 67.7% of respondents have used AR applications in their teaching practices. This difference reflects the contrast between individual AR usage and AR application within guided environments, such as using school-provided tools during workshops or pilot programs. The teaching sessions likely involved supervised or collaborative implementation, rather than being led independently by the instructor.

Challenges to AR Integration

Table 7. Latest Teaching Aids in Teaching and Learning

	Frequency	Percent
Kahoot	2	6.5
Lcd	2	6.5
No any gadget can be use in school	3	9.7
Quizizz	3	9.7
YouTube	3	9.7
Video	5	16.1
Canva	6	19.4
PowToon	7	22.6
Total	31	100.0

Based on the data shown, teachers frequently use the digital teaching tools such as PowToon (22.6%), Canva (19.4%), and videos (16.1%). However, disparities persisted, with 9.7% of participants highlighting that the technology tools in their schools are

difficult to access. This uneven access distribution has infrastructural limitations that could impede the consistent integration of AR technology (Parsons & Maccallum, 2021).

Teachers also identified several challenges they faced while implementing AR tools. As shown in Table 8, the most significant challenge was limited access to technology and resources (54.8%), followed by lack of training for teachers (16.1%).

Table 8. Difficulty in Using Augmented Reality in Teaching

	Frequency	Percent
Difficulty in integrating with curriculum	1	3.2
Lack of training	5	16.1
Limited access of technology or resources	17	54.8
Student engagement issues	6	19.4
Others	2	6.5
Total	31	100.0

These results support previous studies emphasizing that infrastructural and professional barriers hinder effective AR integration, even when teachers expressed receptiveness to technology (Remolar et al., 2021; Seman et al., 2011; Suhaimi et al., 2022). Those studies underscored the critical role of infrastructure and teacher preparedness in achieving effective AR integration. Without proper training and resources, teachers may lack the confidence to create impactful AR experiences, even if they have enough knowledge using the technology (Hébert et al., 2021; Liu et al., 2024; Tzima et al., 2019).

Teachers' Interest in AR with CT Principles

A notable finding is the strong interest in AR applications that constructivist teaching and CT elements. As shown in Table 9, 77.4% of teachers surveyed said they were willing to use these tools in classrooms.

Table 9. Excitement in Using Augmented Reality Application Designed with Computational Thinking Principles for Conducting History Subject in the Classroom.

	Frequency	Percent
Yes	24	77.4
No	7	22.6
Total	31	100.0

This suggests a clear concept to implement a new teaching method that combines real- world learning experiences with problem-solving, logical reasoning, and sequencing skills (Henderson et al., 2007). Integrating CT through AR could encourage students to analyze historical events sequentially, draw connections, and apply logic-based reasoning, transforming the passive nature of history learning into an active process.

DISCUSSION SUMMARY

The results indicate both promise and challenges in integrating AR within history education. Teachers find that challenge of making abstract historical content engaging and perceive AR as a potential solution in the education field. However, personal experiences with AR are limited, and its practical application is impeded by issues going to accessibility and training. The disparity between individual and classroom-based AR point to the need for enhanced professional development and easy-to-access resources.

Teachers' identification of difficult chapters and topics highlights the need for more visual and interactive learning materials. Their existing technological skills suggest they are ready to use these tools in the learning and teaching process. Teachers' strong interest in the AR applications aligned with CT principles points to opportunities for a meaningful learning tool. These findings show that AR can be useful in history education but requires careful alignment with teacher readiness, curriculum goals, and infrastructural support to be effective in real-world settings. Addressing access, professional development, and content alignment will be crucial to realizing AR's potential to enhance student motivation and learning in history classrooms (Kalsum et al., 2023; Khan et al., 2019; Siwi Amumpuni & Sagita, 2023; Zhang et al., 2025).

CONCLUSION

This study explored the readiness, perceptions, and challenges that were faced by Malaysian secondary school history teachers in applying the use of AR as a motivational tool for enhancing student motivation and engagement. The result indicates that although the majority of teachers are technologically confident and acknowledge the possibilities offered by AR, its practical

usage remains conflicted due to limited access to resources, lack of proper training, and infrastructural constraints. However, teachers stated strong interest in AR tools developed with computational thinking (CT) principles, suggesting the receptiveness to pedagogical advancements that promote both engagement and higher-order thinking skills.

This study enhances our understanding of integrating AR into humanities education by illuminating the challenges and opportunities present in classrooms. The include addressing complex historical topics and bridging the gap between AR awareness and its practical application. Highlighted the necessity of AR resources that are both pedagogically aligned and integrated within the curriculum AR resources. Integrating CT elements into AR tools offers an opportunity for transforming traditional teaching methods, which often emphasize rote memorization and cognitively enriched learning experiences. Moreover, the strong interest expressed by teachers in AR applications that apply computational thinking (CT) principles suggests a willingness to use more interactive and problem-solving methods in history education. To facilitate enduring integration, educational policymakers and technology developers should identify the problems that are related to technology access and ensure professional training is enough for all the teachers around Malaysia. Specifically, targeted training programs, easily accessible content, and collaborative platforms can equip educators with the confidence and purpose needed to effectively adapt AR tools.

Future studies should directly explore student outcomes, such as changes in motivation, engagement, and learning performance, while also evaluating the intervention-based use of AR within authentic classroom environments. In summary, AR offers solutions to challenges concerning student engagement and comprehension of intricate historical ideas. By aligning technological advancements with teacher preparedness, AR can transcend its status as a novel instrument, evolving into a pragmatic strategy for facilitating instruction and learning. By working together, educators, policymakers, and developers can use AR to significantly change how history is taught.

ACKNOWLEDGMENTS

The authors would like to express their gratitude to all the secondary school history teachers in Malaysia who participated in this study and generously shared their time and insights. Appreciation is also extended to the institutions and colleagues who provided constructive feedback and support throughout the research process.

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