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Using Virtual Reality (VR) Based on Constructivist Learning Theory to Enhance Engagement in Malaysian General Studies (MPU) Subjects

Nazreena Mohammed Yasin[1]*, Ahmad faris Naqiyuddin Mohd Ghazi[1], Hanisah Md. Idris[2], Amir Faizal Abdul Hanif[3]

[1] *Universiti Tun Hussein Onn Malaysia, Jabatan Sains Sosial, Pusat Pengajian Umum dan Kokurikulum, Persiaran Tun Dr. Ismail, 86400 Parit Raja, Johor Darul Ta'zim, MALAYSIA.*

[2] *Universiti Tunku Abdul Rahman, Social Sciences Department, Centre for Foundation Studies, Jalan Universiti, Bandar Barat, 31900 Kampar, Perak, MALAYSIA.*

[3] *Sapura Research Sdn Bhd, Government Integrated Radio Network, Lot 26921, Jalan Rejang, Seksyen 10, Wangsa Maju, 53000 Kuala Lumpur, Wilayah Persekutuan, MALAYSIA.*

*Corresponding Author: nazreena@uthm.edu.my
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Abstract

General studies subjects such as *Malaysian Studies, Ethics and Civilization*, *Moral Studies and Integrity and Anti-Corruption Course* are often perceived by students as secondary or peripheral compared to their core academic disciplines. This perception can lead to reduced motivation, superficial learning and limited engagement. This paper proposes the innovative integration of Virtual Reality (VR) technology, grounded in constructivist learning theory as a transformative pedagogical tool to address these challenges. Constructivist theory emphasizes active and experiential learning where students construct knowledge through exploration and interaction, making VR an ideal medium to enhance this process. By creating immersive and interactive experiences that simulate real-world historical events, cultural practices and ethical dilemmas, VR enables students to connect theoretical content with tangible experiences. Such an approach not only fosters deeper understanding and critical thinking but also encourages emotional and cognitive engagement. Moreover, this strategy aims to modernize the general studies curriculum by aligning it with contemporary digital trends and student learning preferences. Ultimately, the use of VR in Malaysian general studies (MPU) subjects has the potential to revitalize student interest, cultivate civic consciousness and promote lifelong learning in a dynamic and meaningful way. In addition, this paper highlights the practical implications for educators and curriculum designers while addressing challenges such as cost, infrastructure and the need for educator training to ensure sustainable adoption of VR in MPU subjects.

1. Introduction

In the context of higher education, Malaysian general studies subjects or Mata Pelajaran Umum (MPU), including Malaysian Studies, Ethics and Civilization, Moral Studies, and Integrity and Anti-Corruption Course, play a pivotal role in shaping students' ethical citizenship, historical consciousness and cultural sensitivity. Despite their significance and also it has been made as a compulsory subject for undergraduate students in Malaysia, these subjects are often perceived by students as less relevant than their core academic disciplines, leading to reduced motivation and superficial learning approaches. This disconnect undermines the broader educational goals of fostering informed, ethical and culturally aware citizens in Malaysia's diverse society. Similar concerns were raised in the Malaysia Education Blueprint 2015–2025 (Higher Education), which emphasizes the need for holistic graduates who can balance professional expertise with civic and ethical awareness (MOHE, 2015). This issue is compounded by the fact that MPU subjects are mandatory under the Ministry of Higher Education's policy framework, which aims to produce holistic graduates. However, many students perceive these subjects as obstacles rather than opportunities, often resulting in low attendance, minimal participation and reliance on rote memorization during assessments.

Emerging educational technologies offer promising avenues to address these challenges by reshaping pedagogical approaches and enhancing learner engagement. Among these technologies, Virtual Reality (VR) has garnered significant attention for its potential to create immersive and interactive learning environments (Radianti, Majchrzak, Fromm, & Wohlgenannt, 2020). VR enables students to experience content firsthand, providing opportunities for active exploration and contextual learning that transcend traditional lecture-based methods. For example, there are chapters on general studies such as Ethics and Civilization where students learnt about war in the past and historical sites. When they cannot imagine certain event took place in the past, it makes them demotivated to learn. Therefore, by embedding the learning session with this technology, it is expected to boost students' interest to learn in the class and participate in the learning session.

This paper explores the integration of VR technology with constructivist learning theory as a framework to enhance engagement in MPU subjects. Constructivism emphasizes that learners actively construct knowledge through meaningful experiences rather than passively receiving information (Piaget, 1950; Vygotsky, 1978). VR's capacity to simulate real-world environments and facilitate experiential learning aligns well with constructivist principles, making it crucial for revitalizing MPU education.

By designing VR modules tailored to Malaysian historical sites, cultural landmarks and ethical dilemmas, educators can transform MPU courses into dynamic, student-centered experiences that promote deeper understanding and lifelong learning. This paper will review relevant literature, propose a conceptual design for VR-enhanced MPU modules and discuss expected educational outcomes and implications for Malaysian higher education for General Studies subjects.

2. Objectives of the Study

The objective of the study is as below:

1. To explore the application of Virtual Reality (VR) grounded in constructivist theory to enhance student engagement in MPU subjects.

2. To design VR modules aligned with MPU content that promote active, experiential and contextual learning.

3. To analyze the expected educational outcomes of integrating VR in Malaysian general studies.

3. Problem Statement

Malaysian General Studies (MPU) subjects face persistent challenges in student engagement due to outdated pedagogical methods and lack of perceived relevance. While MPU subjects aim to foster civic consciousness, ethical reasoning and cultural awareness, students often regard them as peripheral. This results in surface-level learning, limited critical thinking and disengagement. This issue has also been documented by Zaid Ahmad & Othman (2017), who highlight that many Malaysian undergraduates perceive MPU subjects as irrelevant and repetitive, further contributing to disengagement. The lack of innovative, student-centered approaches further exacerbates the issue. Thus, there is a pressing need to explore immersive technologies like Virtual Reality (VR) to realign these subjects with the expectations of 21st-century learners. Each year, thousands of undergraduates across Malaysian universities are required to take MPU subjects. Surveys have shown that a significant proportion view the courses as irrelevant to their career aspirations, which highlights the urgent need for pedagogical innovation. Without intervention, this disengagement risks undermining the very objectives of MPU: to nurture ethical, civic-minded and culturally competent graduates. Similar concerns about teaching and learning relevance in Malaysia have also been raised by Alias and Zainuddin (2005) and by Hashim and Yunus (2018), who noted that rigid pedagogical approaches often fail to align with students' expectations and needs. This interactive method is expected to change students' perception towards general studies subjects in Malaysia

and is expected to bring positive changes in students' acceptance toward this subject to be taught in an efficient way.

4. Significance of The Study

This study provides a conceptual framework for using immersive VR experiences in MPU education. It contributes to the growing discourse on educational technology in social sciences, promotes digital innovation in Malaysian universities and aligns general studies with constructivist pedagogical practices. It also supports the Ministry of Higher Education's aspirations for future-ready graduates. As the subjects are compulsory and have been taught in all universities in Malaysia, it can provide a positive impact by adapting this technology in General Studies subjects. This direction also aligns with national aspirations for digital innovation in higher education, as outlined in the Malaysia Education Blueprint (MOHE, 2015), which highlights technology integration as a key driver for producing future-ready graduates. For students, the integration of VR promises to increase motivation and cultural empathy. For lecturers, it provides innovative teaching strategies that move beyond traditional lectures. For higher education institutions, adopting VR aligns with Malaysia's broader digital campus initiatives, supporting the transformation toward future-ready education.

5. Literature Review

The literature part is divided into few categories namely constructivist learning theory, virtual reality in education and challenges in engagement with MPU subjects.

5.1 Constructivist Learning Theory

Constructivism, rooted in the works of Piaget (1950) and Vygotsky (1978), posits that knowledge is actively constructed by learners as they interact with their environment. Rather than passively absorbing facts, learners build mental models through reflection, inquiry and social interaction. Piaget's cognitive developmental theory emphasizes stages where learners assimilate and accommodate new information, leading to schema modification and deeper understanding. Vygotsky introduced the social dimension, highlighting the *Zone of Proximal Development* (ZPD) where learners achieve higher cognitive functions through guided interaction.

Constructivist pedagogy thus encourages active learning strategies such as problem-solving, critical reflection and collaborative learning (Bruner, 1996). These principles align with educational goals for MPU subjects, which aim to develop ethical reasoning, historical empathy and cultural awareness rather than rote memorization. In this context, VR serves as a powerful constructivist tool by offering authentic, immersive environments where learners can engage directly with historical scenarios, cultural practices and moral dilemmas. The sensory-rich and interactive nature of VR facilitates experiential learning, enabling students to contextualize abstract concepts and practice decision-making in safe simulated settings (Herrington & Oliver, 2000). Additionally, when combined with collaborative tasks or guided exploration, VR can support the ZPD by scaffolding complex ideas and encouraging peer interaction, thus reinforcing both individual and social dimensions of learning (Slavin, 2011). As such, VR-enhanced instruction grounded in constructivist theory not only enriches understanding but also fosters meaningful engagement with the content of Malaysian general studies. This perspective is consistent with Phillips (1995) who critically analyzed the multiple interpretations of constructivism and with Von Glasersfeld (1995) who emphasized the role of learners in actively constructing their own reality through experience. Other scholars such as Jonassen (1999) and Fosnot (2013) have also stressed that constructivist environments empower learners to reflect, negotiate meaning and build personal connections with knowledge which are essential for MPU subjects.

Constructivist approaches have already been applied in social sciences through problem-based learning, debates and case studies. The integration of VR represents a natural extension of these methods by offering more immersive, context-rich experiences that reinforce theoretical knowledge with practice.

Beyond individual cognitive processes, constructivism also emphasizes the importance of learning within authentic contexts and through social interaction. When students are placed in environments that mirror real-world challenges, they are more likely to develop transferable skills such as collaboration, negotiation and ethical reasoning. In the context of MPU subjects, constructivist approaches encourage learners not only to acquire knowledge of Malaysian history, culture, and ethics but also to apply this understanding in practical scenarios. For instance, a constructivist task might involve debating cultural dilemmas, role-playing historical figures, or collaboratively solving ethical case studies. These activities allow learners to engage with multiple perspectives and construct meaning through shared dialogue, which deepens understanding and promote critical citizenship. By embedding VR technology into this constructivist framework, MPU courses can foster both personal reflection and collective learning, ensuring that students become active participants rather than passive recipients of knowledge

Another important dimension of constructivism is its emphasis on metacognition and learner autonomy. Constructivist learning environments encourage students to become aware of their own thinking processes,

reflect on how they acquire knowledge, and evaluate the effectiveness of their strategies. In MPU subjects, this could mean that students not only learn about historical or ethical content but also reflect on how their own cultural background, personal values, and prior knowledge shape their interpretations. VR can enhance this reflective process by allowing students to revisit simulations, analyze their decisions in ethical dilemmas and adjust their reasoning in subsequent attempts. Such opportunities foster self-regulated learning, where students take greater responsibility for their intellectual growth, ultimately cultivating independent, critical and lifelong learners.

5.2 Virtual Reality in Education

Virtual Reality technology has evolved as a powerful tool for immersive experiential learning. By simulating authentic environments, VR enables learners to engage multiple senses, explore complex scenarios and receive immediate feedback (Freina & Ott, 2015). In medicine, VR allows students to practice surgical procedures safely; in architecture, to explore designs at full scale; and in history education to virtually visit ancient sites otherwise inaccessible (Radianti et al., 2020).

Studies confirm VR's efficacy in enhancing student motivation, retention and higher-order thinking skills (Makransky et al., 2019) Meta-analyses by Merchant et al. (2014) and Wu et al. (2020) further confirm that immersive VR has a significant positive impact on learning outcomes, particularly in higher education contexts. Jensen and Konradsen (2018) also found that VR head-mounted displays significantly improve engagement across diverse learning contexts, while Parong and Mayer (2018) demonstrated that immersive VR can enhance science learning through stronger conceptual understanding. VR's immersive qualities foster presence and emotional engagement, which can lead to more meaningful learning experiences (Dede, 2009). Furthermore, VR supports multiple learning styles like visual, auditory, kinesthetic and making it inclusive and adaptable (Slater & Sanchez-Vives, 2016). Beyond these domains, VR is increasingly applied in general education to enhance engagement, improve content retention and promote critical thinking. The interactive and immersive features of VR align with experiential learning models, providing learners with agency and autonomy in navigating content (Kolb, 1984). Studies confirm VR's efficacy in enhancing student motivation, retention and higher-order thinking skills (Makransky, Terkildsen, & Mayer, 2019). VR's immersive qualities foster presence and emotional engagement, which can lead to more meaningful learning experiences (Dede, 2009). This sense of "presence" helps learners feel cognitively and emotionally embedded in the learning context, reinforcing the authenticity emphasized in constructivist pedagogy (Herrington & Oliver, 2000; Slater, 2009).

For students in Malaysian general studies subjects such as Ethics and Civilization or Moral and Integrity, VR can be used to simulate culturally rich environments, ethical dilemmas or historical reconstructions that encourage reflection, empathy and decision-making. These learning outcomes are difficult to achieve through traditional didactic methods but are highly valued in civic and character education (Dalgarno & Lee, 2010). Additionally, VR environments often integrate formative assessments, real-time feedback and scenario-based tasks that stimulate higher-order thinking as outlined in Bloom's taxonomy (Anderson & Krathwohl, 2001). Nevertheless, challenges remain. The high cost of VR equipment, and potential issue such as unequal access to digital infrastructure can limit implementation. To address these concerns, Malaysian institutions may consider low-cost alternatives such as Google Cardboard and phased pilot programs before full-scale deployment.

In sum, VR serves not only as a technological innovation but as a pedagogical enhancement tool capable of transforming abstract concepts into tangible, emotionally resonant experiences. Its integration into education especially within MPU curricula, provides a pathway to active, student-centered learning consistent with 21st-century educational goals.

5.3 Challenges in Engagement with MPU Subjects

Malaysian General Studies (MPU) subjects often suffer from a lack of student engagement due to several interrelated factors. Firstly, many students perceive MPU subjects such as Malaysian Studies, Ethics and Civilization, and Moral and Integrity as unrelated to their primary academic or career goals. This perception reduces intrinsic motivation and results in surface-level learning strategies. Secondly, MPU courses have traditionally relied on lecture-based delivery and text-heavy materials, which may not resonate with digital-native learners who thrive in interactive and visual environments. The limited use of active learning methods reduces opportunities for students to critically engage with historical, ethical and cultural content. Thirdly, assessment methods in MPU subjects often focus on factual recall rather than analytical thinking or real-world application. This limits students' ability to connect abstract ideas with lived experiences, further reinforcing the view that MPU subjects are unimportant.

These challenges necessitate a pedagogical shift towards innovative methods that emphasize student agency, contextual learning and emotional engagement such as Virtual Reality (Radianti et al., 2020). Several countries have successfully integrated Virtual Reality into social science education to foster critical thinking, empathy and contextual understanding. In the United States, universities have employed VR to simulate sociological environments and cultural immersion experiences. For example, Stanford University's Virtual Human Interaction

Lab developed VR simulations that allow students to experience social inequality and enhance their understanding of systemic issues. In the United Kingdom, institutions have used VR to teach Political Science by simulating parliamentary debates and international negotiations, promoting deeper comprehension of governance structures and diplomacy. In South Korea, VR is integrated into history and ethics curricula by allowing students to virtually experience historical events such as wars, peace treaties and social movements. These immersive experiences increase student engagement and help contextualize abstract socio-political concepts. These international implementations demonstrate the transformative potential of VR in enriching social science education. They also provide a benchmark for Malaysia to model its own VR-based innovations within MPU subjects.

In Malaysia, studies reveal that students often regard MPU subjects as peripheral and outdated, lacking relevance to their academic and professional futures. Traditional lecture-based pedagogy exacerbates disengagement, limiting opportunities for active exploration or critical reflection. The challenge lies in repositioning MPU content as relevant, dynamic and impactful to foster intrinsic motivation and deeper learning. Immersive learning technologies such as VR offer promising solutions by transforming abstract concepts into tangible experiences. By situating learning in contextualized environments, VR can bridge the gap between theory and practice, enhancing students' connection to Malaysian heritage and ethical values.

In the Malaysian context, previous studies have noted that students often describe MPU classes as 'boring' or 'repetitive,' indicating a disconnect between course design and learner expectations (Zaid Ahmad & Othman, 2017). Addressing this perception through innovative technologies like VR can reposition MPU subjects as dynamic, relevant and impactful for students' personal and professional growth.

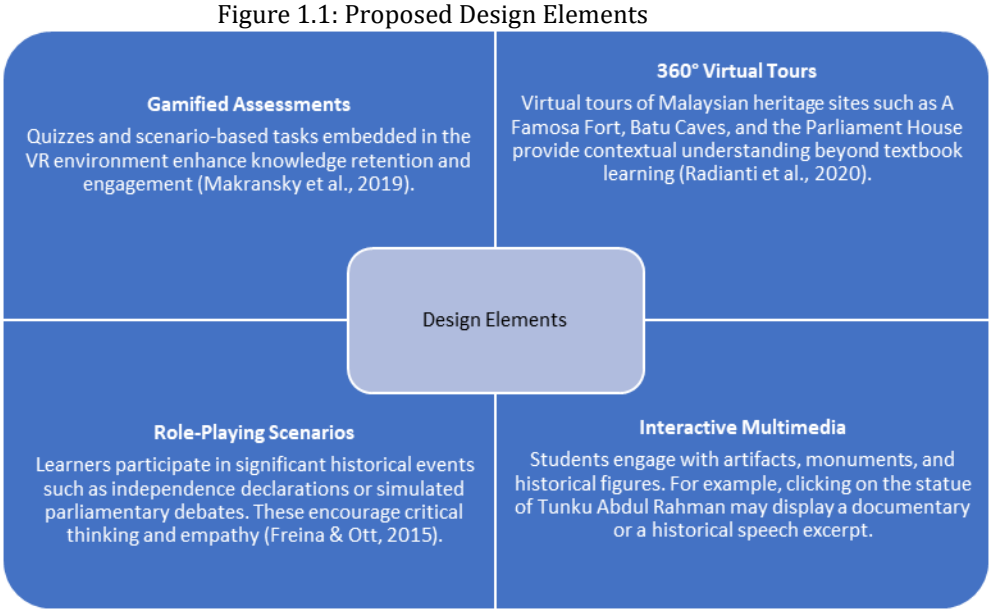
6. Conceptual Framework for VR-Based MPU Engagement

This section outlines a proposed conceptual framework for integrating Virtual Reality (VR) into Malaysian General Studies (MPU) subjects, informed by constructivist learning theory. The framework is designed to address challenges in student engagement by providing immersive, experiential learning environments aligned with MPU content.

6.1 Framework Design Elements

The conceptual framework includes several design elements that support constructivist principles. These elements enable students to actively construct knowledge through immersive exploration, reflection and interaction with historical, ethical and cultural content. Key features include gamified assessments, 360-degree virtual tours, role-playing scenarios and interactive multimedia (Figure 1.1).

Figure 1.1: Proposed Design Elements



In the context of Malaysian general studies, Virtual Reality (VR) can be effectively implemented through various interactive features that promote deeper engagement and contextual understanding. Based on Figure 1.1 above, one approach involves 360-degree virtual tours of iconic national heritage sites such as A Famosa Fort, Batu Caves and the Parliament House, allowing students to explore these locations virtually and gain insights that extend beyond traditional textbook content (Radianti et al., 2020). Another feature includes interactive multimedia elements, where learners can engage with digital replicas of monuments, artifacts and historical personalities. For instance, selecting a virtual statue of Tunku Abdul Rahman might trigger a video clip of a historic

speech or a documentary segment. Additionally, role-playing scenarios immerse students in pivotal moments of the nation's history such as reenacting the proclamation of independence or participating in a mock parliamentary session which fosters both critical thinking and emotional connection to the subject matter (Freina & Ott, 2015). To further support learning outcomes, gamified assessments such as quizzes and problem-solving tasks can be embedded within the VR environment, reinforcing content retention and increasing learner motivation (Makransky et al., 2019).

In terms of pedagogical mapping, each VR design element should be explicitly aligned with specific MPU learning outcomes. For example, 360° virtual tours can be mapped to cultural and historical awareness outcomes, while role-playing scenarios align with ethical reasoning and civic engagement. Such alignment ensures that VR activities are not merely technological add-ons but purposeful pedagogical strategies that directly address course objectives (Herrington & Oliver, 2000; Anderson & Krathwohl, 2001). In addition to gamified quizzes, formative assessments such as reflective journals or collaborative debriefing sessions can be integrated after each VR session. These encourage students to critically analyze their virtual experiences, articulate insights and connect them to theoretical content. Research indicates that structured reflection significantly enhances knowledge retention and critical thinking in immersive learning environments (Makransky et al., 2019; Dalgarno & Lee, 2010).

These design elements also map onto Bloom's taxonomy of cognitive processes, progressing from basic recall in gamified quizzes to higher-order skills such as analysis, evaluation and creation in role-playing scenarios. This structured progression ensures that VR-based learning does not only entertain but also systematically builds knowledge and critical skills.

6.2 Implementation Considerations

To ensure practical application, the proposed framework considers accessibility and scalability. The modules are designed to be compatible with both dedicated VR hardware (e.g., Oculus Quest) and affordable alternatives (e.g., Google Cardboard). This flexibility enables broad adoption in Malaysian higher education institutions regardless of infrastructure or budget. Implementation also includes training for educators to integrate VR effectively into their teaching strategies along with technical support for smooth deployment (Bower et al., 2017). The modular format allows phased implementation and iterative refinement based on feedback from students and instructors.

Beyond hardware compatibility, ensuring accessibility also requires consideration of software usability and user experience design. VR content must be intuitive with clear navigation and instructions tailored to learners with varying degrees of digital literacy. This is particularly important in multicultural classrooms where language proficiency and technological familiarity can vary widely. Designing content that is culturally sensitive and inclusive will further support equitable learning opportunities and encourage wider acceptance of VR-based modules. Scalability is another critical factor. As adoption expands across universities and colleges, centralized platforms or learning management systems (LMS) that host VR modules can facilitate consistent content delivery and updates. Cloud-based VR applications may offer additional benefits by reducing local hardware demands and simplifying maintenance. However, reliable internet access and bandwidth must be ensured especially in remote or underserved areas to avoid exacerbating educational inequalities.

Professional development for educators is essential to successful implementation. Workshops, tutorials, and ongoing support should be provided to build instructors' confidence and competence in integrating VR into their pedagogy. This includes training on technical operation as well as strategies for aligning VR experiences with learning outcomes and assessment methods. Collaborative communities of practice can also be fostered to share best practices, troubleshoot challenges, and innovate together.

Finally, iterative evaluation mechanisms should be embedded throughout the implementation process. Collecting qualitative and quantitative feedback from both students and educators will help identify usability issues, pedagogical effectiveness and engagement levels. This data-driven approach enables continuous refinement of VR modules, ensuring they remain relevant, impactful and aligned with evolving educational needs. By carefully addressing these implementation considerations, VR can be sustainably integrated into Malaysian general studies to enhance learning experiences at scale.

A critical component of the framework is the inclusion of systematic evaluation and continuous improvement mechanisms. VR-based MPU modules should be assessed not only for their technical performance but also for their pedagogical impact such as student engagement levels, knowledge retention and development of critical thinking. Mixed-method approaches, combining surveys, focus groups and performance analytics from VR platforms can provide a holistic picture of effectiveness. Insights gained from these evaluations can guide iterative refinements of content, user experience, and assessment design, ensuring that the modules remain relevant and impactful. Embedding such evaluation cycles within the framework will also help institutions demonstrate accountability and evidence-based improvements which are essential for long-term sustainability.

Successful implementation requires alignment with national higher education policies and institutional strategies for digital innovation. The Malaysia Education Blueprint 2015–2025 (Higher Education) explicitly

highlights technology-enhanced learning as a driver for future-ready graduates (MOHE, 2015). Embedding VR within MPU teaching aligns with these priorities and strengthens institutional justification for resource allocation. Other than that, equity must remain central to implementation, particularly in ensuring that students from rural and underprivileged backgrounds can access VR-enhanced MPU modules. Providing low-cost VR options (e.g., smartphone-based headsets) and ensuring compatibility with multiple devices can prevent the digital divide from widening. Inclusive content design considering language, cultural sensitivity and accessibility for differently abled students further ensures that all learners benefit from these innovations (Slater & Sanchez-Vives, 2016; UNESCO, 2020).

7. Expected Outcomes and Benefits

The integration of VR grounded in constructivist theory is expected to yield multiple educational benefits in various aspects. It is anticipated to generate a range of educational benefits, particularly in enhancing the teaching and learning of general studies (MPU) subjects. Firstly, VR is expected to significantly increase student engagement by providing immersive experiences that capture attention and sustain interest and also addressing the common issue of student disengagement in MPU courses (Freina & Ott, 2015). Secondly, the use of active, multisensory exploration promotes deeper cognitive processing, thereby improving understanding and long-term retention. As learners construct knowledge through direct interaction with virtual environments rather than passive reception, their ability to grasp complex historical, ethical and cultural content is enhanced (Makransky et al., 2019; Piaget, 1950).

Additionally, critical thinking skills are fostered through role-playing simulations and contextual scenarios that require students to evaluate historical events and ethical dilemmas from multiple perspectives. These tasks support the development of higher-order thinking, which is essential for effective civic education (Vygotsky, 1978). Moreover, VR allows students to "experience" significant moments in Malaysian history and culture, thereby cultivating empathy, strengthening cultural understanding and promoting a deeper appreciation for diversity. This experiential approach contributes to a stronger sense of national identity and social cohesion (UNESCO, 2020). Lastly, VR environments support inclusivity by catering to various learning styles such as visual, auditory and kinesthetic, making MPU subjects more accessible and equitable for all students (Slater & Sanchez-Vives, 2016).

In addition to these cognitive and affective benefits, the integration of VR into MPU subjects also supports the development of transferable skills that are highly valued in the workplace. As students navigate immersive environments, collaborate with peers in virtual scenarios and engage in problem-solving tasks, they build competencies in digital literacy, communication and teamwork. These skills are not only essential for academic success but also for employability in a globalized workforce that increasingly relies on technology-driven collaboration. By aligning MPU outcomes with broader graduate attributes such as adaptability, creativity and digital fluency, VR-enhanced learning can contribute to producing future-ready graduates who are equipped to meet the challenges of the Fourth Industrial Revolution.

8. Discussion

The application of VR in Malaysian General Studies aligns with global trends toward digital literacy, experiential learning and student-centered pedagogy (Dede, 2009; UNESCO, 2020). Across the world, countries such as the United States, South Korea and the United Kingdom have showcased VR's transformative potential in education (Radianti et al., 2020). For example, the Virtual Reality in Education project at Stanford University allowed students to explore complex scientific concepts interactively, resulting in higher engagement and improved conceptual understanding (Dede, 2009). Similarly, South Korea's use of VR in history education enabled immersive reenactments of historical battles and cultural sites which heightened student interest and fostered critical reflection on historical events. Similarly, Liu et al. (2017) emphasize that VR and augmented reality are powerful tools to support experiential learning across disciplines, further supporting the case for VR integration in MPU education. These international precedents highlight how VR can make learning more interactive and personally relevant, moving students beyond rote memorization to deeper cognitive and affective engagement.

In Malaysia, although VR initiatives in education are still in their nascent stages, early projects indicate significant promise. Pilot implementations such as virtual tours of Malacca's heritage sites have been positively received by both students and educators, demonstrating VR's potential to enrich cultural and historical learning. However, expanding VR adoption faces several challenges including limited funding, inadequate technical infrastructure and the need for professional development to prepare educators for effective VR integration (Zaid Ahmad & Othman, 2017). Addressing these obstacles will be crucial for the sustainable scaling of VR-enhanced learning experiences across Malaysian institutions. From a theoretical perspective, the alignment of VR with constructivist learning theory is critical. VR's immersive, experiential nature enables students to construct knowledge actively, supporting meaningful learning that is personally relevant and socially situated (Bruner, 1996; Vygotsky, 1978). This pedagogical shift is particularly important in multicultural Malaysia, where understanding diverse historical narratives and ethical perspectives is vital for social harmony.

The integration of gamification within VR addresses motivational challenges by introducing elements of competition, achievement, and narrative engagement, which have been shown to improve educational outcomes in digital learning environments (Deterding et al., 2011). General studies subjects such as Malaysian Studies, Ethics and Civilization, and Moral and Integrity are often perceived by students as secondary compared to their core disciplines. This paper proposes the innovative use of Virtual Reality (VR) technology, grounded in constructivist learning theory to enhance student engagement and deepen understanding. By creating immersive and interactive experiences tied to historical, cultural and social science content, VR can transform passive learning into active and meaningful exploration. This approach not only modernizes the learning environment but also revitalizes students' appreciation for MPU subjects and promoting lifelong learning and civic awareness.

From a theoretical standpoint, the compatibility of VR with constructivist learning principles is central to its educational effectiveness. VR's immersive and experiential design allows students to actively construct knowledge through meaningful interactions within authentic contexts rather than passively receiving information (Bruner, 1996; Vygotsky, 1978). This active engagement aligns with constructivism's emphasis on social interaction, reflection and the building of mental models which are particularly important in Malaysia's multicultural society. Here, VR can help students appreciate diverse historical narratives and ethical viewpoints, fostering social harmony and intercultural understanding.

Moreover, integrating gamification elements such as challenges, rewards, and storytelling within VR environments addresses motivational issues often encountered in MPU subjects. Gamification has been shown to increase learners' intrinsic motivation, persistence and enjoyment which can lead to improved educational outcomes in digital contexts (Deterding et al., 2011). By making learning engaging and rewarding, gamified VR can help students connect emotionally and intellectually with the material and promoting sustained interest in subjects that are often undervalued.

At a policy level, the Ministry of Higher Education can play a critical role by providing funding, guidelines and support for VR integration. Ensuring equity is also essential, rural universities and underprivileged students must be given equal opportunities to access VR-enhanced learning. Beyond MPU subjects, the framework proposed here can also be adapted for other disciplines such as tourism, heritage studies and ethics education.

In summary, leveraging VR technology grounded in constructivist theory presents a compelling opportunity to enhance Malaysian general studies education. It offers an innovative pathway to overcome disengagement, enrich cultural understanding and develop critical citizenship skills. As the educational landscape evolves, embracing such technology-driven pedagogies will be essential to prepare students for the complexities of the 21st century.

9. Conclusion

The innovative use of Virtual Reality technology, grounded in constructivist learning theory, offers a transformative approach to enhancing engagement in Malaysian General Studies (MPU) subjects. By enabling immersive, interactive exploration of historical, ethical and cultural content, VR modules can shift student perceptions of MPU courses from obligatory requirements to meaningful educational experiences. This pedagogical innovation promises increased student motivation, deeper retention, critical thinking skills and cultural empathy which are the key competencies for Malaysia's diverse and rapidly evolving society. Strategic implementation, supported by training and infrastructure development will be essential to realize the full potential of VR-enhanced MPU education. As Malaysia embraces digital transformation, VR offers an effective means to revitalize general studies, ensuring these foundational subjects remain relevant, engaging and impactful for future generations. Looking ahead, VR is only one step in the digital transformation of education. Future innovations such as Augmented Reality (AR), Mixed Reality (MR) and Artificial Intelligence (AI) driven personalization hold further potential to enrich MPU learning, ensuring these subjects remain engaging and relevant in a rapidly evolving global context.

Online License Transfer

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Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm sole responsibility for the preparation of this manuscript.

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